

**CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE**

**Faculty of Economics and Management**

*Department of Economics*



Diploma Thesis

**QUALITY OF LIFE INDEX MEASUREMENTS AND  
ITS INTERNATIONAL COMPARISON**

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## DIPLOMA THESIS ASSIGNMENT

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Thesis title

**Quality of Life Index Measurements and Its International Comparison**

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### **Objectives of thesis**

The main goal of this thesis is to determine a broad term of quality of life on the basis of related Quality of Life Index as well as other available approaches namely the Better Life Index or Human Development Index. Identify relevant dimension defining quality of life and their relationships among them and selected indexes. Compare obtained outcomes for different countries between each other. Specify key causes of country's ranking.

### **Methodology**

The thesis will be divided into two basic parts – the theoretical and own analysis. The first part will provide a literature review and it will contain of qualitative analysis of comprehensive term of quality of life and its existing measurements. The part of analysis will be done using method of both descriptive as well as quantitative such as regression analysis.

## **The proposed extent of the thesis**

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## **Keywords**

Quality of Life Index, Better Life Index, Human Development Index, international comparison

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Anderson R.; Dubois H.; Leončikas T.; Sándor E. (2012) Third European Quality of Life Survey Quality of life in Europe: Impacts of the crisis, Luxembourg: Publications Office of the European Union, ISBN 978-92-897-1099-2

Eurostat (2015) Quality of life indicators – measuring quality of life, [online], Available on www: [http://ec.europa.eu/eurostat/statistics-explained/index.php/Quality\\_of\\_life\\_indicators\\_-\\_measuring\\_quality\\_of\\_life](http://ec.europa.eu/eurostat/statistics-explained/index.php/Quality_of_life_indicators_-_measuring_quality_of_life) [Nov 2016]

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## **DECLARATION**

I declare that I have worked on my diploma thesis “Quality of Life Index Measurements and Its International Comparison” by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any third person.

In Prague .....

.....

Barbora Pištorová

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# Quality of Life Index Measurements and Its International Comparison

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## Měření Indexu Kvality Života a Jeho Mezinárodní Porovnání

### Summary

This diploma thesis examines the quality of life (QOL) measurements and a suitability of indicators for such a research. The theoretical part is an introduction to the issue of life quality determination. The second chapter is the analytical one, further divided into three main chapters. Firstly, there is the computation of Aggregate Quality of Life index, compounded on a basis of four known indexes: Better Life Index, Human Development Index, Quality of Life Index and World Happiness Report on a sample of nine European countries (Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands and the United Kingdom). It captures the international comparison of rankings and objectivity of given indexes. Crucial part of this thesis is chapter dedicated to panel data regression analysis including 22 years for these nine countries. The regression framework demonstrates whether there are some relationships between endogenous variable of life satisfaction and exogenous variables: educational attainment, unemployment, life expectancy at birth, inequality of income distribution, intentional homicides and GDP. In a last part author determines the unsuitability of GDP as QOL indicator and supports this assertion both with her own outcomes and results of another expert studies.

### Souhrn

Tato diplomová práce se zabývá měřením kvality života a určováním vhodnosti ukazatelů, které tuto kvalitu určují. Teoretická část obsahuje úvod do problému s vymezením významu kvality života. Druhou kapitolou je analytická část, dále rozdělena do tří hlavních kapitol. Nejprve, kalkulace Souhrnného indexu kvality života, počítaného na bázi čtyř známých indexů: Index lepšího života, Index lidského rozvoje, Index kvality života a Zpráva o světovém štěstí pro vzorek devíti evropských zemí (Belgie, Dánsko, Francie, Německo, Irsko, Itálie, Lucembursko, Nizozemsko a Spojeného království). Tento index zobrazuje mezinárodní porovnání příček a objektivitu daných indexů. Stěžejní částí této práce je kapitola věnovaná regresní analýze s panelovými daty zahrnující 22 let pro těchto

devět zemí. Regresní rámec prokazuje, zda se mezi závislou proměnou životní spokojenosti a dalšími nezávislými proměnnými: míra dosaženého vzdělání, nezaměstnanost, naděje dožití při narození, nerovnost rozdělování příjmů, úmyslné vraždy a HDP vyskytují vzájemné vztahy. V poslední části autor stanovuje nevhodnost HDP jako ukazatele pro kvalitu života a podkládá tento názor jak svými výsledky, tak závěry z jiné odborné studie.

