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TABLE OF CONTENTS:

1. Introduction	1
2. Literature review	5
2.1. The history of studies on life satisfaction	5
2.2. Measuring and modelling subjective well-being	7
2.3. Empirical research on determinants of life satisfaction	12
2.3.1. Demographic and personality factors	12
2.3.2. Economic factors	17
2.3.3. Political factors	22
2.3.4. Cultural differences	25
3. Research hypotheses	27
4. Methodology	31
5. Description of the data set and variables	35
5.1. The data set	35
5.2. The analysis of variables	37
5.2.1. Dependent variable	37
5.2.2. Continuous explanatory variables	37
5.2.3. Binary explanatory variables	40
5.2.4. Discrete explanatory variables	43
6. Estimation results and model diagnostics	49
6.1. Model estimation	49
6.2. Model diagnostics	51
6.3. Measures of model fit	52
6.4. Partial effects for the general model	53
6.5. Stability of parameters across gender groups	55
7. Verification of the hypotheses	61
8. Conclusions	69
9. References	73
10. Appendix	85
10.1. Zusammenfassung	85
10.2. Abstract	85
10.3. Curriculum Vitae	86

1. INTRODUCTION

Life satisfaction is often regarded as an ultimate goal in human life. Following Frey and Stutzer (2002a, p. 25), it is assumed that everybody aims to feel happy with a unique characteristic of happiness being the goal shared by such a large number of people. Its uniqueness enhances the fact that the attitude towards life satisfaction has not changed substantially since ancient times. Thoughts of philosophers from this period confirm that happiness was then also highly desired and thinkers introduced various approaches to define happiness and to determine how to achieve it.

The first considerations on happiness date back to early Greek philosophy, in which happiness was a primary matter (Malhotra, 2007, p. 13). Plato maintained that happiness means harmony of a human soul. Aristotle introduced an ethical concept, according to which individual well-being could be reached through correct actions. In the view of the latter philosopher happiness represents the “*summum bonum*”, which means the supreme good (Myers and Diener, 1995). The Roman philosopher Cicero expressed the ancient Greek approach to happiness in the following sentence: “There is no fool who is happy, and no wise man who is not” (cited by Malhotra, 2007, p. 13), which indicates that life satisfaction stems from an intelligent reflexion about life in the view of thinkers from this period.

Today’s definitions of happiness refer to a broader concept of subjective well-being and consider happiness a measure of one of its components. According to Diener, Lucas and Oishi (2002, p. 63), subjective well-being is an individual’s evaluation of life in two dimensions, to which belong affect and cognition. Affect represents an instant assessment of events with regard to experienced moods and emotions, whereas cognition touches the intellectual and rational aspects of the evaluation. The cognitive component is usually measured with life satisfaction, commonly called happiness in the literature. Some scientists disagree about the synonymic meaning of both terms, however, the majority of academics uses them interchangeably. For the needs of this work, these words are treated as synonyms.

Shin and Johanson (1978, p. 478) define life satisfaction as a global individual evaluation of life quality. A similar explanation is proposed by Diener (2006, p. 401), who describes life satisfaction as “a report of how a respondent evaluates or appraises his or her life taken as a whole”. An important aspect of the assessment, emphasised by Shin

and Johanson and Frey and Stutzer (2001, pp. 11-12) is a comparison of the own situation with an individually set standard. It is the essence of the subjective evaluation.

On the other hand, Frey and Stutzer (2001, p. 3) allege that everyone should define the word “happiness” on their own, since it has different meanings to various people. The authors say that no agreement among scientists has been reached in defining the term. Everybody perceives happiness differently, therefore, there is no sense in endeavouring to compose one unified definition.

Since the times of ancient Greek philosophers numerous theories indicating sources of happiness have been formulated, which Diener et al. (2002, p. 66) categorise into three groups. The first one gathers need and goal satisfaction theories, which assume that people reach happiness as they succeed in coming closer towards an ideal state when goals are achieved and needs are met. The second category of process and activity theories underlines the role of involvement in activity to approach a desired level of happiness. The last group is composed of genetic and personality predisposition theories, according to which happiness is an inherent characteristic of some people.

The large number of theories concerning life satisfaction results from the fact that questions about happiness have been broadly asked in numerous theoretical dissertations. Since ancient times people have wondered how to make their life happy. Myers and Diener (1995, p. 10) conclude that “theories about happiness are ages old”. However, empirical investigation of the issue by economists has a much shorter history in the literature, beginning in the third decade of the 20th century. In earlier years the field of science was examined mainly by philosophers and sociologists. Frey and Stutzer (2005, p. 208) venture to call the empirical studies on life satisfaction “one of the most stimulating new developments in economics” in recent times. The authors accentuate the significance of research in this area, since according to them happiness is one of the most essential aspects in human life. The potential of the life satisfaction studies is really high, as they can provide new insights in numerous directions.

At first, examination of happiness offers a complementary approach to traditional measures of life quality based on macroeconomic indices. The standard measures, which use socio-economic data such as GDP, inflation or the unemployment rate, are necessary to evaluate the current situation, however, they do not contain sufficient information. Broader indicators of happiness enrich the overall analysis of life quality by providing new perspectives to look at the issue, and identifying domains in which people feel happy and unhappy. Scientists emphasise, however, that the new indices of happiness should not

replace the traditional measures, but complement them, since none of these methods is fully accurate.

Many developed countries around the world have turned their attention to happiness indicators to have a broader look at the life quality of citizens and to evaluate policy recommendations on their basis. Introducing these measures in different countries could enable international comparisons of well-being. In order to make the comparisons between countries possible, the Organisation of Economic Cooperation and Development is preparing special instructions on how to measure life satisfaction to harmonise various approaches across National Statistics Offices. International comparisons may appear helpful to guide the development of countries in an appropriate direction.

A thoughtful diagnosis which takes into account both socio-economic measures as well as happiness indicators may be used as a good source of information for policy makers responsible for the formulation and introduction of reforms influencing conditions of life of citizens. The broad analysis of a current situation based on complementary indices is more likely to suggest correctly the spheres that need interventions. Moreover, it might make policy making closer to the preferences of citizens. One could, however, question this benefit from happiness research, since life satisfaction may be independent of domains affected by policy makers. According to Diener (2000, p. 40), this doubt should be rejected, because the level of happiness is not only the effect of inborn temperament, and it can be influenced by life conditions.

Referring to Diener (2000, p. 41), the national index could also have an educational function for the society, since information that it provides may help in individual decision making to lead people towards an optimal balance of work, leisure, social contacts and religious engagement in their life. Czapiński (2011, pp. 13-14) emphasises the informational role of data on life satisfaction, which could give the society a true picture of their everyday reality. According to the author, honest information about the issue is really needed, because people usually have false perceptions about their life situation in comparison with others. The untrue image of life quality results from stereotypes, selective observations and a partial picture of a current situation presented in media. Czapiński claims that happiness data could be one of the sources of honest information.

Additionally, research on life satisfaction offers a new approach to test theoretical assertions. An empirical perspective in happiness studies gives a new insight into the old theories and allows theoretical conclusions to be tested on real data. It also provides an

opportunity to investigate problems, which were previously difficult, or even impossible, to examine empirically. Therefore, happiness studies could answer a lot of important questions.

The benefits from happiness research enumerated above confirm the high significance of scientific development of this area of economics. The study presented in this thesis contributes to the existing literature on life satisfaction, since its aim is to identify demographic and economic factors that influence happiness of Polish people. The investigation is conducted on the basis of an ordered logistic regression using cross-sectional data from the Social Diagnosis for the year 2011.

The research will provide information on the determinants of happiness of Polish people, which may appear useful in the development of happiness indicators for Poland. An answer to the question of the factors affecting happiness is crucial, as it indicates how the situation could be improved. It may yield essential information for policy makers concerning which reforms would be most beneficial for society in terms of happiness. The research provides not only general information about the state of happiness of the Polish society as a whole, but the thesis also presents statistical data for particular groups, which offers a broader look at the issue. Moreover, it seems that there is lack of current studies examining econometrically factors influencing life satisfaction for Poland, which enhances the relevance of the research discussed in this thesis. This examination also enables one to test assertions about happiness determinants resulting from previous studies for different countries. It provides an opportunity to check if life satisfaction of Polish people is affected by similar aspects.

The remainder of the thesis is organised as follows. Section 2 presents theoretical considerations and empirical studies devoted to the issue of life satisfaction. In Section 3 the research hypotheses are introduced, while Section 4 discusses the methodology applied to test them. Section 5 contains a description of the data set and the variables used in the research, with the results and diagnostics presented in Section 6. Section 7 verifies the research hypotheses. Conclusions are included in Section 8.

2. LITERATURE REVIEW

2.1. The history of studies on life satisfaction

Utilitarians are regarded as the forerunners of scientists investigating the issue of happiness (Diener et al., 2002, p. 63). Jeremy Bentham, a British philosopher, known as a founder of classical utilitarianism, defined a good life as a state with pleasure and without pain. The first empirical studies on subjective well-being appeared in the third decade of the 20th century. One happiness researcher of this time was Flügel, who in 1925 developed a method to examine the impact of pleasant and unpleasant events on human moods, emotions and thoughts (Mizrachi, 2010, p. 25). However, investigation of life satisfaction in this period was scarce. The end of World War II brought more intensive development of analyses of individuals' subjective well-being. Then there also appeared the first surveys to measure happiness on a large scale, of which Gallup was a pioneer (Diener et al., p. 64).

Life satisfaction has been for a long time mainly a subject of examination of psychologists, sociologists and political scientists, whereas economists have seen no need in investigating the issue and measuring utility (Stutzer and Frey, 2010, p. 679). Economists have thought that conclusions drawn from the revealed preference theory have been enough to infer individual's utility on the basis of their choices. Sen (1987) has attributed economists' reluctance to examine life satisfaction to the general conviction that "choice [...] is the only human aspect that can be observed" (p. 18). Decisions made by individuals have been found to be a good source of information on their utility, since the theory relies on the concept of "homo economicus" introduced by Mill (Szacki, 2002, p. 263). According to this approach, humans are perfectly rational and strictly self-interested, so their choices reflect their pursuit to maximise utility.

The standard theoretical assumptions came in for a lot of criticism in the following years. Scitovsky (1976) claims that "it seemed to rule out – as a logical impossibility – any conflict between what man chooses to get and what will best satisfy him" (p. 4). Querying the assumptions of the standard economic theory by social scientists have changed economists' attitudes to studies on life satisfaction. Discussions of Kahneman and Smith have opened a way towards reconsideration of classical assumptions. Kahneman (1994), a behavioural economist, has questioned the correctness of the

rationality assumption. Smith with other scientists has presented a model, which casts doubt on the self-interest assumption, since it shows that people share their own gains with others (Hoffman, McCabe and Smith, 1996). The vivid discussion among scientists on the possibilities of changing the assumptions of “homo economicus” began in 1990s. Until this time, few economists worked on the issue.

The first economic study devoted to happiness was an article by Easterlin published in 1974. The researcher examined mainly the relationship between income and life satisfaction on the basis of nineteen countries from different continents and formulated a theory known today as the “Easterlin paradox”. The paradox indicates that average life satisfaction of individuals within a given country remains constant over time despite increasing income per capita, whereas numerous studies on micro data display a positive correlation between the two variables. The paradox appears because people take into account their relative financial situation compared to a reference standard or a norm instead of considering own income in absolute terms when judging their happiness. Therefore, raising income of all individuals does not make them happier. What improves life satisfaction is when income increases relatively higher in comparison with other people.

In the next decade the study of Easterlin did not find many followers who investigated the issue of happiness from the economic perspective. One of the main catalysts of studies in this field was a small symposium of the *Economic Journal* in 1997, during which researchers came back to the problems raised by Easterlin (Frank, 1997; Ng, 1997; Oswald, 1997). The studies corroborated Easterlin’s theory and concluded that income influences life satisfaction significantly up to a point when it exceeds the level of fulfilling basic needs. After this point, mainly changes in the relative income have an impact on happiness. The symposium increased researchers’ awareness of the relevance of studies on life satisfaction, which has resulted in numerous publications on this topic.

Among the factors that have contributed to the intensive growth of studies on subjective well-being, Diener et al. (2002, p. 64) enumerate also the change in the attitude of citizens of Western countries in the pursuit of a good life associated with their achievement of a high level of development of the economies. These nations no longer have to care about meeting their basic needs, which allows them to seek other factors that could improve their life satisfaction.

Due to the issues mentioned above since the 1990s. there has been an observable growing interest of economists to deepen the knowledge on subjective well-being. As a

result, there have appeared numerous publications in the field and scientists have started to work intensively to improve the methods of measuring and collecting data about individuals' happiness. The next section discusses the aspects related to the measurement of subjective well-being.

2.2. Measuring and modelling subjective well-being

In 1881, the optimistic economist Edgeworth believed that “an ideally perfect instrument”, called by himself a “hedonimeter”, “continually registering the height of pleasure experienced by an individual” (Edgeworth, 1881, p. 101) can be used to measure happiness. Although this device has not been invented, Frey and Stutzer (2005, p. 209) underline that over the past years there has been exceptional progress in the measurement of life satisfaction, which has contributed to the value of research on subjective well-being.

Different methods have been developed to measure an individual's life satisfaction. The most popular are representative surveys which provide scientists with information about global evaluation of happiness within a given society. Another possibility to assess individuals' life satisfaction is the Experience Sampling Method proposed by Csikszentmihalyi, Larson and Prescott in 1977 (Conner, Tennen, Fleenon and Barrett, 2009). The method allows one to collect data on individuals' real experience at particular times in their natural environments. Quite recently Kahneman, Krueger, Schkade, Schwartz and Stone (2004) have suggested the Day Reconstruction Method which assumes ranking events and activities undertaken by an individual during the previous day according to satisfaction which they provided. The most technically advanced method relies on investigation of the brain activities with the use of the functional magnetic resonance.

The majority of economic analyses of life satisfaction have been performed on the basis of global evaluations of individuals' happiness inferred from surveys. Developments in the construction of surveys have allowed for the collection of data on representative populations and for the approximation of individuals' level of life satisfaction. Data availability has allowed researchers to conduct empirical analyses of happiness, which are discussed later in the chapter.

Surveys are perceived as a good method of collecting data on individuals' utility, since they provide researchers with information on the evaluation of a current situation of

a person directly involved (Stutzer and Frey, 2010, p. 680). As argued in the previous part of the chapter, the observation of individuals' behaviour may lead to incorrect conclusions about their utility, because their choices could be influenced, *inter alia*, by bounded rationality and other-regarding preferences. People are seen as the best judges of their well-being, and therefore respondents are directly asked how satisfied they feel with their current life in surveys. In their answer they usually need to indicate an appropriate level of life satisfaction based on a given scale. Self-reported measures are considered today by researchers as the most accurate empirical estimation of individuals' happiness (Worell, 2002).

Together with a rising awareness of the need for studies on subjective well-being, numerous surveys have been designed to measure self-reported happiness. To enumerate the most well-known examples, one could mention the Euro-Barometer, the German Socio-Economic Panel and the Satisfaction With Life Scale proposed by Diener, Emmons, Larsen and Griffin (1985). The last method of measuring individual happiness stands out from the other two, since it is a multiple-item instrument to assess life satisfaction. The Euro-Barometer and the German Socio-Economic Panel include a single question concerning how a person feels satisfied with their life, whereas the Satisfaction With Life Scale measures happiness on the basis of five statements to which respondents answer on a seven-point scale.

A main concern of researchers is the validity of self-reported happiness, since it is an essential condition that has to be met to conduct analyses on the data obtained via surveys. Numerous research indicates that the measures of well-being correlate with different individual characteristics related to happiness, which proves their validity. Pavot, Diener, Colvin and Sandvik (1991) show high convergence of self-reported happiness with the opinion of other people about the level of life satisfaction of a particular person. People who evaluate themselves as satisfied with their life are usually considered as happy by their closest friends and family members. Seidlitz and Diener (1993) claim that happy people recall easier positive memories than negative. Fernandez-Dols and Ruiz-Belda (1995) affirm that people with higher self-reported life satisfaction smile more often. The works of Myers (1992) and Veenhoven (1988) also indicate a significant correlation of life satisfaction with individuals' nature. Happy people are more energetic, sociable and creative, in contrast to people with a low level of self-reported life satisfaction, who are more often hostile or abusive. Kahneman and Krueger (2006, p. 22)

conclude that “the data are a valid subject for study in the sense that they capture at least some features of individuals’ emotional states”.

With reference to Stutzer and Frey (2010, p. 684), another criterion that should be met by the data on self-reported happiness in order to use them in economic studies is interpersonal comparability. According to Robbins (1938), this condition can never be fulfilled, because even if people are characterised by identical preferences and reactions, they may experience different levels of utility from the same situation. However, if a study does not intend making comparisons of happiness levels between individuals in absolute values, the errors caused by violation of the criterion are not significant (Frey and Stutzer, 2002b, p. 406). Investigation of determinants of life satisfaction is an example of a study which does not require interpersonal comparability of the data. The only important assumption is that higher values of self-reported happiness for a particular person are associated with their higher frequency or inventiveness of feeling positive emotions.

However, if a study compares levels of life satisfaction between different individuals, the data needs to meet the criterion on interpersonal comparability. Frey and Stutzer (2005, p. 210) conclude that economists are lukewarm about the fulfilment of this assumption. However, the problem seems more serious in theoretical dissertations than in the empirical studies. Empirical analyses often investigate groups of individuals and measure the effect of different circumstances on respondents’ happiness. Concentration on groups causes individual oddities that counterweight one another (Stutzer and Frey, 2010, p. 686). In Harsanyi’s opinion (1987, p. 957), “economists and philosophers influenced by logical positivism have greatly exaggerated the difficulties we face in making interpersonal utility comparison”.