**Key words:** Quality of Life Index, Better Life Index, Human Development Index, World Happiness Report, international comparison, indicators for quality of life measurement, panel data regression analysis

**Klíčová slova:** Index kvality života, Index lepšího života, Index lidského rozvoje, Zpráva o světovém štěstí, mezinárodní porovnání, ukazatele pro měření kvality života, regresní analýza s panelovými daty

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## **List of Abbreviations**

BLI	Better Life Index
CMEPSP	Commission on the Measurement of Economic Performance and Social Progress
EdAtt	Educational Attainment variable
EU	European Union
GDP	Gross Domestic Product
GNP	Gross National Product
HDI	Human Development Index
IntHom	Intentional Homicides variable
LExp	Life Expectation variable
LSat	Life Satisfaction variable
OECD	Organisation for Economic Cooperation and Development
ONS	Office for National Statistics
PISA	Programme for International Student Assessment
QOL	Quality of Life
QOLI	Quality of Life Index
SDSN	Sustainable Development Solutions Network
UNDP	United Nations Development Programme
UNE	Unemployment variable
InIn	Inequality of Income Distribution variable (income quintile share ratio)
WHO	World Health Organisation
WHR	World Happiness Report

## **Countries Abbreviations**

BEL	Belgium
DNK	Denmark
FRA	France
GER	Germany
IRL	Ireland
ITA	Italy
LUX	Luxembourg
NLD	Netherlands
UK	United Kingdom

## 1. INTRODUCTION

The term quality of life (QOL) is frequently used in these days. But who could really explain this broad term with just one definition. There exist many aspects from which this comprehensive term could be explained. Researches across the world are trying to analyse it, and come up with some universal approach for its calculation. But who does really know what are the right dimensions to take into consideration? What really affects our quality of life and overall life satisfaction. There is one common consensus among various approaches. The quality of life for given country, area or people should be always positive and as high as possible. Also, it has been found that life satisfaction is based on a very subjective opinion of every single human being, who are affecting by various factors.

Of course, there have always been and always will be the organisations or individuals with one simple goal, which is to generalise this term and quantify it. Ever since the foundation of OECD in 1961 their main mission is to enhance better lives for a people through the help to governments with policies arrangements. In 2011 OECD launched its Better Life Index in order to introduce a common measurement for well-being for its 35 member states. They demonstrate the QOL measurement on a basis of 11 main dimensions where each of them has also several subdimensions. (OECD, 2017b) Another approach of QOL measurement is Human Development Index measured by United Nations or Quality of Life Index by Inter Nation. This one is quite special, as it gathers data for its computation from the expats living in given countries. From other point of view the “happiness score” base on interviewed people shows World Happiness Report. All those indexes have one common goal, to find out which country has the most satisfied citizens, they rank countries from the quality of life perspectives. Even though, there are many similar aspects, the country rankings differ. In this thesis, there is compounded so called Aggregate Quality of Life index from these four indices in order to find out differences between nine developed European countries on a basis of QOL and the objectivity of given indexes.

A problem with a “right” QOL indicator recognition is ongoing process. As was stated earlier it is very hard to estimate the proper dimensions which would really explain QOL and people’s well-being. GDP is considered as the most controversial one. National life quality is frequently classified according to country’s GDP. As Fender, Haynes and Jones

(2011) stated in their research, GDP brings assorted deficiencies and limitations to the measurement. Gross domestic product represents the economic output of an economy, which is useful for a recognition of economic activity rather than individual's satisfaction. Also, Easterlin (1974) examined a speculative connection between well-being and GDP, and compiled his happiness-income paradox. This thesis, detailly examined GDP as QOL indicator and also provides further broad analysis of other often used quality of life dimensions, whether they are suitable and are able to explain the term.

## **2. OBJECTIVES AND METHODOLOGY**

### **2.1. Objectives**

The main goal of this thesis is to determine a broad term of quality of life. There is many definitions and opinions about the quality of life comprehension or even just definitions. There also exist many different approaches to QOL measurements. The author will take four of the most well-known indexes such as Better Life Index, Human Development Index, Quality of Life Index and World Happiness Report and on a basis of dimension index and arithmetic mean the Aggregate Quality of Life (AggQOL) index will be set for nine European countries. The aim of AggQOL is a ranking comparison of these nine countries based on their life quality, and the objectivity of a given world indexes and their measurements.

Another goal of this thesis will be rather connected to the suitable indicators for QOL measurements. As the author will examine many of available QOL research approaches, there will be chosen the most used indicators or subdimensions of QOL in order to find out their connection to the life satisfaction, which will indicate the QOL. Regression analysis approach using panel data for given indicators in same nine European countries, will reveal the significance/non-significance of relationships between life satisfaction and educational attainment, unemployment, life expectancy at birth, intentional homicides, inequality of income distribution and GDP per capita growth.

Discuss the GDP (an original measure of an economic activity) measurements as a broad used indicator for comparison of wellbeing among countries, although it has never been intended to be a social progress indicator. But is this truly explaining and reflecting the right situation in the country in terms of quality of life? Therefore, GDP will be analysed in close connection to QOL measurement.

### **2.2. Methodology**

The thesis will be divided into two basic parts – the theoretical and own analysis. The first part will provide a literature review and it contains of qualitative analysis of comprehensive term of quality of life and its existing measurements. On a basis of induction and deduction in an available related literature.

The part of analysis will be done using method of both descriptive as well as quantitative such as regression analysis. Practical part is divided into three main sections. The very first one is dedicated to the Aggregate Quality of Life index (AggQOL) for 2015 for nine European countries (Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherland and the United Kingdom). AggQOL is a composition of four well-known and world-wide indexes: World Happiness Report (WHR), Human Development Index (HDI), Quality of Life Index (QOLI) and Better Life Index (BLI). Firstly, the data of regarding indexes and countries for year 2015 were gathered from various internet sources. Every index data was collected from its original database of given organisation. The maximum and minimum values were set in case of every index and therefore the dimension calculated for each country in each index. The dimension index calculation depends on actual, minimal and maximal value of each index and country, it span is from 1 as the best result to 0 as the worst. Just in case of QOLI the maximal and minimal values were interchanged, forasmuch in this index it is applied, the lower the better. Secondly, the calculation of AggQOL for every country was compounded with a help of arithmetic mean of its dimension indexes from four available indices. Finally, the differences in country ratings between AggQOL and four well-known indices were also calculated. Microsoft Excel software was used for calculations and creation of result tables. Detailed methodology of given research is later described in a thesis.

Secondly, there is a regression analysis research, which describing the relationships between endogenous variable represented by life satisfaction data and six other exogenous variables for nine above mentioned European countries– educational attainment, unemployment, life expectancy at birth, inequality of income distribution, intentional homicides and GDP per capita growth. Time period covers 22 years, from 1995 till 2016. Dataset contains 198 observations, and it is in a form of a long, balanced and fixed panel data. Data about life satisfaction are gathered from a questionnaire and personal interview done by Standard Eurobarometer, where at least 1.000 people from each country of European Union were asked to answer the question “How are you satisfied with the life you lead?” with a choosing the most appropriate option from “very satisfied” till “no at all satisfied”. So, as these data are in a categorical form, there were edited through assigning different weights to different answers to the quantitative data format. Even though, it was gathered the data of regressors from the same database, it was not possible, so multiple



sources were used in order to compile a comprehensive dataset. There also occur a problem with missing values, which was solved by interpolation of time series. All the data were processed in Microsoft Excel software and following regression and all the related tests and verifications were done in Gretl software version 9.1.13 win32. As this is a case of panel data regression, firstly the panel diagnosis had to be run in order to find out the best method for model estimation. Although, fixed effects were picked as the most suitable one, after a verification of estimated parameters, the author decided to incline towards the pooled OLS method, as it provides better outcome of economic and statistical verification. The more concrete and specific methodology is later described in a chapter 4.2.2. of this thesis.

### **2.3. Research Limitations**

The author is aware of a specific research limitations which occurred during the practical part of a thesis. The first analytical part concerning about AggQOL index, originally there was intended to include more world known indexes for QOL measurements, such as Where-to-be-born index. But unfortunately, it was not possible due to not sufficient data in case of Lichtenstein and different years of studies. Also, there was not sufficient methodology about mentioned index, so the author could not calculate the index for this country.

Secondly, the part of analysis dedicated to regression analysis faced considerable insufficiency in a term of data collection. The author had to rely on the assumption and research of Eurobarometer, who provides the data about countries life satisfaction. As this bureau belongs under the European Union the available data were logically just for its member states. And because of the intention of a long panel data dataset, the author required long time series data, which, however, is not met by all EU countries. That is one of the main reasons, why the countries of interest in this thesis, are all highly developed countries of Europe. Because, for example the Czech Republic or Eastern European countries with different economies joint the EU in 2004 where there was an Eastern enlargement.

### **3. THEORETICAL PART**

#### **3.1. Literature Review**

One of the main problem mentioned in this thesis is the problem with GDP as a quality of life indicator for its measurement. There has always been a speculative connection between life satisfaction of individuals and GDP. These discussions have brought many interest from public and have helped to discover many interesting studies. Easterlin (1974) firstly introduced his income-happiness paradox in other words Easterlin paradox. This paradox explains relation among per capita income and national happiness. His research brought an interesting finding about disproportion of two mentioned parameters. It shows that even though there occurs increase in overall national happiness, there is decrease in income per capita. After publishing this study, there have been many researches who re-examined this relation.