There is some research which suggests that self-reported happiness can be compared between different people. One of the examples of such analyses is a study by van Praag (1994, p. 95) who proves that a sequence of verbal labels referring to different states of life satisfaction is similarly understood by all individuals in the sample. The researcher also displays the possibility of translating the verbal label sequence into numerical figures or on a line scale. According to his examination both mechanisms of translations are uniform over the respondents. Kahneman (2000) also analyses the issue on the basis of patients’ feelings and reactions to a painful medical treatment, which was earlier a subject of study of Redelmeier and Kahneman (1996). The author observes a high correlation between self-reported pain of respondents during the medical procedure

and evaluation of pain of these patients done by assistants seeing the treatment. Moreover, Kahneman notices significant convergence in ranking pain among patients.

Assuming that self-reported happiness is a valid measure on which economic studies can be based, Frey and Stutzer (2005, p. 210) propose a microeconomic model to analyse subjective well-being with the following functional form:

$$W_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (1)$$

where:

- W_{it} - a latent variable of subjective well-being of an individual i at time t ,
- X_{it} - independent variables explaining the level of subjective well-being including socio-demographic and socio-economic features or environmental, social, institutional and economic conditions,
- ε_{it} - an error term,
- α, β - parameters.

This approach enables one to analyse separately the impact of each explanatory variable on subjective well-being. To estimate the model, it is suggested to use the ordered probit or ordered logistic method, since the dependent variable has an ordinal form.

The error term captures unobserved characteristics and measurement errors, which can be a potential source of bias. Stutzer and Frey (2010, p. 686) discern two kinds of errors included in the error term. The first type are white noise errors uncorrelated with the explanatory variables, whereas the errors of the second sort are so called systematic errors related to the independent variables.

An example of the error of the first category is the impact of temporal mood states. Thomas and Diener (1990) present a study, which proves the influence of individuals' present moods on their judgments of life satisfaction. This result indicates that respondents may make little mental effort in the overall assessment of their happiness and do not recall their general state of well-being, but base their responses on a current feeling. However, this kind of error is thought to be random and therefore should not bias the estimation results. The only impact they have on the model is that they lower its statistical fit.

The second type of error causes more serious consequences on the estimation results, since it leads to the bias of outcomes. There are different aspects which could occasion these errors. Firstly, the order of questions in a questionnaire may influence individuals' self-reported happiness. For instance, if a question about life satisfaction is

preceded by asking about an assessment of living conditions, the data on self-reported happiness can be systematically biased. Such an example shows how important a proper construction of the survey is.

Secondly, Schwarz and Strack (1999) point out that the social desirability of particular answers often has a significant impact on the results of surveys. Respondents before giving an answer may rethink their personal assessment of their happiness according to what is socially desirable. The authors say that the effect is particularly explicit in face-to-face interviews. Diener and Oishi (2004) show that different societies assign various weights to the meaning of life satisfaction in their everyday life. According to their work, happiness is a more important value for inhabitants of Latin America than for people living in the Asian countries by the Pacific Ocean. Therefore, individuals from societies where life satisfaction is valued higher may have a tendency to report higher happiness levels, since they perceive it as desirable.

Furthermore, measurement errors may correlate with individual characteristics. As an example, Frey and Stutzer (2002b, p. 407) discuss the differences in self-reported life satisfaction for people at different ages. Young respondents often declare lower happiness than old individuals. Apart from the reason that young people may be less satisfied with life, the difference may have its basis in a change of the attitude towards reacting to questions about subjective well-being. The only solution to the possible bias is the appropriate composition of psychological tests.

Another issue that leads to systematic errors are unobserved personality traits which are correlated with individual characteristics of the respondents and self-reported happiness. For instance, Argyle (1999) finds that people who engage in voluntary work usually feel more satisfied with their life. However, it does not inevitably mean that voluntary work increases the level of happiness. There may be an unobserved personality feature such as extroversion that could bias the results. Referring to DeNeve and Cooper (1998), extroverted people usually experience higher life satisfaction. At the same time such people more often decide to do voluntary work, which leads to biased outcomes of estimation. Frey and Stutzer (2002b, p. 407) argue that since the individual effects are constant in time, analyses based on panel data could exclude the risk of bias. This method allows one to control for time-invariant unobserved individual features.

Although the last two decades have witnessed great progress in this field of economics, there is still a great need for further investigation and development of methods to measure and model subjective well-being. The majority of today's research,

whose findings are discussed in the next section, is based on the data collected via surveys. The following part describes various approaches and conclusions drawn from analyses of determinants of subjective well-being.

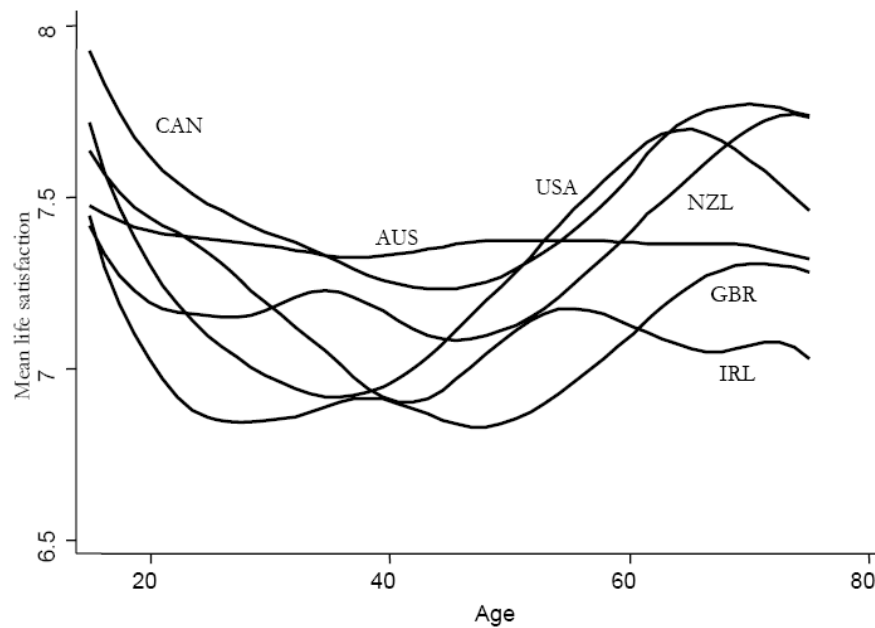
2.3. Empirical research on determinants of life satisfaction

Happiness functions described above have been estimated by numerous researchers using different types of data. Some studies are based on individual data, others on aggregate data. Investigations of the level of happiness are performed on information collected in various cultures. Analyses on panel data are more popular, though there exist a large number of studies based on cross-section data. Referring to the previous examinations, Frey and Stutzer (2002a, p. 27) distinguish three kinds of factors that influence life satisfaction. Firstly, happiness is determined by demographic and personality characteristics, to which belong inter alia age, gender, education, marital status, nationality and health. Secondly, economic aspects have an impact on life satisfaction. The category consists of factors such as income, unemployment and inflation. Institutional factors, which include the extent of governmental decentralisation and the scope of citizens' rights to participate in politics, constitute the third group of determinants. Results of previous research on the impact of individual variables on happiness are described in the following sections dedicated to the mentioned categories.

2.3.1. Demographic and personality factors

This sector summarises the most common demographic and personality factors, which are widely studied by numerous researchers. One such characteristic is age. Frey and Stutzer (2002a, p. 28), encapsulating results of different investigations of the effect of the variable on happiness, conclude that the relationship between age and life satisfaction is U-shaped (e.g. Blanchflower and Oswald, 2008; Clark, 2007). Young and old people feel happier in comparison to the middle-aged group. People in the age 30-35 are the least satisfied with their life. The study of Deaton (2007) corroborates these findings for some countries, however, at the same time it emphasises the inconsistency of the relationship across different cultures. Figure 2.3.1.1 depicts the problem.

Figure 2.3.1.1. Relationship between age and life satisfaction in selected countries



Source: Deaton, A. (2007). Income, aging, health and well-being around the world: Evidence from the Gallup World Poll. *NBER Working Papers No. 13317*. Retrieved February 22, 2013, from <http://www.nber.org/papers/w13317>, p. 43.

Deaton (2007) claims that the relationship between age and happiness depends on the level of country development. The U-shaped relationship is observed for citizens' of rich economies, whereas people from low- and middle-income countries report lower happiness as they are getting older. Gwozdz and Sousa-Poza (2010) argue that the inconsistent pattern of Deaton's analysis may be related to missing covariates. In their study based on 13 waves from the German Socio-Economic Panel and the Survey of Health, Aging and Retirement in Europe Gwozdz and Sousa-Poza observe a U-shaped relationship between the two variables for people in the age of 16-65 and a sharp decline in life satisfaction for older individuals. Once the authors control for individual heterogeneity, individuals' happiness remains constant over the whole life cycle. Lelkes (2008) also attributes the unclear relationship between old age and life satisfaction obtained by Deaton to the lack of control variables, since according to her investigation aging does not cause a decline in life satisfaction itself, but the relationship is due to the effect of other factors related to aging such as deterioration of health and lower income. In this study, however, controlling for differences in income results in an evident U-shaped pattern.

Referring to Fitzroy, Nolan and Steinhardt (2011) who examine the impact of age on life satisfaction, it is also worth analysing the determinants of life satisfaction separately for young and old people, because estimation based on the whole sample may lead to incorrect conclusions. Separate regressions for subsamples of individuals from West Germany in the age 18-45 and over 45 have allowed the researchers to observe significant differences in the effect of reference income on happiness of the two analysed groups. The estimation results has indicated that people under 45 experience a significant, positive impact of comparison income on their life satisfaction, whereas the variable has an entirely opposite effect on older individuals. These outcomes show importance of checking stability of estimated coefficients across age groups.

Furthermore, Frey and Stutzer (2005, p. 213) raise the issue of causality in the happiness function. The right hand side variables are assumed to determine life satisfaction which is the dependent variable. However, in contrast to this assumption there can be reverse causality with happiness influencing some of the explanatory variables. Lelkes (2008) investigates the problem with the variable age and checks if happy people are more likely to live longer. The initial estimates show a significant coefficient, with an increase in happiness by one point leading to reduction in death probability of 3.1%. However, further examination proves that the significant value of the coefficient resulted from a lack of information on the health status in the model. Adjustment for health status removes evidence of reverse causality.

Another demographic variable commonly included in studies on the determinants of happiness is gender, though its impact on life satisfaction is usually found to be very small. Wilson (1967), Diener et al. (2002) and Ng, Loy, Gudmunson and Cheong (2009) claim on the basis of available research that no general conclusions about the relationship between gender and life satisfaction can be drawn. Lucas and Gohm (2000) find that there are small differences across genders. Frey and Stutzer (2002, p. 28) conclude that women are generally slightly happier than men, which is also a result of estimation of inter alia Gerdtham and Johannesson (2001) on the data for Sweden, Alesina, Di Tella and MacCulloch (2004) investigating happiness in U.S. and European countries, and Nappo (2010) on a sample of Italian people. Giusta, Jewell and Kambhampati (2011) notice that in the UK average happiness is similar across genders, though there are more pronounced variations in life satisfaction for women. The authors perform separate analyses for both gender groups and observe that various determinants have a different impact for men and women, which indicates that the separate analyses for both groups is worthwhile.

Marital status is a further variable belonging to the group of demographic factors. The majority of previous research shows a clear positive impact of marriage on life satisfaction. With reference to studies of Alesina et al. (2004), Glenn and Weaver (1979), Mastekaasa (1994) and Veenhoven (1984), married people report higher levels of happiness in comparison with never married individuals, whereas never married respondents feel more satisfied with life than previously married people (divorced, separated or widowed). The impact of marital status on self-reported happiness is consistent across different nations, as shown by Diener, Gohm, Suh and Oishi (2000) and Stack and Eshleman (1998). Diener et al. (2002) emphasise that the impact of marriage on life satisfaction can differ for men and women, therefore, the separate analysis for both gender seems necessary.

With respect to this variable, there again arises a question of causality if marriage makes people more life satisfied or if intrinsically happier people get married. The causal relationship is broadly examined by Stutzer and Frey (2006) who ascertain on the basis of longitudinal data from the years 1984-2000 for German residents that the selection effect cannot be excluded. The authors observe that happier people are more likely to get married whereas intrinsically less happy individuals, even before they got married, are characterised by a higher probability of getting divorced. Stutzer and Frey conclude that the selection effect is the strongest for individuals married at a young age and those who marry late. They also notice evident differences in the benefits from marriage between people, which dispose them to the conclusion made earlier by Frey and Eichenberger (1996) that marriage is a “behavioural anomaly”.

An important demographic determinant of life satisfaction is the level of educational attainment. The results of much research (Ferrante, 2009; Gerdtham and Johannesson, 2001; Gray, Kramanon and Thapsuwan, 2008 and Wilson, 1967) indicate that well educated individuals report higher life satisfaction. Diener, Suh, Lucas and Smith (1999) conclude that the correlation between the two variables has often been found to be small, though significant. They explain the positive relationship by the fact that attaining higher levels of education make people closer to achieving their goals. Cheung and Chan (2009) check consistency of the relationship across different nations. Their study includes 35 countries and proves that higher education is related to more happiness. However, some researchers find the impact of education on life satisfaction insignificant, which is the result of investigation of Campbell, Converse and Rodgers (1976) and Nappo (2009).

As mentioned earlier, referring to the study of Lelkes (2008), it is important to include the explanatory variable health when estimating the happiness function. Mroczek and Sapiro (2005) conclude that results of much cross-sectional research indicate that people in good health usually report higher happiness levels. This confirms a summary done by Frey and Stutzer (2002a, p. 28), according to which health problems significantly lower self-reported life satisfaction.

Analysing the impact of health on happiness, there are two aspects emphasised in the literature that should be taken into account. Firstly, some researchers, such as Gerdtham and Johannesson (2001), claim that both health and life satisfaction are endogenous variables. The authors therefore perform their investigation on the basis of a system of equations and distinguish between direct effects of different factors on individuals' life satisfaction and indirect effects of the variables through their impact on health. A second issue concerns the method of measurement of individuals' health. Diener et al. (2002, p. 68) mention that the relationship between the two variables depends on how health status is measured. Self-reported health appears to be a significant determinant of happiness, whereas objective health does not have an important impact on the variability of life satisfaction across individuals. This result is confirmed by the study of Gwozdz and Sousa-Poza (2010) who observe that the difficult objective state of health of old people does not influence their happiness significantly.

Referring to prior research, it seems that religiosity is also an important determinant of life satisfaction. In 1985 Witter, Stock, Okun and Haring analysed results of 28 studies, which led them to the unambiguous conclusion that religiosity and subjective well-being are positively correlated. According to their investigation, religious commitment explains between two to six percentages of total variability of subjective well-being. This assertion is consistent with Dorahy et al. (1998) who observe that studies show generally a positive effect of religiosity on individuals' happiness. More recent studies also prove the positive relationship between the two variables (Headey, Schupp, Tucci and Wagner, 2010; Lelkes, 2008 and Roemer, 2010).

In the literature two explanations of the positive impact of religiosity on happiness dominate. On the one hand, regular church attendance and involvement in religious organisations enable one to build social network, which may be a basis of support. Lim and Putnam (2010) allege that the positive relationship between religiosity and happiness is an effect of social and participatory mechanisms. Religious organisations offer a chance for their members to get in touch with people with a similar world-view and strike

up an acquaintance. On the other hand, religion may influence happiness not only by providing a sense of belonging, but also provide meaning to an individuals' life. Inglehart (2010) asserts that religion may give a sense of meaning in everyday life, since it provides interpretation of difficult and unpredictable events.

Among personality factors, Frey and Stutzer (2001, p. 10) enumerate such characteristics as optimism, self-esteem, extroversion, personal control or neuroticism that influence individuals' assessment of happiness. Wilson (1967) ascertain that happy people are usually extroverted, optimistic, with high self-esteem and modest aspirations. However, these factors are difficult to measure and implement in econometrics models, and therefore, there is not much economic research investigating their impact on life satisfaction. These factors are mainly the topic of psychological studies, so the analysis of these aspects is not developed in this literature review. The next section discusses the second category of determinants of happiness, namely economic factors.

2.3.2. Economic factors

Among economic factors Frey and Stutzer (2001, p. 10) enumerate the most relevant, which are the following: income, unemployment and inflation. The individual factors are discussed one after another in this section.

The relationship between income and happiness appears to dominate the previous studies on the determinants of life satisfaction. It seems that no other factor influencing happiness is paid so much attention as income. The "comfortable conclusion", as named by Silver (1980, p. 160), assumes that higher income yields higher happiness. Wealthier people have more possibilities to meet their needs and to obtain what they desire, which has a direct impact on their level of life satisfaction. It is significantly higher than the state of happiness of poorer individuals, which has been proved by numerous studies for both developing (Graham and Pettianto, 2001; Lelkes, 2006) and developed economies (Blanchflower and Oswald, 2004; Di Tella, MacCulloch and Oswald, 2001; Easterlin, 2001 and Frey and Stutzer, 2000). The results indicate that the impact of income on happiness is stronger in developing countries.

However, the positive influence of income on the level of happiness is not infinite. The effect seems to diminish for larger values of income. As an example there could be mentioned an article of Frey and Stutzer (2002b, p. 409) who notice decreasing marginal happiness with absolute income on the basis of data from the General Social Survey for

the U.S. in the years 1972-1974 and 1994-1996. The diminishing impact of income on life satisfaction is also observed by Helliwell (2003, p. 346) who bases his research on three successive waves of the World Values Survey for many countries (dependently on the wave from 18 to 30 countries).

The studies mentioned above present only one aspect of the relationship between income and life satisfaction, which is perceived as the “comfortable conclusion” referring to the words of Silver (1980, p. 160). The second angle of the relationship is more striking and was observed for the first time by Easterlin (1974) (Clark, Frijters and Shields, 2008). The researcher documented that average reported happiness remains constant over time in spite of the sharp increases in GNP per capita, which contrasts to the results of the micro analyses that find the positive impact of income on life satisfaction. These two contrasting findings are labelled the Easterlin Paradox.

Clark et al. (2008) suggest that the Easterlin Paradox provides the evidence that the individual utility function includes relative income terms. There are two types of them. Firstly, it is social comparison, since people evaluate their income relatively to the material situation of others. Secondly, individuals have a tendency to draw comparisons from the past experience or from the expectations about the future.

Social comparison assumes that people do not evaluate their income in absolute terms, but in the relation to others. The issue is commonly raised in the literature. Veblen (1899) uses a phrase “conspicuous consumption” to describe individuals’ behaviour which has an aim to impress other people. Duesenberry (1949) introduces the concept of the relative income hypothesis, which emphasises the importance of social comparisons in deriving individual satisfaction. Easterlin (1995, p. 44) explains that individual happiness will not increase if the income of each person rises, because the financial standards which are the basis for comparisons change proportionally to the change of the income in the whole society. Frey and Stutzer (2002a, p. 33) emphasise that for the proper analysis it is essential to identify the reference group with which respondents make comparisons. For instance Clark and Oswald (1996) investigate happiness on the data for 5000 British workers and treat as a reference group people with similar labour market features. Fitzroy et al. (2011) define a reference group as individuals in the same age category, education and gender.

The second type of relative income terms in the utility function is related to the process of adaptation. People adjust their assessment of happiness to past experiences and future expectations. Therefore, they adapt to the current conditions, which makes their

aspirations higher. According to the aspiration level theory, increases in income are related to the increase in aspirations. At the same time, the larger the difference between aspired and virtual income, the less happy people feel (Stutzer and Frey, 2010, p. 691).

Frey and Stutzer (2002a, p. 30) also mention that the positive impact of income on life satisfaction can be a result of influence of other factors. Countries characterised by higher GNP per head usually have more developed and stable democratic conditions. Therefore, the positive relationship between income and happiness may in fact be an effect of a more advantageous situation in wealthier economies, where people experience more esteem for human rights or more equality between men and women.

The discussion on the impact of income on life satisfaction raises a question of causality, if indeed income influences happiness and not the other way round. Kenny (1999) displays the inverse relationship, which can be logically justified that happier people have more motivation to work hard and that this results in higher economic growth and larger income per head. Frey and Stutzer (2002a, p. 31) claim that people more satisfied with life may be also characterised by greater creativity and enterprising spirit, which can help them in earning higher income. This possibility could not be excluded, however, numerous research (Frijters, Geishecker, Haisken-DeNew and Shields, 2006; Gardner and Oswald, 2007) indicate that the relationship runs in fact from income to happiness.

A second important economic factor influencing life satisfaction is unemployment. According to the neoclassical economists, unemployment is voluntary (Ohtake, 2012, p. 59). People choose to engage in work or stay unemployed basing their decision on the prevailing wage rate. They compare it with their individual reservation wage that indicates the minimal wage for which they are willing to work (Socha and Sztanderska, 2000, p. 42). Referring to this approach, Ohtake (2012) concludes that the voluntarily unemployed people should be more life satisfied or equally happy to the employed individuals, everything else being equal. The author justifies his conclusions by the fact that work is assumed to involve disutility. However, Frey and Stutzer (2002a, p. 29) summarising the previous research observe that unemployment reduces life satisfaction significantly, which casts doubt on the neoclassical assumption of voluntary unemployment. Frey and Stutzer (p. 26) also emphasise the need for explanation of the paradox that work which is perceived as a burden for people makes them happier. Happiness research offers a new perspective to look at the issue.

Unemployment influences people's happiness in two ways. Firstly, it has a direct, personal effect on individuals who become unemployed. Secondly, the macro-level effect of joblessness assumes that people's happiness is influenced by changes in the general rate of unemployment, which has an impact also on individuals not put out of work. Concentrating on the direct effect of the variable, Di Tella et al. (2001) investigate the impact of unemployment on happiness on a sample of micro data for Europe in the years 1975-1991. The results of their estimation show that unemployment reduces happiness significantly even after controlling for the personal characteristics of the individuals in the sample. Frey and Stutzer (2002a, p. 29) name the outcome as a "pure" impact of joblessness on life satisfaction, since the regression is controlled for the other factors.

The negative impact of unemployment on life satisfaction is very strong. Di Tella et al. (2001) present evidence that unemployment is "a major economic source of human distress" (p. 337). The study of Clark and Oswald (1994) on UK micro data indicates that unemployment is the factor which has the strongest impact on happiness. The researchers find that it reduces life satisfaction even more considerably than such negative events as divorce or separation. Referring to the investigation of Winkelmann and Winkelmann (1998) on panel data for German men, a decrease in happiness due to becoming unemployed can be counterbalanced by an increase in income by seven times in order to keep a constant level of life satisfaction of an individual. On the basis of such estimation results Ohtake (2012, p. 59) suggests that instead of redistributing income to the unemployed people creating new jobs would be much more efficient in increasing individuals' happiness.

Once again the question of causality arises, and in particular whether unemployment causes unhappiness or maybe the relationship runs from life dissatisfaction to joblessness. It seems very probable that unhappy individuals have a smaller motivation to perform well at work, which may lead to their lay-off, whereas people satisfied with their life are more engaged in their work which lowers the likelihood of them losing their jobs. Winkelmann and Winkelmann (1998) address this issue in their study and ascertain that there is no problem of reverse causality. Frey and Stutzer (2002a, p. 29) observe that a lot of previous research prove the bad performance of unhappy people in the labour market, however, they conclude that the major causality runs from joblessness to life dissatisfaction.

Another group of studies investigate the macro-level effect of joblessness (e. g. Wolfers, 2003), that is, the influence of the general unemployment rate in the region on

happiness. Econometric research proves that the rising rate of unemployment leads to reductions in the level of life satisfaction even for working individuals. The paper of Di Tella, MacCulloch and Oswald (2003) is one such example, and finds a strong significant impact of the general unemployment rate on individuals' life satisfaction after controlling for their status in the labour market.

Researchers investigate different aspects that explain the significant influence of the general unemployment rate on people's happiness. A possible explanation of the relationship between the two variables, which is analysed by Schwarze and Härpfer (2007), is inequality aversion. The research performed on the data from German Socio-Economic Panel Study for the years 1985-1998 shows that German individuals independently of their income feel less happy if regional income inequality is larger. Frey and Stutzer (2002a, p. 29) discuss another potential reason for the important impact of the unemployment rate on individual happiness, namely general consequences for the economy. On the one hand in the conditions of rising unemployment there appears a threat of higher taxes, on the other, people become afraid of an increasing number of crimes or violent demonstrations. Moreover, the rise of the unemployment rate elicits distress due to the probability of losing a job or worsening work conditions due to the strengthened position of employers in the labour market. Job security has been examined *inter alia* by Luechinger, Meier and Stutzer (2010) on the basis of the data for the United States and the European Union. The authors observe that fluctuations in the unemployment rate affect the happiness of workers in the private sector much more considerably, a group whose work is characterised by lower dismissal protection in comparison with employers in the public sector. It emphasises the relevance of the general unemployment rate in individuals' assessment of happiness, particularly for workers experiencing higher job insecurity.

Looking from the perspective of the unemployed individuals, a high unemployment rate is beneficial in terms of their life satisfaction. The results of the analysis of Clark (2003) indicate that unhappiness of unemployed people is smaller in a situation when there are many jobless people in the region. In conditions of high unemployment joblessness is perceived as an unusual occurrence and therefore, its impact on happiness is mitigated. Clark and Oswald (1994) obtain similar findings and observe that the negative impact of joblessness on life satisfaction is weaker for young and elderly respondents than for people in the middle of their productive age. The authors attribute

the results to the much higher level of unemployment in the first two groups in comparison with the individuals in the age of 30-49.

Empirical analyses (Di Tella et al., 2001; Wolfers, 2003) prove that high inflation substantially lowers reported life satisfaction. For the data for twelve European countries in the years 1975-1991 Di Tella et al. calculate that a one percentage increase in the inflation rate from its mean value (equal to 8%) leads to reduction of average life satisfaction by 0.012 units. Researchers compare the impact of inflation and unemployment on happiness to analyse the trade-off between the variables. Wolfers concludes that individuals are characterised by stronger aversion towards unemployment than inflation. A similar result is obtained by Di Tella et al. whose examination indicates that if the unemployment rate increases by one percentage point, inflation should decrease by 1.7 percentage points to keep the same average level of happiness.

2.3.3. Political factors

The last category of determinants of happiness enumerated by Frey and Stutzer (2002a, p. 27) consists of institutional factors. Individuals' life satisfaction is affected by the features of the political system in which people live. Current research considers mainly the impact of various forms and strength of democracy and government decentralisation on happiness.

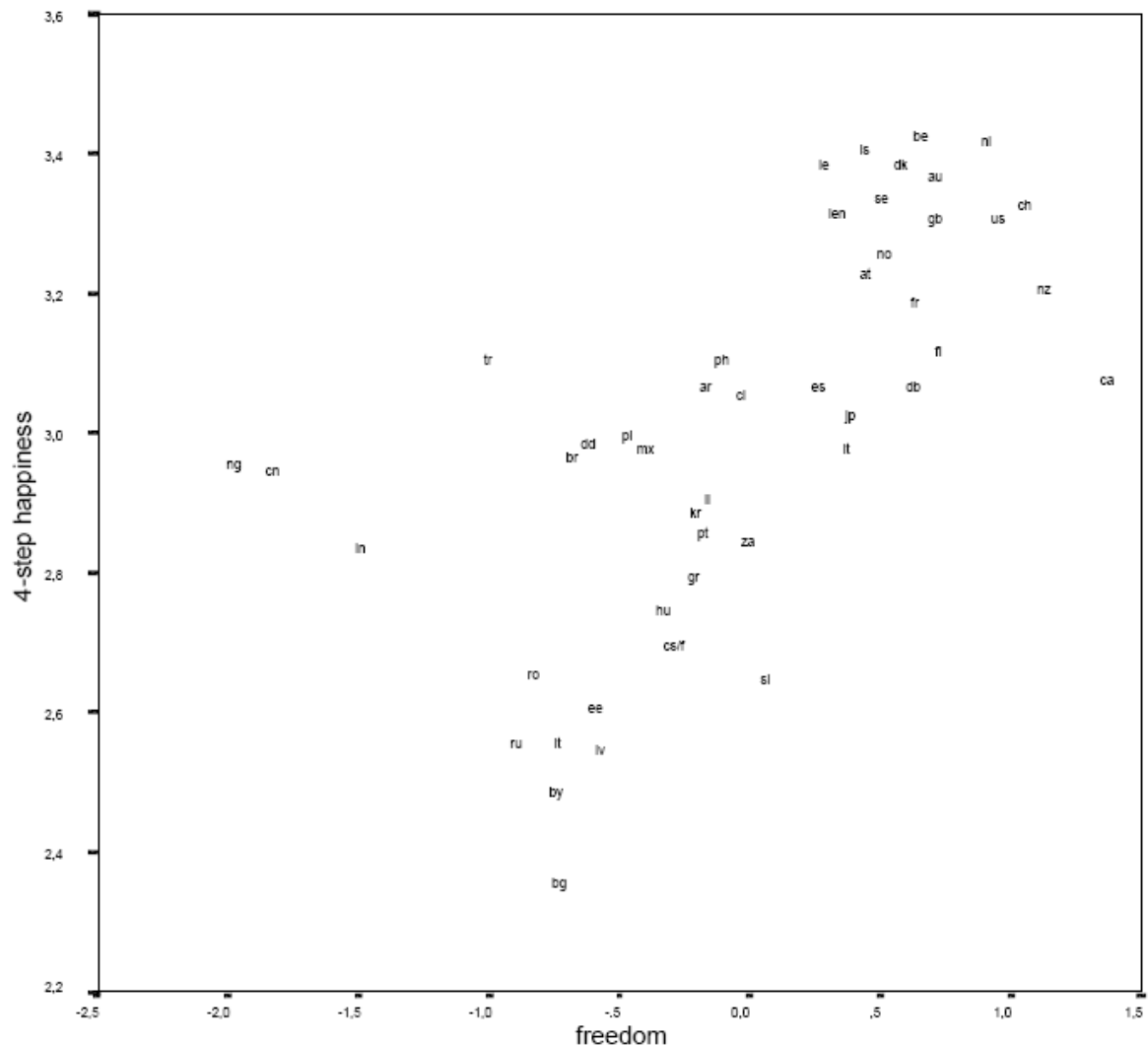
Living in a country of a constitutional democracy substantially raises people's life satisfaction. On the basis of data for Switzerland in the years 1992-1994 Frey and Stutzer (2000) find even evidence that the impact of democratic participation in public decision making in a country on happiness is stronger than the influence of demographic and economic factors. Comparing estimation results for cantons with highly developed participation rights with to those with the lowest forms of direct democracy, the researchers conclude that inhabitants of the former have an 11 percent higher probability of being completely satisfied than the citizens of the latter canton. Frey and Stutzer give two reasons for the positive impact of direct democracy on life satisfaction. First of all, politicians in democratic conditions feel controlled by society and therefore, they have more incentives to rule according to the preferences of the citizenry. They aim to be re-elected, so they endeavour to meet the expectations of the society. Secondly, democracy engages individuals in the country to participate in the public life via referenda. The right

to vote fosters happiness, because citizens have an opportunity to influence the final decision and choose a better solution for them.

The same research of Frey and Stutzer (2000) presents also evidence of relevance of government decentralisation in increasing the average happiness. The scientists determine the level of government decentralisation on the basis of local autonomy experienced by the chief local administrators of Swiss municipalities, who report their opinion on a ten-point scale. The estimated marginal effects indicate that an increase by 1 point in the local autonomy index leads to a rise of the share of very happy people by 3.3 percentage points.

Following Veenhoven (2000), Frey and Stutzer (2002b) argue that the extent of constitutional democracy of a country can be evaluated on the basis of different freedom indices, which include political, economic and personal freedom. Veenhoven analyses freedom on the basis of data for 46 nations in the early 1990s and finds a clear positive relationship between happiness and freedom, which is depicted in the figure below.

Figure 2.3.3.1. The relationship between happiness and freedom



Source: Veenhoven, R. (2000). Freedom and happiness. A comparative study in 46 nations in the early 1990's. In: E. Diener and E. M. Suh (Eds.), *Culture and subjective wellbeing* (pp. 257-288). Cambridge: MIT Press. p. 276.

Focusing on individual types of freedom, Veenhoven (2000) concludes that happiness is at most correlated with economic freedom, which refers to the possibility of free exchange of labour, goods and services for citizens. Political and private freedom are characterised by a weaker relationship with happiness. The authors emphasise that economic freedom influences life satisfaction significantly even after controlling for income per capita, which indicates its independence of wealth.

The clear correlation between direct democracy, government decentralisation and life satisfaction does not, however, mean that the causal relationship runs in fact from these institutional factors to happiness. Inglehart (1999) presents an idea that high levels of happiness of citizens may lead to an increase in the legitimacy of the current political

regime, which creates a good opportunity to develop democratic conditions. Investigating the situation in Latin America, Graham and Pettinato (2001) also encounter a problem to establish the direction of the causal-and-effect relationship. Their study indicates that pro-democratic attitudes raise life satisfaction, though simultaneously happier individuals are more likely to be pro-democratic. The direction of causation still remains unclear.

2.3.4. Cultural differences

This literature review comprises the basis for investigation of the determinants of happiness of Polish people. However, before formulating research hypotheses, it is important to mention the aspect of differences between cultures in determining life satisfaction. Some studies suggest that there exist evident differences between various cultures, which should be taken into account when formulating hypotheses.

Firstly, there have been observed a difference in the average level of happiness by Diener, Diener and Diener (1995), who claim that individualist cultures are characterised by higher life satisfaction than collectivist nations. Secondly, according to the study of Suh, Diener, Oishi and Triadis (1998), the happiness of citizens of individualistic nations is affected by emotions to a great extent. In collectivist cultures social norms and emotions have an important effect on life satisfaction. The conclusions of this study are consistent with the results of Diener et al. (2000), who investigated differences in the influence of marital status on happiness across cultures. The authors find that in individualist nations unmarried individuals living together are happier than married or single people, whereas in collectivist cultures the relationship is inverse.

Despite the visible and important differences between cultures, Frey and Stutzer (2002a, p. 39) argue that they are very often hyperbolised. Numerous studies, discussed in the above literature review, present evidence that culture influence determinants of happiness, however, the factors affecting individuals' life satisfaction have usually universal character. Frey and Stutzer argue that independent of cultural origin, individual life satisfaction is a final goal of each of us and various factors influence happiness in a similar way. It justifies formulating research hypotheses on the basis of these studies.

The literature analysis discussed in this section allows me to formulate research hypotheses and construct a proper form of an econometric model to investigate determinants of happiness of Polish people. The next chapter is dedicated to presentation of hypotheses.

3. RESEARCH HYPOTHESES

The model of the determinants of happiness presented below depicts the impact of chosen factors on life satisfaction of Polish people. This section introduces research hypotheses concerning the direction and the scale of influence of particular factors. With reference to the different types of determinants of happiness distinguished by Frey and Stutzer (2002a), which has been discussed in the preceding chapter, the study presented in this work analyses two groups of factors, namely demographic characteristics and economic aspects.

The first hypothesis is related to the variable age. On the one hand, the majority of studies, examples of which are given in the previous section, find a U-shaped relationship between the two variables. On the other hand, some studies prove that older people are not happier than middle-age and their results indicate a negative relationship. Following Gwozdz and Sousa-Poza (2010), and Lelkes (2008), the negative relationship may be due to omitting control variables from the model. Since the regression estimated in this work controls for such aspects as income and health, the following hypothesis has been formulated:

Hypothesis 1: The relationship between age and life satisfaction is U-shaped. Young and older people are characterised by a higher probability of being happy than middle-age individuals.

The second demographic variable discussed in the literature review is gender. Its effect on happiness is usually found to be very small, though some researchers observe that it is significant. Existing studies often lead to the conclusion that women feel slightly more satisfied with life than men (Alesina et al., 2004; Gerdtham and Johannesson, 2001; Nappo, 2010), a relationship which will be examined in this study. The following hypothesis will be tested:

Hypothesis 2: Women are more likely to feel happy than men.

The next hypothesis investigates the effect of marital status on life satisfaction of Polish people. Researchers (Alesina et al., 2004; Mastekaasa, 1994; Veenhoven, 1984)

usually observe higher life satisfaction levels for married individuals than for never married respondents. At the same time never married people appear happier in comparison with previously married individuals. Referring to the prior literature, this study tests the following hypothesis:

Hypothesis 3: The probability of being happy is higher for married individuals than for never-married, however, the latter are more likely to feel happy than divorced, separated or widowed people.

The effect of education on happiness will also be tested. According to Diener et al. (1999), attaining higher levels of education is thought to move individuals closer to their goals, which makes them more satisfied with their life. The same conclusion is obtained from the empirical studies of Cheung and Chan (2009), Ferrante (2009) and Gerdtham and Johannesson (2001). This assertion will be tested with the following hypothesis:

Hypothesis 4: People that have attained many years of education are more likely to feel satisfied with life than individuals with shorter education experience.

Another demographic factor that may explain some variability of life satisfaction across people is their state of health. Referring to findings of Mroczek and Sapiro (2005), and to the summary of happiness studies of Frey and Stutzer (2002a), bad health has a negative impact on self-reported happiness. The data base enables me to include two factors related to individuals' health in the model. The following two hypotheses concerning the issue have been formulated:

Hypothesis 5: Disability lowers individuals' probability of feeling happy.

Hypothesis 6: People that have experienced a serious illness in the last year are characterised by a lower probability of feeling happy.

The next hypothesis relates to the effect of individuals' religiosity on life satisfaction. Researchers consistently report a positive relationship between the two variables (Headey et al., 2010; Lelkes, 2008 and Witter et al., 1985), which may result

from the opportunity that church attendance gives to engage in social contacts and also from the fact that religion yields sense to everyday life. On the basis of the mentioned literature the following research hypothesis has been formulated:

Hypothesis 7: The more often a person attends church services, the more likely that the person is happy with their life.

The positive impact of organisation membership on happiness does not apply only to religious organisations however, but also to all groups that gather regularly, because they offer an individual a feeling of social support and affiliation to a society. This relationship is also tested in this study through the following hypothesis:

Hypothesis 8: Organisation membership increases the probability of an individual feeling happy.

The next two hypotheses concern economic factors that may have an impact on happiness, namely income and unemployment. The database does not provide any individuals' opinion about their level of income in relation to others. The analysis therefore concentrates on the influence of absolute income on life satisfaction. Numerous studies find a positive impact of income on happiness (Blanchflower and Oswald, 2004; Di Tella et al., 2001 and Graham and Pettianto, 2001), which will be tested by the following hypothesis:

Hypothesis 9: Individuals with higher income are characterised by a higher probability of being happy.

The assumptions of neoclassical economics on the way how unemployment influences happiness contradicts results from empirical analyses. The voluntary character of unemployment in neoclassical economics suggests that it should not lower individuals' life satisfaction (Ohtake, 2012, p. 59), however, empirical research reports a strong negative impact of this variable on happiness (Frey and Stutzer, 2002a). Many studies (Clark and Oswald, 1994; Di Tella et al., 2001) also show that unemployment plays the

most important role among other factors in explaining variability of life satisfaction. The following research hypotheses are therefore formulated:

Hypothesis 10: Employed people are more likely to feel satisfied with life than unemployed individuals.

Hypothesis 11: Unemployment has the strongest effect on happiness among all analysed factors.

The study presented in this work is based on micro data for Polish people, which makes it impossible to examine the effect of macroeconomic variables on life satisfaction. Therefore, there have not been formulated hypotheses concerning the general unemployment rate, inflation and political factors.

Finally, the general model of determinants of life satisfaction will be tested for stability of parameters across males and females, since some researchers (Giusta et al., 2011) suggest that the particular variables influence happiness differently for the two genders. In case this assertion is confirmed, the analysis of life satisfaction determinants should be performed separately for men and women. In order to test the statement, the following hypothesis has been formulated:

Hypothesis 12: There are significant differences in the influence of individual factors on life satisfaction of men and women.

The next section discusses the methodology, which will enable me to test the hypotheses formulated above.

4. METHODOLOGY

When choosing the appropriate method to estimate the impact of individual factors on life satisfaction one has to take into account the structure of the dependent variable. The explained variable happiness is an ordered response with four categories referring to the levels: very happy, quite happy, not too happy and unhappy. According to Greene (2003) and Wooldridge (2002), an appropriate method to examine ordered categorical data is the ordered probit or ordered logit estimation method. In this study I use the ordered logit model, since this approach seems to dominate in happiness research.

The ordered logistic method is based on a latent variable regression, which has the following form:

$$y^* = x\beta + \varepsilon \quad (2)$$

where:

- y^* - a latent variable representing for example the utility function of the individual,
- x - a vector of explanatory variables without a constant,
- β - a vector of parameters,
- ε - a vector of error terms.

The latent variable y^* defines the observable, dependent variable y , which is the self-reported level of happiness in the case of the model under discussion. The relationship between the two variables is assumed to be the following:

$$y = \begin{cases} 1 & \text{if } y^* \leq \alpha_1 \\ 2 & \text{if } \alpha_1 < y^* \leq \alpha_2 \\ 3 & \text{if } \alpha_2 < y^* \leq \alpha_3 \\ 4 & \text{if } y^* > \alpha_3 \end{cases} \quad (3)$$

where: $\alpha_1, \alpha_2, \alpha_3$, are unknown threshold parameters and $\alpha_1 < \alpha_2 < \alpha_3$. Referring to Greene and Hensher (2010, p. 141), the threshold parameters usually contain no informative value and are necessary only for calculations, therefore, they will not be analysed in this study.

Wooldridge (2002, p. 506) emphasises that the interpretation of the estimated parameters in the ordered logit model is of limited interest. The sign of a coefficient provides information about the direction of the relationship between the explanatory variable and the extreme categories of the dependent variable, but its exact value is not

directly interpretable. For instance, a positive estimated coefficient means that the probability of the highest outcome increases, whereas the probability of the lowest one decreases. It does not, however, give unambiguous information about the effects for the intermediate categories. To analyse the precise impact of a particular variable on the dependent variable, the marginal effects need to be calculated.

Before model estimation, all explanatory variables have been analysed in order to check relevance of including them in the regression function and to determine their proper form. Continuous variables have been analysed on the basis of histograms and descriptive statistics. Similarly, the analysis of discrete variables has been conducted on the basis of descriptive statistics, but they have also been checked to see if their categories contain similar numbers of observations. Binary variables have been examined additionally with the Wilcoxon procedure to check if the mean values of the dependent variable in the particular groups differ significantly. No significant difference in the average values suggests that the variable could be an unimportant factor in explaining the variability of the dependent variable. The average values of the dependent variable for groups of discrete variables with more than two categories have been compared with the Kruskal-Wallis test. If the test has indicated a significant difference in the mean values, I apply the Wilcoxon procedure to investigate between which categories the differences appear. The method has resulted in some groups of the discrete variables being joined, which has been necessary especially in the case of the categories consisting of a small number of observations.

Having estimated the coefficients of the regression function, diagnostics checks have been completed to examine whether the model complies with the assumptions of the ordered logistic method. Firstly, in order to check if the model is correctly specified, I perform the link test, which is a generalised form of the RESET test used in OLS estimation. This test allows one to detect a model specification error, which can arise in the case of omitted important factors explaining the analysed issue or including in the regression irrelevant variables. The estimated coefficients may be significantly influenced by the specification error. The result of a link test indicating proper model specification means that no other statistically significant regressors can be found, excluding an accidental case. The link test in the data analysis and statistical software *Stata* checks correctness of model specification by refitting the model with two new predictors, namely the linear prediction from the model and its squared value. In a properly specified model

the predicted value should be a significant predictor, whereas its squared value should not.

Furthermore, I also examine whether the model violates the assumption of proportional odds, called also a parallel regression assumption, according to which the relationship between all pairs of outcome groups is identical (Greene and Hensher, 2010, p. 182). This assumption means that there exists only one set of coefficients, so only one model. This is an intrinsic characteristic of all ordered choice models. There are two ways to check whether the assumption holds. The first is called the Brant procedure. This tool, however, has a strong disadvantage, since in the case of large samples it is more likely to indicate a violation of the assumption. Since the sample employed in this study is large, it is worth examining the issue also with the second method, which is based on a likelihood-ratio test of proportionality of odds across the response categories.

Greene and Hensher (2010, p. 183) notice that the null hypothesis of parallel regression is frequently rejected. At the same time, the authors conclude that the literature still does not provide a clear answer what failure of the model the rejection of the hypothesis reveals apart from the mechanical one that the relationship between each pair of outcome groups is not the same. When the assumption of the parallel regression is violated, some econometricians suggest estimation of the model with the unordered multinomial logit method. However, this approach meets with strong criticism, since it increases the number of parameters significantly and makes the results more difficult to interpret. Williams (2006) emphasise that the unordered multinomial logit models should be applied to completely different situations and they are not destined to analyse the behaviour of an ordered variable. Therefore, many scientists do not change the method of estimation after rejection of the null hypothesis of parallel regression and use the tests to support the model or cast doubts on the results.

An alternative solution to the unordered multinomial logit model is application of a generalised ordered logistic method, which ignores the proportional odds assumption. However, it often appears that the estimation results obtained in the ordered logistic regression and in the generalised ordered logit model are very similar and there is no practical difference. In such a situation it is better to base the analysis on the model estimated with ordered logit, because interpretation is simpler and more straightforward.

The diagnostics have been followed by the analysis of model fit. As Greene and Hensher (2010, p. 163) mention, in the case of ordered logit estimation there is no equivalent statistic to the standard R^2 calculated in OLS models that indicates the

proportion of variability in the dependent variable explained by the independent variables included in the regression. This R^2 cannot be computed in the ordered logit model due to different estimation methods applied in these approaches. OLS estimates are computed in order to minimise variance, whereas ordered logit results are obtained through an iterative process of the maximum likelihood method. However, scientists have introduced various statistics that measure explained variability and improvement from a null model only with a constant to a fitted model. These statistics are called pseudo R^2 , since they take similar values to the standard R^2 , from the range 0 to 1, where 1 indicates the best model fit, but interpretation of the pseudo R^2 is different from the OLS-based R^2 .

Referring to the work of Giusta et al. (2011), who find that various factors influence life satisfaction differently in the case of men and women, the model has been checked with the likelihood-ratio test to test whether the same set of coefficients can be used to explain the variability of the dependent variable in groups of males and females. In order to calculate the test statistic it is required to estimate three models: on the full sample with exclusion of the variable gender and on the subsamples of men and women. The test statistic is described by the following formula:

$$LR = 2 \left(\sum_{i=1}^n \log L_i - \log L_{pooled} \right) \quad (4)$$

where: $\log L_{pooled}$ is the log likelihood of the model on the full sample and $\sum_{i=1}^n \log L_i$ refers to the sum of log likelihoods of the models estimated on the subsamples (Greene and Hensher 2010, p. 121). The statistic LR is characterised as a χ^2 distribution with the degrees of freedom equal to $n - 1$ multiplied by the number of parameters in the regression. The null hypothesis assumes that the coefficients of models estimated on different subsamples are equal. Rejection of the hypothesis suggests that the analysis of the dependent variable should be performed on separate models.

The methodology discussed in this chapter has been applied to determine factors which influence the level of life satisfaction of Polish people. The next part of the work presents the first stage of the described methodology, namely the initial analysis of the variables.

5. DESCRIPTION OF THE DATA SET AND VARIABLES

5.1. The data set

The study, presented in this work, on the determinants of life satisfaction of Polish people is conducted on the basis of the data collected within a research project called the Social Diagnosis. The project is a scientific endeavour undertaken by the members of the Council for Social Monitoring who aim to complement the standard diagnosis based on institutional factors with complex data on households and attitudes, and the state of well-being of their members (Czapiński, 2011, p. 13). The research provides an assessment of conditions and the quality of life of Polish people in their own report.

The investigation includes numerous important aspects of everyday life of Polish households and their members. Czapiński (2011, p. 13) says that the project interdisciplinary, since it comprises examination of both economic and non-economic factors. There could be distinguished three areas that it takes into account. Firstly, the research allows for identification of the socio-demographic structure of households. Secondly, it provides information about the living conditions in Polish households, which are influenced by such aspects as: the financial situation, access to medical services, culture, rest and education of new communication technologies. Moreover, the project allows for the determination of the quality and the style of life of Polish people.

Collecting data on the socio-demographic structure of the Polish society is not an aim of the project. Information about socio-demographic characteristics is used to make comparisons of the conditions and the quality of life between different groups of people distinguished according to some features such as for instance gender, age, education level or socio-occupational status. The proper subject of the Social Diagnosis is investigation of the conditions and the quality of life in connection with the social change.

The Social Diagnosis enables a dynamic analysis of changes in society, since it is a panel study. The idea for the project (which arose in 1999) resulted in the first wave of research that took place in 2000. The next wave was conducted three years later and in the following time the research has been performed regularly every two years, so today the set consists of data from six years (2000, 2003, 2005, 2007, 2009 and 2011) (Panek, Czapiński, Kotowska, 2011, p. 35). Each consecutive wave includes all available households that have been surveyed in the former wave and is broadened by a new

representative sample of households. In order to avoid the problem of seasonality, investigation always takes place in March. It is conducted by professional interviewers from the Central Statistical Office in Poland. Collection of data within the last two waves was extended into April, since the large sample size made it impossible to conduct the study in one month.

Households included in the study are selected by stratified sampling, which consists of two stages. The first phase of stratification is based on voivodeships, which are the units of the administrative division of Poland at the high level. The second stage is performed within voivodeships, where households are stratified by the size of the place of residence into three categories: large towns (with at least 100 000 inhabitants), small towns (with fewer than 100 000 inhabitants) and rural regions.

The data are collected with the use of two questionnaires (Panek, Czapiński, Kotowska, 2011, p. 35). The first one assembles general information about the household and is completed by the interviewer on the basis of a conversation with one representative of the household who is supposed to have the broadest picture about the situation of the household. This questionnaire is a source of information about the structure and the living conditions of the household. Moreover, it gathers data about the socio-demographic characteristics of its members. The second part of the survey enables one to investigate the quality of life of individual members of the household. This questionnaire is filled in individually by all available members who are at least 16 years old.

The model, presented in this work, is estimated on the basis of data for the year 2011, which are the newest available data. For this year the data set includes information on 12,386 households with 36,753 members, 26,453 of which met the requirements of the second questionnaire and completed it (Panek, Czapiński, Kotowska, 2011, p. 36). The final sample used to estimate the model consists of 18,993 observations however, due to missing data for some individuals. On the basis of the literature presented in the second chapter, variables have been chosen from the Social Diagnosis dataset to model the determinants of life satisfaction of Polish people. The next section discusses the variables.

5.2. The analysis of variables

This section presents the initial analysis of variables, which allowed me to determine appropriate forms of the variables used in the estimation of a model of life satisfaction determinants. It is divided into four parts devoted subsequently to the description of the dependent variable, continuous regressors, binary and discrete predictors.

5.2.1. Dependent variable

As dependent variable information about a state of happiness self-reported by respondents is used, which is a discrete variable with four options. In the individual survey respondents were asked how they were feeling at that time taking all aspects into consideration. In an answer they chose between four options: very happy, quite happy, not too happy and unhappy. The table below presents the frequency of each answer.

Table 5.2.1.1. Characteristics of the dependent variable

Answers	Number of respondents	Percentage
Very happy (value 1)	1,417	7.46%
Quite happy (value 2)	13,433	70.73%
Not too happy (value 3)	3,811	20.07%
Unhappy (value 4)	332	1.75%

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The results indicate that the vast majority of respondents feel quite happy. They constitute about 71% of the sample. The second most popular answer is “not too happy” chosen by every fifth person. The distribution of observations across the four categories of the variable is uneven, since the answer “unhappy” has been indicated by less than 2% of respondents.

5.2.2. Continuous explanatory variables

In the research three continuous variables are used, namely age, years of education and income. The table below summarises their main characteristics.

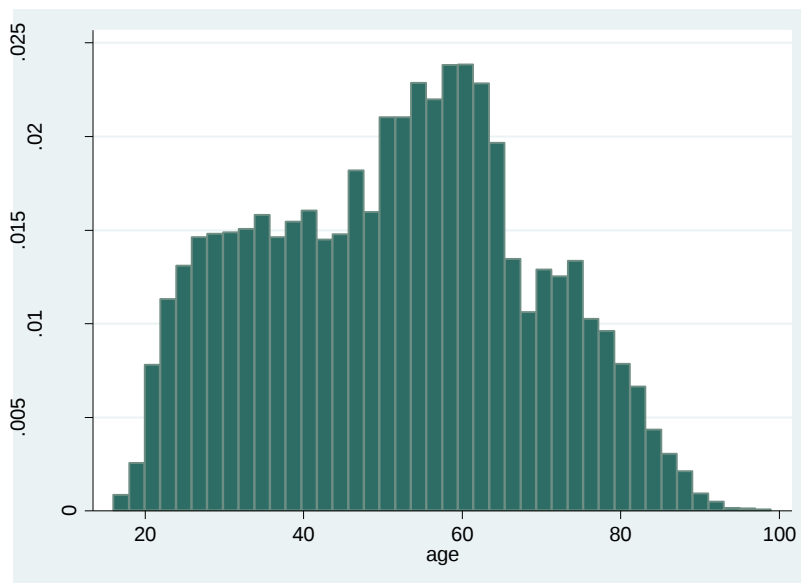
Table 5.2.2.1. Characteristics of continuous explanatory variables

Variable	Mean value	Standard Deviation	Minimum value	Maximum value
Age	51.57	17.12	16	99
Years of education	11.75	3.36	0	27
Income	1,662.73	1,372.58	30	40,000

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The average respondent in a sample is about 52 years old and the variable age takes on values from 16 to 99. Initially the data set contained many observations for which age was below 16. They have been excluded from the research sample, since they had been probably incorrectly introduced into the data set, as the survey of Social Diagnosis is done only for individuals at least in the age of 16. The distribution of the variable age across the sample is shown in Figure 5.2.2.1.

Figure 5.2.2.1. Histogram of age

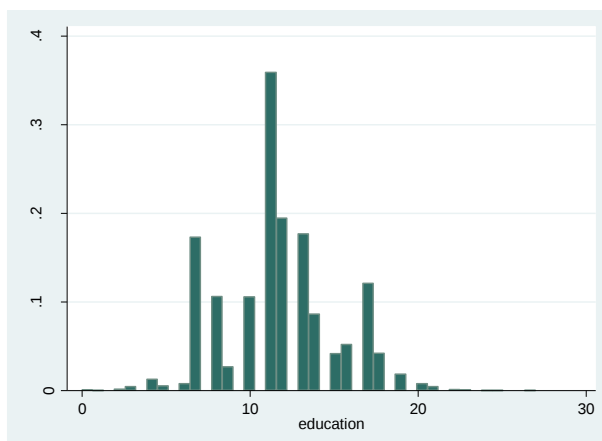


Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The sample consists mainly of people in the age range from 25 to 65. Observations beyond this interval are much rarer. In particular, there are few respondents below 20 years old and over 85. On the basis of the literature (Alesina et al., 2004; Blanchflower and Oswald, 2004; Ferrante, 2009; Nappo, 2010) I introduce the squared value of age into the regression model below.

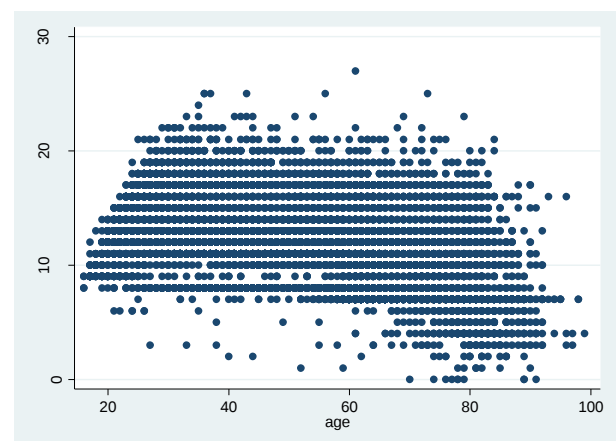
The variable “years of education” is characterised by a mean value equal to 11.75. However, what casts doubt on the correctness of the variable, is its minimum value of 0. This seems contradictory with Polish law, which levies an obligation to learn at school on every person in the age from 7 to 18, so in the sample where the youngest individuals are 16 the observations below 9 years of education should be singular. Looking at the histogram of the variable, which is presented in Figure 5.2.2.2, it gets even more questionable, since there are many respondents with less than 9 years of education. They constitute 20% of the whole sample. The scatter plot showing the relationship between age and education, presented in Figure 5.2.2.3 gives an explanation to the problem. The majority of respondents with less than 9 years of education are people who were young in the time of the World War II, therefore, they did not have a chance to attend a school. The singular observations of people born after the World War II and with few years of education have been analysed, and they are usually disabled respondents, which explains their short period of learning.

Figure 5.2.2.2. Histogram of years of education



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

Figure 5.2.2.3. Scatter plot of age and years of education

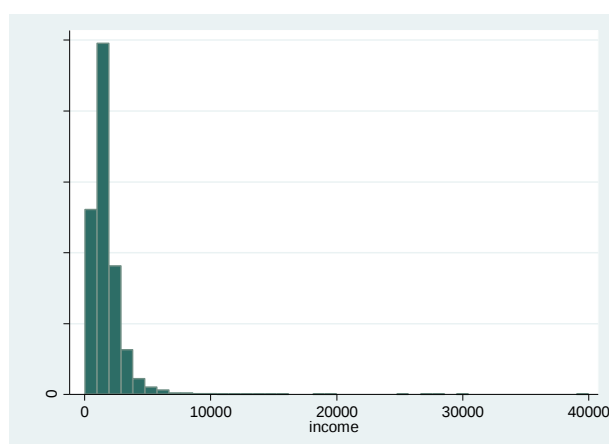


Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The variable income has been formed on the basis of answers of respondents to the following question: *what is your own personal net income per month averaging over the last three months*. It takes values between 30 and 40,000 PLN with a mean value equal to 1,662.73. As Figure 5.2.2.4 shows, observations of monthly income higher than 10,000 PLN are rare. The majority of respondents earns less than 5,000 PLN. The

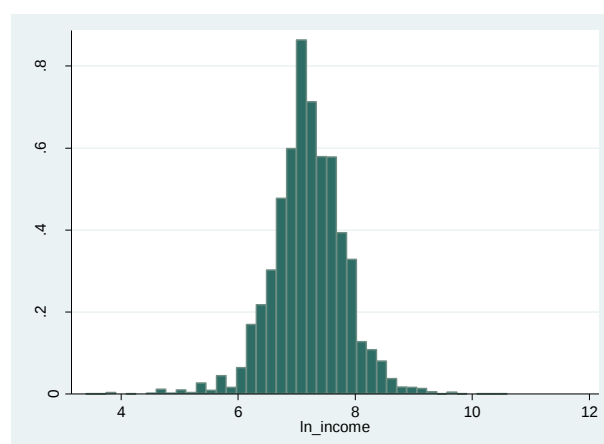
characteristics of people with the lowest and highest levels of income have been analysed in order to check the correctness of observations. All individuals with monthly income below 50 PLN are economically inactive, which justifies their low income. Referring to the literature (Ferrante, 2009, Graham, Eggers and Sukhtankar, 2004), this variable has been introduced into the model in logarithm form. Figure 5.2.2.5 presents the distribution of the logarithm of income.

Figure 5.2.2.4. Histogram of income



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

Figure 5.2.2.5. Histogram of logarithm of income



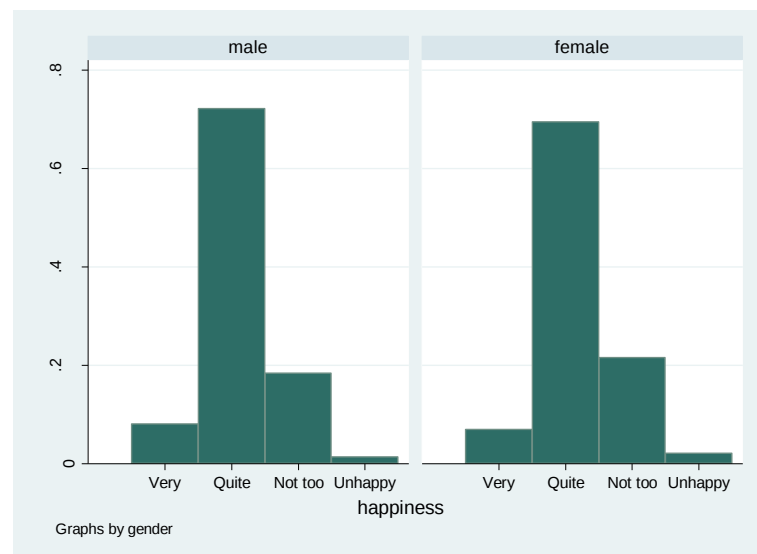
Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

5.2.3. Binary explanatory variables

Four binary variables are used as regressors in the analysis below. The following variables belong to this group: gender of respondent, if a person is disabled, was seriously ill in the last year and if she or he is a member of an organisation.

The sample is made up of 46% men (8,722 observations) and 54% women (10,271 observations), so the representation of each group is quite even. Figure 5.2.3.1 presents the distribution of answers to the question about happiness in the two groups distinguished by gender. The graph indicates that among men the answers related to positive levels of happiness are chosen slightly more often in comparison with women.

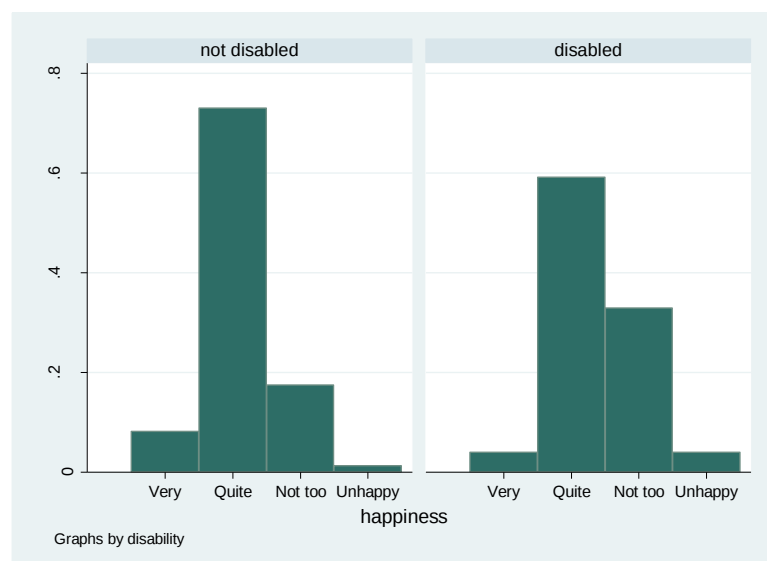
Figure 5.2.3.1. Histograms of life satisfaction by gender



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The next binary variable informs if a person is disabled. It has been created on the basis of the data on having different kinds of disability certificates by respondents. In the data set there are 3,168 disabled people, which comprise almost 17% of the research sample. According to the histograms presented in Figure 5.2.3.2 there is a significant difference in the frequency of answers given by able and disabled individuals. The answers indicating lower life satisfaction levels are much more frequent among disabled people.

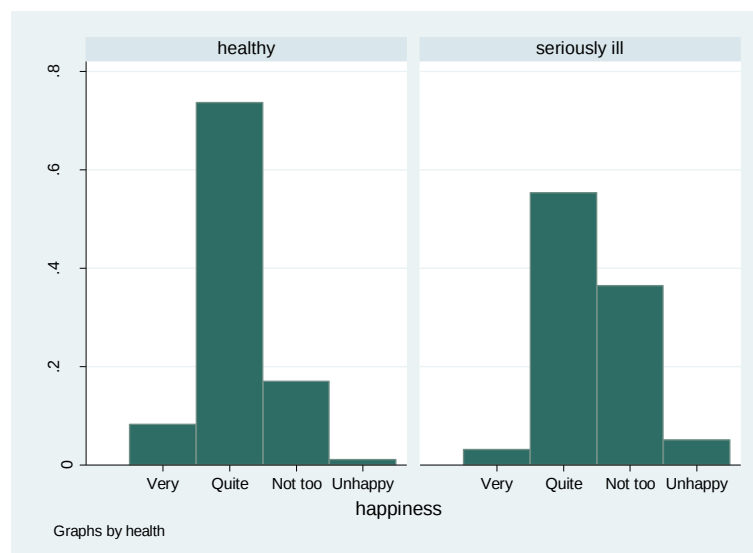
Figure 5.2.3.2. Histograms of life satisfaction by disability



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

A similar difference in the distribution of answers to the question about life satisfaction is present between people who experienced a serious illness in the last year (3,032 observation in the research sample) and individuals who did not have big health problems (15,961 observations). This is depicted in Figure 5.2.3.3 below.

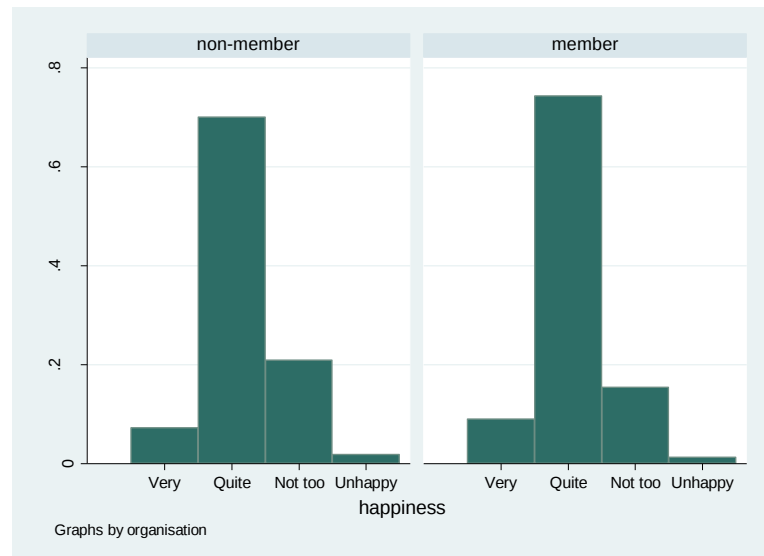
Figure 5.2.3.3. Histograms of life satisfaction by health



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The binary variable indicating whether a person belongs to an organisation has been formed from a discrete variable. Initially the variable had four levels, which referred to possible answers to the question about the organisation membership. Respondents could choose between the following possibilities: belonging to none, one, two and three or more organisations. However, the distribution of people between the categories was very uneven, since only 443 individuals belong to two organisations and 176 respondents are members of three or more organisations. Therefore, the observations indicating membership in at least one organisation have been joined into one category. After this reformulation of the variable, the sample consists of 2,957 organisation members and 16,036 non-members. Figure 5.2.3.4 below presents the distribution of answers across the two groups. Both histograms are very similar. Among organisation members the answer “quite happy” is slightly more popular, whereas the option “not too happy” is chosen more rarely in comparison to the group of non-members.

Figure 5.2.3.4. Histograms of life satisfaction by organisation membership



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

As mentioned in the methodology part all binary variables have been checked with the Wilcoxon test to see if there is a significant difference between average values of happiness for their categories. Table 5.2.3.1 shows the results of the test.

Table 5.2.3.1. The Wilcoxon test for binary variables

Variable	z	p-value
Gender	-6.72	0.00
Disability	-22.60	0.00
Health	-28.55	0.00
Organisation membership	7.55	0.00

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

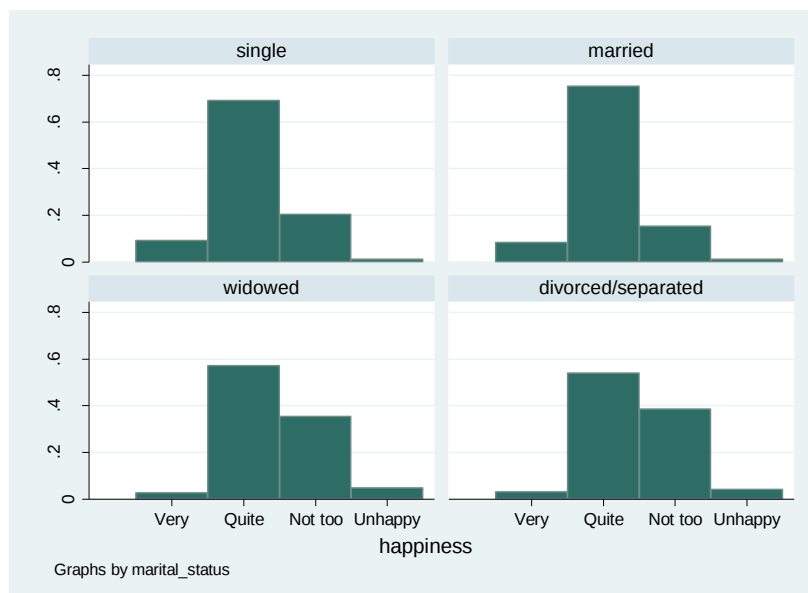
The p-values are all very small and lead to the conclusion that the categories of all binary variables differ significantly in their mean value of life satisfaction. It indicates that inclusion of these variables in the research is justified.

5.2.4. Discrete explanatory variables

In the model three discrete explanatory variables are included: marital status, the frequency of church attendance and the labour market status of respondents. The first

variable has been re-grouped, since initially it consisted of six levels (single, married, widowed, divorced, legally separated and actually separated) and some of the categories were characterised by very few observations, with only 37 individuals being legally separated for instance. Therefore, divorced and separated people have been joined into one group. After this re-formulation of the variable the sample consists of 18% singles, 64% married respondents, 13% widowed and 5% divorced or separated individuals. Figure 5.2.4.1 below characterises the distribution of answers to the happiness question across all categories of the variable. It shows clearly the highest frequency of answers indicating lower levels of life satisfaction among widowed and divorced or separated people in comparison to singles and married individuals.

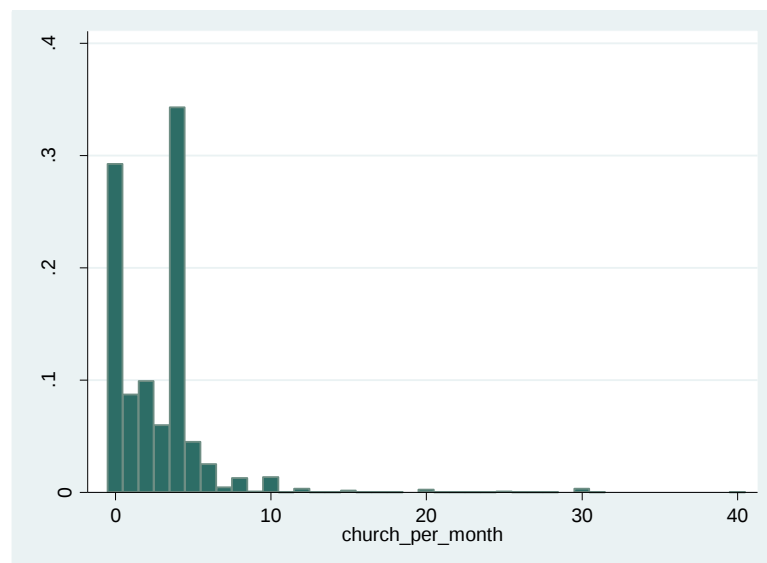
Figure 5.2.4.1. Histograms of life satisfaction by marital status



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The frequency of church attendance was at first a continuous variable, however, due to very few observations for its high values it has been transformed into a discrete variable. Its initial distribution is depicted in Figure 5.2.4.2.

Figure 5.2.4.2. Histogram of the frequency of church attendance



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The variable has been transformed into discrete form and the data has been grouped into four categories. The first one, comprising 29% of the sample, refers to people who never go to church. The second category (25% of all observations) joins respondents who rarely attend church services, attending one to three times a month. The next group consists of people regularly participating in religious services, attending 4-6 times a month. In the Catholic Church, to which a vast majority of Polish people belong, regular attendance means participation on every Sunday and all other holy days, therefore, the group is formed by individuals going to church from four to six times a month. This category comprises 41% respondents in the sample. The last group (5% of all observations) joins people attending church services more than 7 times a month. The histograms in Figure 5.2.4.3 show the distribution of answers to the question about happiness in particular groups. There are no large differences, though it could be noticed that the answer “not too happy” is more common in the group of individuals who do not go to church than in other categories.

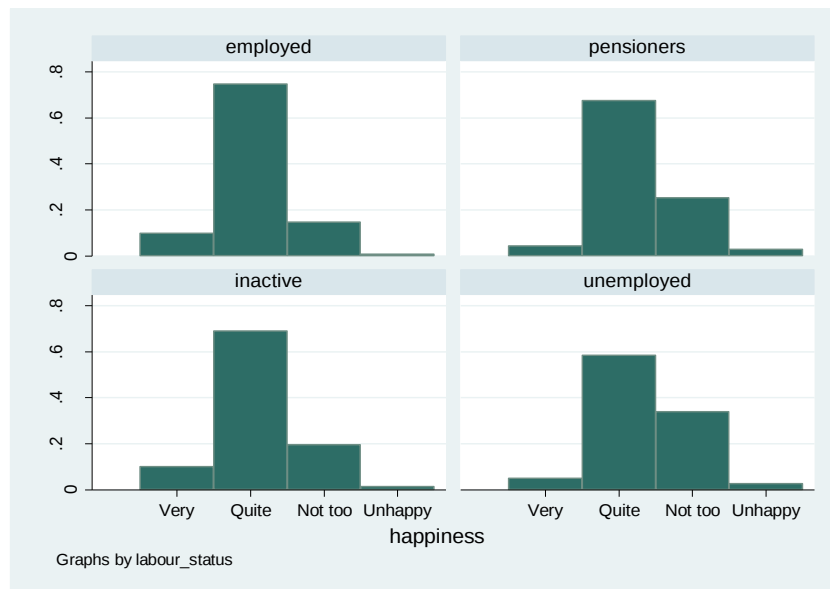
Figure 5.2.4.3. Histograms of life satisfaction by the frequency of church attendance



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The last discrete variable refers to the status of a person in the labour market. Initially the variable consisted of nine levels, however, some of them were very small and they have been joined into the following categories: employed individuals, pensioners, economically inactive and unemployed people. The research sample is dominated by employed people, who constitute 48% of the total. 41% of respondents are in pension, 8% are economically inactive and 3% unemployed. Figure 5.2.4.4 presents the distribution of the level of happiness in these groups. Employed individuals more often choose the answer “quite happy” than other categories, the difference being especially visible in comparison with unemployed respondents.

Figure 5.2.4.4. Histograms of life satisfaction by the status on the labour market



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

All discrete explanatory variables have been tested with the Kruskal-Wallis procedure to test whether there exist significant differences between mean values of happiness for their categories. The results of the analysis are presented in Table 5.2.4.1.

Table 5.2.4.1. Results of the Kruskal-Wallis procedure

Variable	chi ²	p-value	chi ² with ties	p-value
Marital status	610.88	0.00	957.91	0.00
Church attendance	66.68	0.00	104.56	0.00
Status on the labour market	378.27	0.00	593.16	0.00

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The p-values in the table above indicate that the null hypothesis assuming no difference in mean values in categories of the variables should be rejected at the 1% significance level. This result justifies the inclusion categories of these variables in the model of determinants of life satisfaction.

The analysis conducted in this chapter has provided necessary information to introduce the variables in an appropriate form into the model and to eliminate possible problems with data. The descriptive statistics have indicated a direction of expected relationships between the explanatory variables and life satisfaction. The next section presents the results of estimation done on the basis of variables described above.

6. ESTIMATION RESULTS AND MODEL DIAGNOSTICS

Implementation of the methodology described in the chapter 4. is presented in this section. On the basis of the data collected an econometric model investigating the impact of individual socio-demographic and economic factors on the happiness of Polish people is estimated. The chapter is divided into sections devoted to the following aspects: general estimation results, model diagnostics, measures of model fit, partial effects of the variables on individuals' life satisfaction, and a test of the stability of parameters for the gender groups.

6.1. Model estimation

Using the ordered logistic method, the following model has been estimated:

$$\begin{aligned}
 happiness_i = & \beta_1 age_i + \beta_2 age_i^2 + \beta_3 female_i + \sum_{k=1}^3 \lambda_k marital_status_{ki} \\
 & + \beta_4 education_i + \beta_5 disabled_i + \beta_6 seriously_ill_i \\
 & + \sum_{k=1}^3 \mu_k church_attendance_{ki} + \beta_7 organisation_member_i \\
 & + \sum_{k=1}^3 \phi_k labour_market_{ki} + \beta_8 \ln_income_i + \varepsilon
 \end{aligned} \tag{5}$$

where: β, λ, μ and ϕ are coefficients, i refers to an individual, k indicates dummy variables for different categories of the discrete regressors and ε is an error term.

Table 6.1.1 presented below shows the results of model estimation. The analysis is based on 18,993 observations. The likelihood-ratio χ^2 test statistic is equal to 2,949.14 and its p-value indicates that the model as a whole is statistically significant, since the null hypothesis assuming a model with no predictors is rejected. The McFadden's pseudo R^2 implies that the model fits to the data by 9.34% better than a model only with a constant as a predictor.

Table 6.1.1. Estimation results of the ordered logistic regression

	Coefficients	Std. deviations	P > z
Age	0.1093	0.0064	0.0000
Age squared	-0.0009	0.0001	0.0000
Gender Base level: Male			
Female	-0.0374	0.0356	0.2940

	Coefficients	Std. deviations	P > z
Marital status Base level: Single			
Married	-0.6837	0.0539	0.0000
Widowed	0.2790	0.0730	0.0000
Divorced/Separated	0.4608	0.0827	0.0000
Years of education	-0.0577	0.0062	0.0000
Disability Base level: Not disabled			
Disabled	0.3464	0.0473	0.0000
Health in the last year Base level: Healthy			
Seriously ill	0.7951	0.0454	0.0000
Church attendance Base level: Never			
Rare	-0.3363	0.0446	0.0000
Often	-0.5136	0.0407	0.0000
Very often	-0.7142	0.0850	0.0000
Organisation membership Base level: Non-member			
Member	-0.1337	0.0473	0.0050
Status in the labour market Base level: Employed			
Pensioners	-0.2761	0.0553	0.0000
Inactive	-0.0710	0.0686	0.3000
Unemployed	0.4109	0.0901	0.0000
Logarithm of income	-0.5300	0.0321	0.0000
Number of observations		18,993	
LR $\chi^2(17)$		2,949.14	
Prob > χ^2		0.0000	
Pseudo R²		9.34%	

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The p-values of the particular variables used in the regression show that with two exceptions the factors are significant determinants of happiness of Polish people. The null hypothesis of a coefficient equal to zero is rejected at the 1% significance level in the case of almost all variables. The two exceptions are the variables indicating a female gender and an inactive employment status. The coefficients of marital status, church attendance, organisation membership and being a pensioner indicate that these factors lower the probability of feeling unhappy. Moreover, an increase in years of education or income leads also to the reduction of likelihood of experiencing low levels of happiness. On the other side, the positive sign of the coefficients by the variables indicating being widowed, divorced, disabled, seriously ill in the last year and unemployed show that respondents with the mentioned characteristics are more likely to declare low levels of life satisfaction.

6.2. Model diagnostics

The specification of the model is initially examined using link test, whose results are presented in the table below.

Table 6.2.1. The results of the link test

	Coefficients	Std. deviations	P > z
Linear predicted value from the model	0.9966	0.0536	0.000
Squared linear predicted value from the model	-0.0010	0.0142	0.947

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The test is used to detect a specification error. In a correctly specified regression the linear predicted value from the model should be statistically significant, which is the case in the model under discussion. The p-value equal to 0.000 suggests a rejection of the null hypothesis that the variable is insignificant. The second variable, which is the squared linear predicted value from the model, is found to be an insignificant predictor in the regression under discussion, which once more proves its proper specification. These results of the link test indicate that it should be impossible to find any other statistically significant regressor that would explain the dependent variable.

Secondly, the model is tested to examine whether it violates the proportional odds assumption, which means the identical relationship between any two pairs of outcome groups. There are two methods to check the fulfilment of this assumption and both have been applied to the model under discussion. The Brant test and a likelihood ratio test are used to investigate the issue. The results of both tests are presented in Table 6.2.2.

Table 6.2.2. The results of the Brant test and the likelihood ratio test

	chi²	P > chi²
Brant test	132.95	0.000
LR test	135.41	0.000

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

On the basis of the results of the tests reported in the table above, the null hypothesis indicating fulfilment of the proportional odds assumption has to be rejected. In

the case of both tests the p-value is equal to 0.000, which is smaller than the 1% significance level. It means that the relationship between each pair of outcome groups is not the same and separate models should be estimated to investigate the issue, since there is no single set of coefficients for all outcome groups. Instead of estimating the model with the use of ordered logit, a method that safely ignores the proportional odds assumption, namely generalised ordered logit, could be implemented.

However, the estimation results obtained with the use of generalised ordered logit are not reported in this work, since there is little practical difference between outcomes of ordered logit and generalised ordered logit. In such a situation it is better to concentrate on the results of ordered logistic regression, which are more straightforward to interpret. Furthermore, application of generalised ordered logit in research on determinants of happiness is not common in the current literature, which focuses on estimation results obtained with the use of standard ordered logit or probit. Therefore, the analysis of factors influencing the life satisfaction of Polish people in this study has been conducted on the basis of ordered logit estimation outcomes.

6.3. Measures of model fit

This section describes the measures of fit of the model under discussion. The characteristics are presented in Table 6.3.1.

Table. 6.3.1. The measures of model fit

Log-Likelihood Intercept Only:	-15,795.1	Log-Likelihood Full Model:	-14,320.5
D(18,973):	28,641.09	LR(17):	2,949.14
McFadden's R²:	0.093	Prob > LR:	0.000
ML (Cox-Snell) R²:	0.144	McFadden's Adjusted R²:	0.092
McKelvey and Zavoina's R²:	0.199	Cragg-Uhler (Nagelkerke) R²:	0.177
Variance of y*:	4.105	Variance of error:	3.290
Count R²:	0.714	Adjusted Count R²:	0.023
AIC:	1.510	AIC*n:	28,681.09
BIC:	-158,278	BIC':	-2,781.66
BIC used by Stata:	28,838.13	AIC used by Stata:	28,681.09

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

Mc Fadden's R^2 provides information on how many percentage points the analysed regression fits better to the data than an intercept model, which includes only a constant as an explanatory variable. The results in Table 6.3.1 indicate that the model estimated in this study explains data by 9.3% better than a model with a constant as the only predictor. The value of McKelvey and Zavoina's R^2 shows that the variation of a latent variable could be explained in 19.9% by the regression if the variable was directly observed. Referring to the count R^2 , the model has predicted correctly the values of the dependent variable in 71.4% of cases, given the cut-off point of 0.5. The adjusted count R^2 gives a share of correctly predicted values of the explained variable controlling for a baseline model which assumes that the more common outcome could be forecasted without any knowledge about the predictors. The value of the statistic in this model indicates that beyond this baseline model the proportion of correctly predicted outcomes is equal to 2.3% on the basis of the regressors included in the analysis.

After the general description of the model, its diagnostics and measures of fit, the further part of the analysis focuses on the impact of individual factors on happiness of Polish people. The next section reports the partial effects of the variables included in the model.

6.4. Partial effects for the general model

Since the coefficients obtained in the ordered logistic regression, shown in Table 6.1.1, do not provide information on the size of the impact of the factors on the dependent variable and indicate only a direction of influence for the extreme categories of the explained variable, the partial effects have been calculated. Table 6.4.1 presents values of the partial effects.

Table 6.4.1. The partial effects for the general model

	Very happy	Quite happy	Not too happy	Unhappy
Age	-0.0058*** (0.0004)	-0.0108*** (0.0007)	0.0153*** (0.0009)	0.0012*** (0.0001)
Age squared	0.0000*** (0.0000)	0.0001*** (0.0000)	-0.0001*** (0.0000)	0.0000*** (0.0000)

	Very happy	Quite happy	Not too happy	Unhappy
Gender				
Base level: Male				
Female	0.0020 (0.0019)	0.0037 (0.0035)	-0.0052 (0.0050)	-0.0004 (0.0004)
Marital status				
Base level: Single				
Married	0.0337*** (0.0026)	0.0764*** (0.0068)	-0.1014*** (0.0084)	-0.0087*** (0.0009)
Widowed	-0.0135*** (0.0033)	-0.0316*** (0.0093)	0.0416*** (0.0115)	0.0035*** (0.0010)
Divorced/Separated	-0.0204*** (0.0031)	-0.0586*** (0.0128)	0.0725*** (0.0144)	0.0065*** (0.0014)
Years of education	0.0031*** (0.0003)	0.0057*** (0.0006)	-0.0081*** (0.0009)	-0.0007*** (0.0001)
Disability				
Base level: Not disabled				
Disabled	-0.0166*** (0.0021)	-0.0398*** (0.0062)	0.0520*** (0.0076)	0.0044*** (0.0007)
Health in the last year				
Base level: Healthy				
Seriously ill	-0.0337*** (0.0017)	-0.1073*** (0.0078)	0.1290*** (0.0083)	0.0120*** (0.0011)
Church attendance				
Base level: Never				
Rare	0.0193*** (0.0028)	0.0291*** (0.0034)	-0.0448*** (0.0057)	-0.0035*** (0.0005)
Often	0.0285*** (0.0024)	0.0473*** (0.0037)	-0.0702*** (0.0054)	-0.0056*** (0.0005)
Very often	0.0507*** (0.0079)	0.0369*** (0.0018)	-0.0816*** (0.0077)	-0.0060*** (0.0006)
Organisation membership				
Base level: Non-member				
Member	0.0074*** (0.0027)	0.0123*** (0.0041)	-0.0182*** (0.0063)	-0.0015*** (0.0005)
Status in the labour market				
Base level: Employed				
Pensioners	0.0150*** (0.0031)	0.0262*** (0.0051)	-0.0382*** (0.0075)	-0.0031*** (0.0006)
Inactive	0.0039 (0.0038)	0.0067 (0.0062)	-0.0098 (0.0093)	-0.0008 (0.0007)
Unemployed	-0.0184*** (0.0034)	-0.0514*** (0.0136)	0.0642*** (0.0155)	0.0057*** (0.0015)
Logarithm of income	0.0281*** (0.0018)	0.0523*** (0.0034)	-0.0744*** (0.0045)	-0.0060*** (0.0005)

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

Notation: Standard deviations are given in the parentheses. *** indicates 1% significance level, ** 5% significance level and * 10% significance level.

The results indicate that serious health problems in the previous year has the strongest effect on happiness of Polish people. This factor increases the probability of declaring themselves as not too happy by almost 13 percentage points. At the same time falling seriously ill causes an 11 percent decrease in the likelihood of feeling quite happy. Another variable that has a great impact on life satisfaction is marriage. Married individuals are characterised by a 10 percent smaller probability of being not too happy than single people. Table 6.4.1 also shows a large effect of church attendance on happiness. Very often attendance of religious services lowers the probability of feeling not to happy by 8 percentage points, compared to people who never go to church. On the other side, gender and inactive status in the labour market appear to be insignificant determinants of life satisfaction. The partial effects depicting the impact of individual factors on happiness have been used to verify the hypotheses, which is performed in the chapter 7. The next section investigates the stability of the parameters across males and females.

6.5. Stability of parameters across gender groups

The assertion of Giusta et al. (2011) that life satisfaction of males and females is influenced by factors differently has been checked using the likelihood-ratio test. The LR test statistic, which has been defined in the methodology part, was found to be 22.98, whereas the 95% critical value of χ^2 distribution with 19 degrees of freedom is equal to 10.12. Since the test statistic is larger than the critical value, the null hypothesis assuming that the same set of coefficients explains the variability of the dependent variable in the two subsamples distinguished by gender is rejected. It indicates that the correct values of parameters can be obtained from separate estimation of the model for both groups. The table below reports the results of separate regressions.

Table 6.5.1. Ordered logistic estimation results for males and females separately

	Males	Females
Age	0.1032*** (0.0097)	0.1146*** (0.0087)
Age squared	-0.0008*** (0.0001)	-0.0009*** (0.0001)
Marital status Base level: Single		
Married	-0.6752*** (0.0771)	-0.6707*** (0.0772)
Widowed	0.4932*** (0.1357)	0.2377** (0.0935)
Divorced/Separated	0.4786*** (0.1384)	0.4413*** (0.1061)
Years of education	-0.0638*** (0.0093)	-0.0542*** (0.0084)
Disability Base level: Not disabled		
Disabled	0.3327*** (0.0743)	0.3521*** (0.0620)
Health in the last year Base level: Healthy		
Seriously ill	0.8834*** (0.0715)	0.7359*** (0.0588)
Church attendance Base level: Never		
Rare	-0.3632*** (0.0635)	-0.3151*** (0.0632)
Often	-0.4981*** (0.0593)	-0.5246*** (0.0565)
Very often	-0.7080*** (0.1624)	-0.6994*** (0.1020)
Organisation membership Base level: Non-member		
Member	-0.0898 (0.0697)	-0.1709*** (0.0644)
Status in the labour market Base level: Employed		
Pensioners	-0.2849*** (0.0852)	-0.2680*** (0.0747)
Inactive	-0.2396** (0.1145)	0.0341 (0.0866)
Unemployed	0.3546*** (0.1359)	0.4709*** (0.1210)
Logarithm of income	-0.6045*** (0.0463)	-0.4593*** (0.0455)
Number of observations	8,722	10,271
LR $\chi^2(16)$	1,353.11	1,568.54
Prob > χ^2	0.0000	0.0000
Pseudo R^2	9.60%	8.99%

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

Notation: Standard deviations are given in the parentheses. *** indicates 1% significance level, ** 5% significance level and * 10% significance level.

The coefficients from the ordered logit model provide information only on the sign of the relationship between regressors and the dependent variable. The above results indicate that the direction of the effect of the factors on happiness of males and females is the same, however, differences in significance of some variables can be observed. Organisation membership explains significantly the variability of happiness only for women, whereas inactive status in the labour market is an important determinant of life satisfaction only in the case of men. Since the coefficients from the ordered logistic regression are not directly interpretable, Table 6.5.2 presents marginal effects for both regressions.

Table 6.5.2. Partial effects for males and females separately

	Males				Females			
	Very happy	Quite happy	Not too happy	Unhappy	Very happy	Quite happy	Not too happy	Unhappy
Age	-0.0059*** (0.0006)	-0.0083*** (0.0009)	0.0134*** (0.0013)	0.0009*** (0.0001)	-0.0057*** (0.0005)	-0.0130*** (0.0010)	0.0171*** (0.0013)	0.0016*** (0.0002)
Age squared	0.0000*** (0.0000)	0.0001*** (0.0000)	-0.0001*** (0.0000)	0.0000*** (0.0000)	0.0000*** (0.0000)	0.0001*** (0.0000)	-0.0001*** (0.0000)	0.0000*** (0.0000)
Marital status								
Base level: Single								
Married	0.0346*** (0.0037)	0.0682*** (0.0095)	-0.0960*** (0.0119)	-0.0068*** (0.0011)	0.0319*** (0.0037)	0.0807*** (0.0099)	-0.1026*** (0.0121)	-0.0100*** (0.0014)
Widowed	-0.0234*** (0.0053)	-0.0554*** (0.0194)	0.0735*** (0.0228)	0.0053*** (0.0019)	-0.0110*** (0.0041)	-0.0293*** (0.0124)	0.0367*** (0.0150)	0.0035*** (0.0015)
Divorced/Separated	-0.0227*** (0.0054)	-0.0536*** (0.0197)	0.0712*** (0.0232)	0.0051*** (0.0019)	-0.0184*** (0.0038)	-0.0614*** (0.0174)	0.0724*** (0.0190)	0.0074*** (0.0022)
Years of education	0.0037*** (0.0005)	0.0052*** (0.0008)	-0.0083*** (0.0012)	-0.0005*** (0.0001)	0.0027*** (0.0004)	0.0062*** (0.0010)	-0.0081*** (0.0013)	-0.0008*** (0.0001)
Disability								
Base level: Not disabled								
Disabled	-0.0174*** (0.0036)	-0.0321*** (0.0084)	0.0463*** (0.0111)	0.0032*** (0.0008)	-0.0157*** (0.0025)	-0.0457*** (0.0091)	0.0558*** (0.0104)	0.0055*** (0.0011)
Health in the last year								
Base level: Healthy								
Seriously ill	-0.0392*** (0.0027)	-0.1097*** (0.0120)	0.1382*** (0.0130)	0.0106*** (0.0015)	-0.0297*** (0.0022)	-0.1065*** (0.0103)	0.1231*** (0.0109)	0.0131*** (0.0016)

	Males				Females			
	Very happy	Quite happy	Not too happy	Unhappy	Very happy	Quite happy	Not too happy	Unhappy
Church attendance								
Base level: Never								
Rare	0.0226*** (0.0043)	0.0248*** (0.0038)	-0.0446*** (0.0074)	-0.0029*** (0.0005)	0.0168*** (0.0037)	0.0320*** (0.0057)	-0.0447*** (0.0086)	-0.0041*** (0.0008)
Often	0.0307*** (0.0040)	0.0352*** (0.0040)	-0.0619*** (0.0071)	-0.0040*** (0.0006)	0.0266*** (0.0031)	0.0578*** (0.0062)	-0.0771*** (0.0082)	-0.0072*** (0.0009)
Very often	0.0549*** (0.0164)	0.0228*** (0.0037)	-0.0733*** (0.0130)	-0.0044*** (0.0008)	0.0456*** (0.0086)	0.0485*** (0.0034)	-0.0868*** (0.0103)	-0.0074*** (0.0009)
Organisation membership								
Base level: Non-member								
Member	0.0053 (0.0042)	0.0069 (0.0050)	-0.0114 (0.0087)	-0.0007 (0.0006)	0.0089** (0.0035)	0.0180*** (0.0062)	-0.0246*** (0.0090)	-0.0022*** (0.0008)
Status in the labour market								
Base level: Employed								
Pensioners	0.0171*** (0.0053)	0.0212*** (0.0059)	-0.0360*** (0.0105)	-0.0023*** (0.0007)	0.0134*** (0.0038)	0.0300*** (0.0083)	-0.0397*** (0.0110)	-0.0037*** (0.0011)
Inactive	0.0151* (0.0079)	0.0158*** (0.0059)	-0.0290** (0.0129)	-0.0019** (0.0008)	-0.0017 (0.0042)	-0.0039 (0.0102)	0.0051 (0.0131)	0.0005 (0.0012)
Unemployed	-0.0177*** (0.0059)	-0.0369** (0.0173)	0.0510** (0.0215)	0.0036** (0.0016)	-0.0192*** (0.0041)	-0.0673*** (0.0207)	0.0783*** (0.0221)	0.0082*** (0.0026)
Logarithm of income								
	0.0348*** (0.0028)	0.0489*** (0.0043)	-0.0785*** (0.0061)	-0.0052*** (0.0006)	0.0226*** (0.0023)	0.0521*** (0.0054)	-0.0684*** (0.0068)	-0.0064*** (0.0008)

Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

Notation: Standard deviations are given in the parentheses. *** indicates 1% significance level, ** 5% significance level and * 10% significance level.

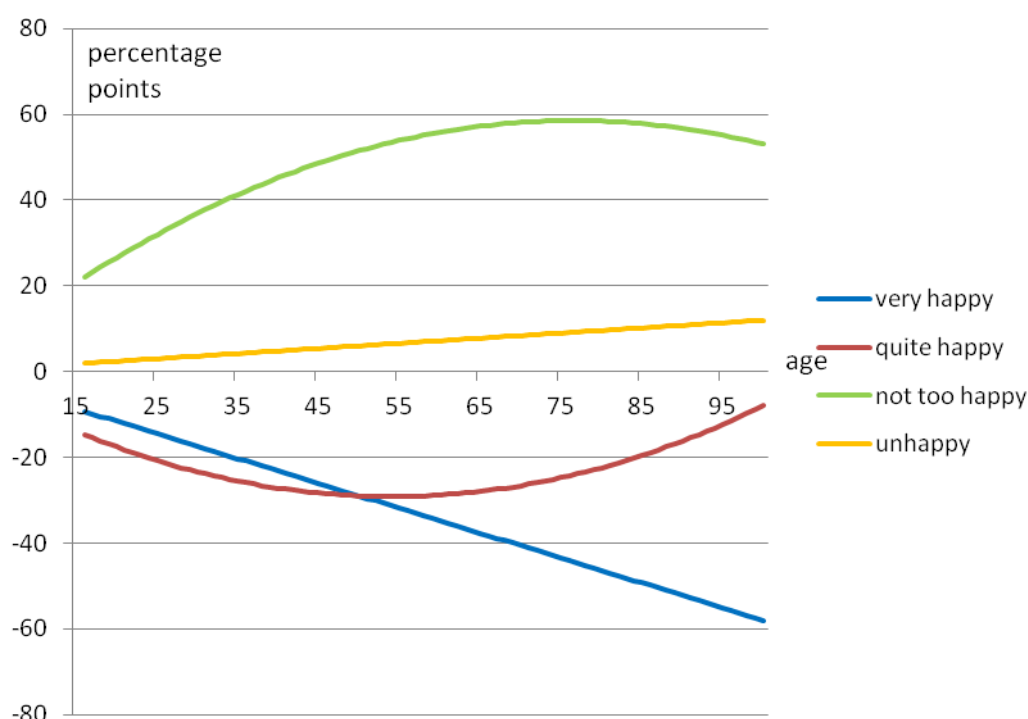
The direction of the influence of the analysed factors on happiness of Polish people is the same across genders, though the partial effects for the two groups show that the variables differ in the size of the effect. Being widowed influences life satisfaction of males more strongly, whereas being unemployed and church attendance have a stronger impact on the happiness of females. There could be observed also a difference in the influence of disability and health problems in the last year, however, it is smaller than in the case of the previously discussed variables. Being disable is a more important determinant of happiness of females, while serious illness has a bigger effect in the case of males. These results are used to verify the hypotheses described above, which is done in the next chapter.

7. VERIFICATION OF HYPOTHESES

The models whose estimation results are presented in the previous part of the work depict the impact of various factors on life satisfaction of Polish people. The estimated coefficients and partial effects enable me to test the research hypotheses formulated in the 3 chapter. This section is devoted to the verification of the previous hypotheses based on the existing literature.

According to the first hypothesis, the relationship between age and life satisfaction should be U-shaped, which would indicate that young and older individuals are more likely to feel happy than middle-age people. The relationship obtained in estimation is depicted in Figure 7.1 For the most extreme categories of the dependent variable, which refer to the levels “very happy” and “unhappy”, the estimated partial effects show a linear relationship between the variables, which proves that the older a person is, the more likely they are to feel unhappy and the less likely to report themselves as very happy. This result contradicts the hypothesis, though the estimated partial effects for the categories “quite happy” and “not too happy” indicate the non-linear relationship. For the mentioned categories the research hypothesis is true and consistent with studies of Gwozdz and Sousa-Poza (2010), and Lelkes (2008), since the results show a higher probability of feeling happy for younger and older individuals than for middle-age respondents.

Figure 7.1. The relationship between age and life satisfaction



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

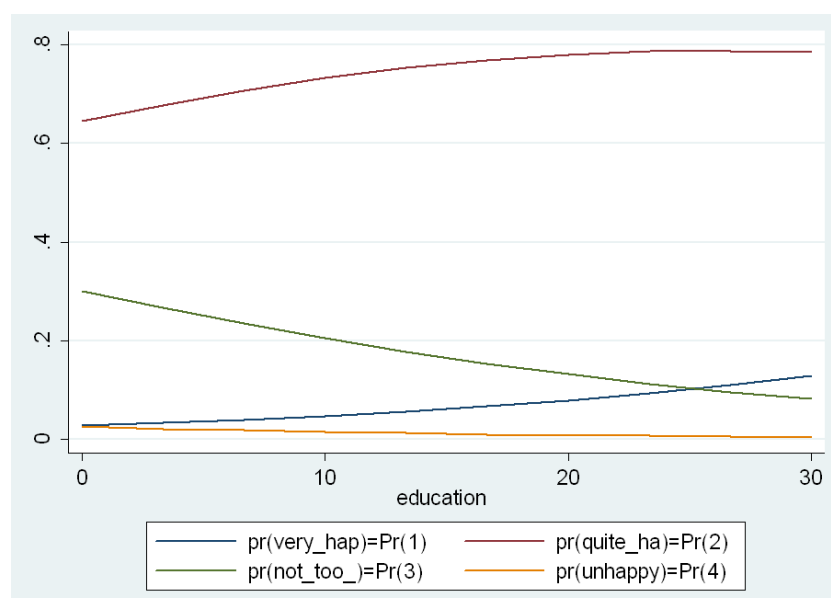
Referring to Table 6.1.1 the second hypothesis assuming that women are characterised by a higher probability of being happy than men should be rejected, since the p-value indicates that the variable is not a significant determinant of life satisfaction in the case of Polish people. The result could have been supposed on the basis of the initial analysis of variables, where the histograms presented in Figure 5.2.3.1 show a very similar distribution across genders. Therefore, gender does not explain the variability of the dependent variable.

The variable marital status appears highly significant and the estimated coefficients of the categories of marital status support the stated hypothesis. Married people are by 3.37 percentage points more likely to feel very happy and by 7.64 percentage points more likely to report themselves as quite happy in comparison with single individuals. The latter are however more likely to experience high levels of life satisfaction than widowed, divorced or separated people. Divorced or separated individuals seem to be characterised by the greatest risk of feeling unhappy. Their probability of being not too happy is 7.25 percentage points larger than for single people, whereas widowed individuals are 4.16 percentage points more likely to feel not to happy

compared to singles. These results are consistent with the conclusions of Alesina et al. (2004), Mastekaasa (1994) and Veenhoven (1984).

The estimated partial effects confirm the research hypothesis concerning the positive influence of education on life satisfaction, which was also found by Cheung and Chan (2009), Ferrante (2009) and Gerdtham and Johannesson (2001). The effect is significant, though not very strong. An increase in the length of education by 1 year leads to a 0.31 percentage points higher probability of being very happy and a 0.57 percentage points greater likelihood of feeling quite happy. The positive relationship between years of education and life satisfaction is depicted in Figure 7.2 with the predicted probabilities for the variable. The small slopes of lines on the graph confirm the weak impact of the determinant on happiness.

Figure 7.2. Predicted probabilities dependently on years of education



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

Two variables included in the model related to individuals' health have appeared to be significant and the values of their partial effects confirm the research hypotheses. Health problems, such as disability and serious illness, significantly lower the probability of feeling happy and increase the chances of experiencing unhappiness, which is also a conclusion of Frey and Stutzer (2002a), Mroczek and Sapiro (2005). Bad health in the last year has an even stronger negative impact on life satisfaction than disability. Disabled people are 3.98 percentage points less likely to be quite happy, whereas in the case of individuals who experienced a serious illness in the last year the probability falls by 10.73

percentage points. Moreover, the latter are 12.90 percentage points more likely to report themselves as not too happy. Disability increases this probability by 5.2 percentage points. The difference in the scale of impact on happiness between these health problems may result from individuals' adaptation to disability, whereas a serious illness is more likely to be a sudden event. Therefore, it might have a greater effect on people's emotions and perception of happiness.

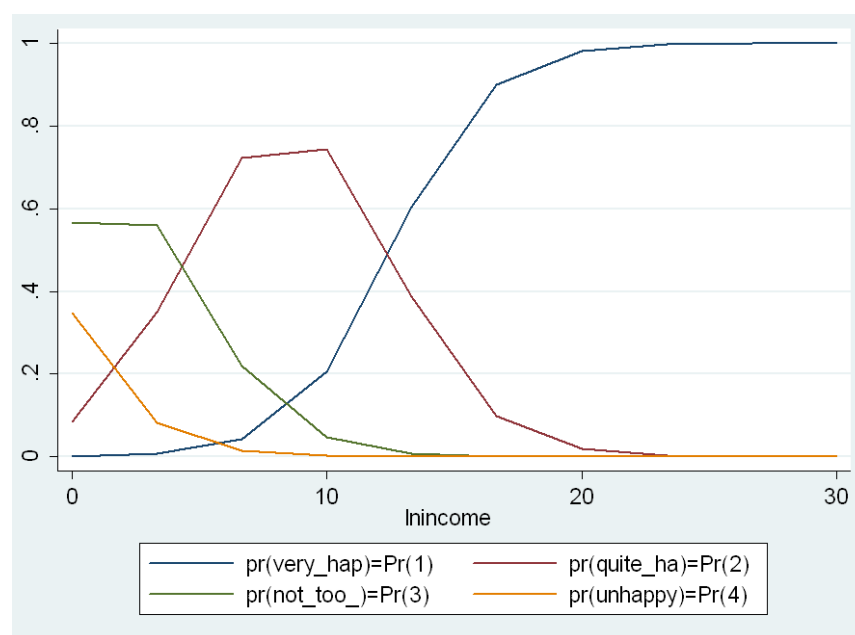
The 7th hypothesis concerning the direction of influence of religiosity on life satisfaction could not be rejected on the basis of the results presented in Table 6.4.1. According to the assertions of Headey et al. (2010), Lelkes (2008) and Witter et al. (1985), often attendance of church services increases the likelihood of higher levels of happiness. The partial effects show that the probability of feeling very happy or quite happy is larger for any group taking part in religious services than for people who never attend them. At the same time the likelihood of experiencing lower levels of life satisfaction is lower for the former compared to the latter. It could be observed that the positive effect of religiosity on individuals' happiness becomes greater for people who attend church services more often. Compared to people who never go to church, the probability of feeling very happy increases by 1.93 percentage points for individuals rarely taking part in religious services, by 2.85 percentage points for people often participating in them and by 5.07 percentage points for respondents attending church services very often. Similarly regularity can be noticed in the case of other categories of the dependent variable. These results may confirm the assertion that church attendance gives a chance to engage in social contacts and brings sense to everyday life, which could have a positive effect on individuals' life satisfaction.

A similar relationship is observed in the case of the variable related to organisation membership of a respondent. Since membership in a group allows for a feeling of social support and belonging to society, it increases individuals' probability of feeling quite happy by 1.23 percentage points and lowers likelihood to be not too happy by 1.82 percentage points. The results are significant at the 1% significance level, though the impact of the variable on life satisfaction is not strong. The estimated partial effects show a positive relationship between organisation membership and happiness, and confirm the research hypothesis.

The values of the partial effects for the variable logarithm of income prove that the research hypothesis should not be rejected. The higher the income, the greater the probability of feeling happy, which is in line with the results obtained by Blanchflower

and Oswald (2004), Di Tella et al. (2001), Graham and Pettianto (2001). The positive effect of the variable on happiness is depicted in Figure 7.3, which presents predicted probabilities dependent on the logarithm of income. Predicted probabilities for the levels of the dependent variable “not too happy” and “unhappy” clearly fall as income increases. There can also be observed an S-shaped line of predicted probabilities for the category “very happy”, which shows that the probability for this level increases very slowly for low and very high values of income, whereas in the middle there is a very steep increase in the probability of feeling very happy. The graph indicates that a small change in earnings of the middle income group leads to a sharp increase in the probability of being very happy. The parabolic shape of predicted probabilities for the category “quite happy” is interesting. It shows that up to some point an increase in income influences positively the probability of feeling quite happy, however, at some level of income the direction of the relationship reverses. On the basis of the graph it could be concluded that the probability of feeling quite happy falls, because the likelihood of being very happy increases. For the highest values of income, experiencing low levels of happiness is very improbable. The probability decreases to 0. This result should be treated with a degree of caution however, since in the sample there is a small number of respondents with such high levels of income. Therefore, the effect may be not representative for the whole population of Polish people, because it is based on few observations.

Figure 7.3. Predicted probabilities dependently on logarithm of income



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

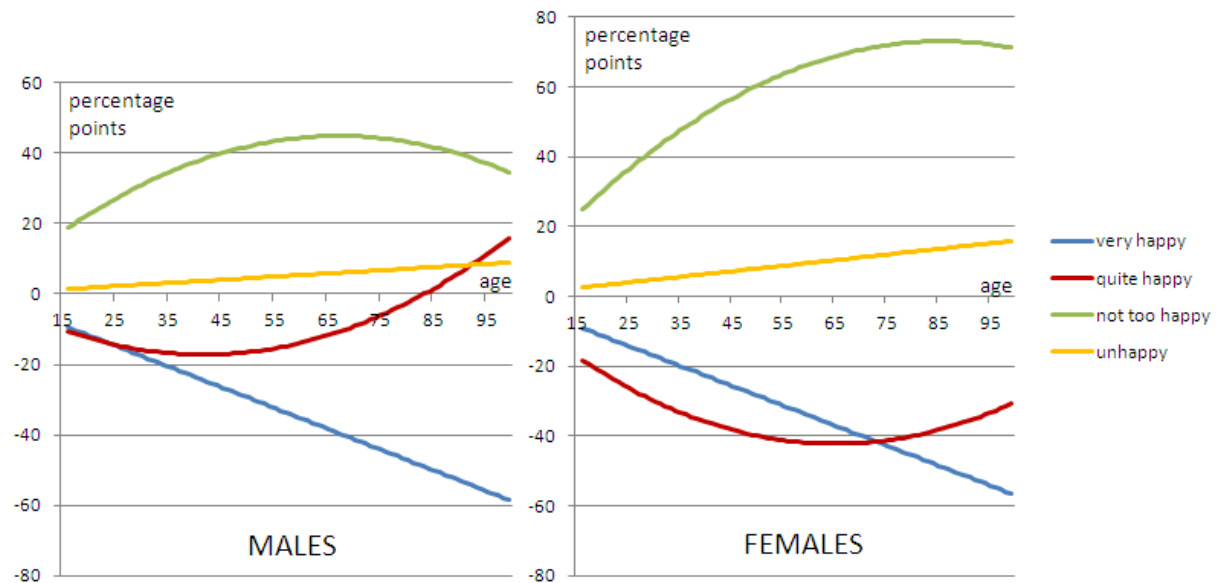
The next hypotheses concern the impact of economic status in the labour market on happiness. One of the three dummy variables related to the economic status, indicating that a person is inactive in the labour market, is found to be insignificant. This may result from the fact that this category consists of various people in different situations in their life. On the one hand, students belong to the group and on the other older people who do not work a few year before their pension. Therefore, the variable will not be interpreted. The partial effects of the dummy variable related to unemployed individuals support the 10th hypothesis that unemployment increases the probability of feeling unhappy. Unemployed people are by 5.14 percentage points less likely to report themselves as quite happy and by 6.42 percent more likely to be not too happy. At the same time, these values lead to the rejection of the hypothesis that unemployment has the strongest impact on happiness among all factors. This result contradicts the assertions of Clark and Oswald (1994) and Di Tella et al. (2001). The model estimated in this work indicates that experiencing a serious illness in the last year has the strongest effect on happiness of Polish people. The second most important factor is if a person is married.

The likelihood ratio test of the stability of the parameters across gender groups provides support for the last research hypothesis, according to which there are significant differences in the influence of individual factors on the happiness of males and females. On the basis of this result the model has been estimated separately on two subsamples of men and women. The calculated coefficients and partial effects are reported in Tables 6.5.1 and 6.5.2. Significant differences in the estimated impact of particular factors on happiness have been noticed for almost all variables with the exception of years of education and church attendance. The remaining part of this section discusses in more detail the differences between genders. The variables years of education and church attendance are omitted in this discussion, since they seem to influence happiness of men and women in a similar way.

Similar to the model estimated on the whole population, the relationship between age and life satisfaction is U-shaped in the case of the categories “quite happy” and “not too happy” for both gender groups, and linear in the other cases. However, the two groups differ in the effect of age when there is a reversal of the relationship, which is depicted in Figure 7.4. For men the probability of being quite happy decreases till 40 years and then starts to increase, whereas for women it takes place much later, since they experience the reversal of the relationship at around 65 years old. The same pattern exists for the

category “not too happy”. The probability of reporting themselves as “not too happy” increases until around 65 years old for males and around 85 years old for females.

Figure 7.4. The relationship between age and life satisfaction by gender groups



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

Marital status also influences the happiness of males and females differently. The direction of the relationship stays the same, though the size of coefficients varies. Being married has a stronger impact on life satisfaction of females compared to males, whereas being widowed influences happiness of men more than women. Moreover, in the case of females the dummy variable “widowed” is insignificant at the 1% significance level, while for males it is highly significant.

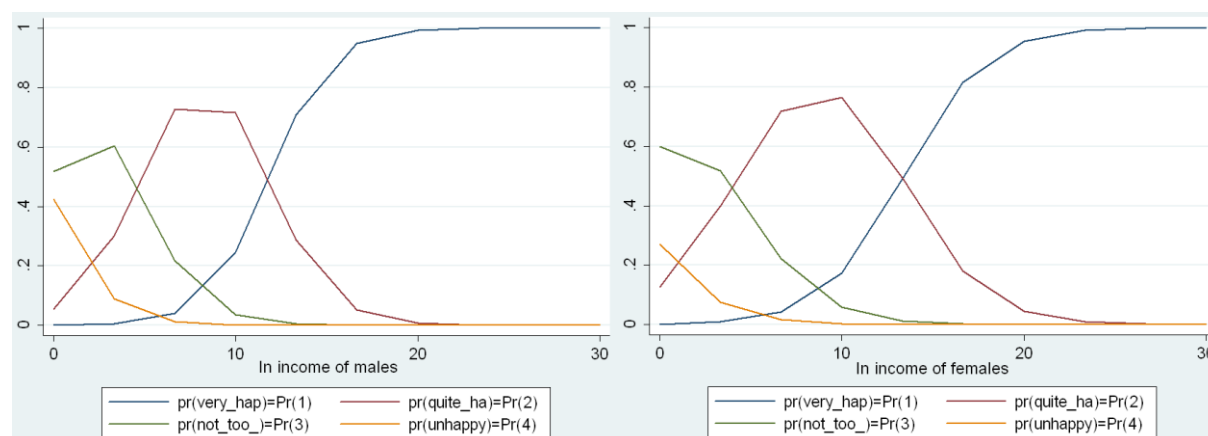
Furthermore, the sizes of the effect of the variables related to health on happiness differ between the gender groups. Disability lowers life satisfaction of women more strongly than men. For instance, the probability of feeling not too happy increases by 5.58 percentage points in the case of disabled women and by 4.63 for men. However, experiencing a serious illness in the last year has a stronger impact on happiness of males compared to females. The mentioned differences are not large, though visible.

The variable related to organisation membership is not an important determinant of happiness for men, whereas in the case of women it is a highly significant factor. This could result from a very unequal distribution of males between organisation members and non-members, though it has been checked that the groups consist of enough number of observations. Almost 16% of males and about 15% of females are organisation members.

This result indicates that the feeling of affiliation to the society and social contacts may play an unimportant role for males in determining their happiness.

Economic status in the labour market also has different effects for both genders. Inactivity is an important determinant of happiness only in the case of men. For females, however, the unemployment status is more important and significantly lowers their probability of feeling happy. The size of the influence of the second economic variable, namely personal income, is also a bit different for males and females. As shown in Figure 7.5, the S-shaped line of predicted probabilities for category “very happy” is more evident in the case of men than women. The middle income group of males is characterised by a steeper increase in happiness due to increasing income. In the graph of predicted probabilities for males an unusual relationship for the category “not too happy” is observed, namely that its probability increases as income goes up for low values of earnings. This would indicate that at low values of income higher earnings make men more likely to declare low happiness levels. This contradicts usual conclusions drawn in previous research. This uncommon shape of the line should be treated with caution, since it may result from other specific characteristics of the low income group of males.

Figure 7.5. Predicted probabilities dependently on logarithm of income for males and females



Source: Own elaboration on the basis of data from the Social Diagnosis for the year 2011

The estimated econometric model has allowed me to define factors that influence life satisfaction of Polish people. Verification of hypotheses has shown that the obtained results are justified in light of existing literature and the situation of Polish people. The results discussed in this chapter may be useful to influence more efficiently the state of happiness of Polish people. The next section presents final conclusions from the research.

8. CONCLUSIONS

The research presented in this thesis has enabled me to determine factors which influence life satisfaction of Polish people. The analysis was conducted on the basis of the econometric model estimated on the cross-sectional data from the Social Diagnosis for the year 2011. As dependent variable in the regression were used answers of respondents to the following question: *taken all together, how would you assess your life in these days – could you say that you are very happy, quite happy, not too happy or unhappy?* The model was estimated with the ordered logistic method, since the explained variable is an ordered response with four categories referring to different levels of perceived happiness.

The results confirm previously formulated hypotheses of a positive impact of education, negative influence of health problems, such as serious illness and disability, and a positive effect of income on happiness. Moreover, the study indicates a significant impact of marital status on the explained variable. The partial effects indicate that married people are characterised by a higher probability of feeling happy than single individuals, and the latter are more likely to be satisfied with life than widowed, divorced and separated respondents, which is consistent with the hypothesis. Furthermore, the graph of the relationship between happiness and age (see Figure 7.1) confirms the hypothesis about the non-linear relationship between the two variables. Middle-age individuals are more likely to feel “not too happy” and less likely to declare themselves as “quite happy” compared to young and older people. The level of life satisfaction reflects also an impact of religious engagement, as often attendance of church services increases the likelihood of high levels of life satisfaction. A small degree of variability of happiness across Polish people is explained by organisation membership. The variable increases the probability of experiencing higher levels of life satisfaction at the 1% significance level, however, the size of the effect is small. Additionally, the negative influence of unemployment on happiness supported my hypothesis, according to which unemployed individuals are more likely to feel less satisfied with life. On the other hand, the hypothesis assuming that unemployment has the strongest impact on happiness was rejected. Experiencing a serious illness in the last year appears to influence life satisfaction most. The estimation results also led to the rejection of the hypothesis concerning the effect of gender on happiness. The variable appears insignificant in the model under discussion, which nevertheless is consistent with some studies dedicated to investigation of life satisfaction.

The test of the stability of parameters across gender groups rejected the null hypothesis, according to which the variables taken into account in the model influence life satisfaction of men and women in the same way. This result suggest that two separate regressions should be estimated on the subsamples of males and females, since the coefficients and partial effects differ significantly between the two groups. Numerous differences between the effect of particular factors on happiness of men and women are observed. Age and being unemployed influence life satisfaction of females more so than males. The variable disability has the strongest impact on females, whereas experiencing a serious illness in the last year lowers the probability of feeling happy for males to a greater extent. Organisation membership is a significant determinant of happiness only in the case of women. On the other hand, an economically inactive status in the labour market has a significant impact only on life satisfaction of men. The variable marital status also influences both groups differently. Being married has a stronger effect for women, whereas being widowed lowers the probability of feeling happy in the case of men to a greater extent.

The research allowed me to identify the factors that influence the happiness of Polish people. The information could appear useful with regard to many aspects. Firstly, it indicated how the state of life satisfaction of Polish people can be improved, which might help policy makers to formulate adequate recommendations of reforms. The estimation results show that such factors as serious illness, being unemployed, marital status and church attendance influence happiness of the Polish society strongly. Falling seriously ill is a difficult personal experience and the government cannot affect the frequency of serious illnesses, however, it could improve the health care system to enable people to be treated in good conditions in order to minimise suffering caused by the bad state of health. It would lower the size of the negative impact of serious illness on life satisfaction, since its partial effects probably reflect to some degree huge problems in the Polish public health care system.

In order to improve the state of happiness, the government should also focus on the problem of unemployment. The issue seems especially important in the situation of the high unemployment rate in Poland, which in March 2011, when the collection of the data of the Social took place, reached 13.3% (Central Statistical Office). The study presented in this thesis shows only one angle of its negative impact on life satisfaction, which is its direct effect on unemployed people. However, the problem is much broader, because according to the literature (Di Tella et al., 2003) high unemployment also lowers

life satisfaction of economically active individuals. Therefore, the government should endeavour to motivate people to work and to provide them appropriate job opportunities.

The meaningful role of marital status and church attendance in explaining the variability of happiness across individuals could emphasise importance of promoting by the government an appropriate value system in the country. The estimation results indicate that the reversal from traditional values such as marriage, family and religion could lead to lower happiness. The results seem especially important in light of large custom and cultural changes in modern societies, which suggest a new set of ethic values.

Moreover, the results of the research may play an educational role for the Polish society and present the citizens the honest picture of the situation in the country. They also enable one to compare happiness determinants with other economies, which could broaden the image of how to effectively influence life satisfaction. Finally, the study contributes to the existing happiness literature. The advantage of the research is reinforced by the fact that it seems that there are no studies devoted to an econometric investigation of life satisfaction determinants for Poland on the basis of current data.

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10. APPENDIX

10.1. Zusammenfassung

Die Arbeit behandelt das Thema der Lebenszufriedenheit von Polen. An der Grundlage der Daten der Gesellschaftsdiagnose für das Jahr 2011 wurde ein ökonometrisches Modell, das die Richtung und die Größe des Einflusses der einzelnen Faktoren für das Glücksein darstellt, eingeschätzt. Die Ordered Logit Methode wurde für das Auswerten benutzt. Die Ergebnisse der Einschätzung haben den positiven Einfluss der Heirat, der Teilnahme in Gottesdienste und des Einkommens gezeigt. Dagegen eine Behinderung, eine schwere Krankheit und Arbeitslosigkeit verringern die Wahrscheinlichkeit, sich glücklich zu fühlen. Die Forschung hat auch die U-förmige Beziehung zwischen Alter und Lebenszufriedenheit bewiesen. Weiterhin wurde eine differenzierte Analyse für Männer und Frauen durchgeführt.

10.2. Abstract

The thesis discusses the issue of life satisfaction of Polish people. Using data from the Social Diagnosis for the year 2011 an econometric model depicting the direction and the size of influence of particular factors on happiness is estimated. To do this the thesis makes use of the ordered logistic method. The estimation results show a positive impact of being married, frequent church attendance and income on the probability of feeling happy. On the other hand, disability, falling seriously ill and being unemployed significantly lower the likelihood of being happy. The study also confirms a U-shaped relationship between age and happiness. The thesis further conducts separate analyses in groups distinguished by gender.

10.3. Curriculum Vitae

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Education

Since October 2012 University of Vienna, Master Program in Economics
Since October 2011 University of Warsaw, Master Program in International Economics
October 2008 – June 2011 University of Warsaw, Interdisciplinary Studies in Economics and Management
Bachelor thesis in economics: *The Influence of Individual Characteristics of The Unemployed in Poland on Reservation Wages*
Bachelor thesis in management: *The Analysis of The Degree of Freedom in the Scouting Association of the Republic of Poland*
Sep 2005 – June 2008 Secondary School, a class with extended programs of mathematics and geography

Foreign languages

English – advanced in writing and speaking (C2), Certificate of Proficiency in English
German – advanced in writing and speaking (B2)
Russian – lower advanced in writing and speaking (B1), Certificate of University of Warsaw

Additional skills

Knowledge of MS Office (Word, Excel, PowerPoint, Outlook)
Knowledge of STATA, MATLAB
Touch typing, Certificate of Polish Association of Stenographers and Secretaries, 10.VI.2006