Easterlin also claims that according to his researches together with Angelescu (2009), there is no significant relationship between GDP growth and happiness of citizens, when a long-term time series are taken into consideration.

On the other hands, research done by Sacks, Stevenson and Woifters (2010) stands on the opposite site when it comes to interpretation of relation between income and overall well-being. They build their thesis on an argument that one's satisfaction is heavily influenced by absolute income of an individual. They also see a direct connection from the fact, that in countries, where is rapid economic growth there is also a rapid growth in life satisfaction.

As Fender, Haynes and Jones (2011) stated in their paper: "Since the early 1970s, researchers, national statistical agencies, and international agencies like the World Bank, the Organisation for Economic Cooperation and Development (OECD), Eurostat, and the United Nations Statistical Division have been working to produce more accurate and comprehensive measures of well-being. The search was given fresh impetus following the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP) (CMEPSP, 2009). Commissioned by French President Sarkozy and chaired by two Nobel economists, Joseph Stiglitz and Amartya Sen, the commission concluded that,

“the time is ripe for our measurement system to shift emphasis from measuring economic production to measuring people’s well-being.”

Based on previous events, in 2010 the British Office for National Statistics (ONS) introduced a systematic programme dealing with national well-being measurements. A very basic purpose of this first part of a nationwide debate was to gather sufficient information about what people’s matters and what affects their personal satisfaction with life. In accordance with this research done by OSN, Fender, Haynes and Jones (2011) evaluated and categorised the results in their paper. The main categorization of well-being measurements is divided into two broad groups: monetary and non-monetary measures.

### **3.2. Quality of Life Definition**

In these days, the term “Quality of life” is a very frequently used. It is something that is regularly promoted by health care companies and its improvement everybody wants. But what does it really mean? How all of the people, businesses or governments could define it, when it raises to the surface that nobody really defined this broadly used term “Quality of Life” (IESE Business School, 2013). There exists many of possible explanations and studies how to define it properly. One of them is a very aptly named research by Barcaccia et al (2013: 185-203) “*Defining Quality of Life: A Wild-Goose Chase*”. The authors try to emphasize an evasive perception.

As most people, predominantly doctors and scientists, believe in the best way of quality of life measurements are different rating systems of their patients to pain measurements or evaluating of all disabilities one could have, Barcaccia et al (2013: 185-203) tend to reject these theories. According to them it must be examined from much more broader perspective which is rather multidimensional and very subjective to a given individual. There must be taken into consideration both positive as well as negative aspects of life. It can be described as a very dynamic circumstance that reacts to one’s life events. Such as unstable family and acquaintance relationships, sudden illness, losing a job or other disturbances that may change one’s perception of “quality of life” very promptly and seriously.

Although the measurement is extremely demanding and problematic the authors put a huge emphasis on clarity of a definition. They compare it again to the medical examinations where doctors must be very specific with diagnoses as well as with an aftercare.

Over the last 20 years none of analysts could find a clear, explicit and common definition in scientific papers. Most of the researchers do not even struggle with a precise definition, they just simply use it as an indicator. Based on various observations of “quality of life” interpretation the authors came up with several points that could approximate accurate explanation. Firstly, and simply is it personal satisfaction with a life, which may very oscillate. The second point is more detailed listed as “multidimensional factors that include everything from physical health, psychological state, level of independence, family, education, wealth, religious beliefs, a sense of optimism, local services and transport, employment, social relationships, housing and the environment” (IESE Business School, 2013). Still another dimension of people’s everyday life shapes the quality of life perception. There must be included cultural aspects and values, personal anticipations and aims of what one’s expects from life. This is very much rooted in a background where a given individual was born and raised. As well as a possibility of proper education and personal development play a key role in a point mentioned above.

Of course, the health perspective cannot be missing. It is not enough just an absence of illness, but physical, cerebral and social welfare must be presented. Barcaccia et al (2013: 185-203) emphasize the importance of multidisciplinary medical teams, because not just a physical care, but also an evolution of an aspect on psychosocial needs.

Another way of defining quality of life term is an interpretation of specific facts and events, which people use for an explanation why some handicapped people enjoy “better” quality of life than others. Also, it is very connected to people’s mental and psychical balance. It reflects to ability of accept a current condition, and mainly a skill to adjust negative reflection about that condition into more positive one (IESE Business School, 2013).

It is definitely worth to mention Farquhar’s four different definitions of life quality. According to Farquhar (1995) there can be cited four different ways: global, component, focused and combination interpretation.

The first type – global definitions contain the very usual and frequent approach for quality of life definition. It includes wide range of all possible definitions and it encompasses perception of satisfaction and happiness as well as dissatisfaction and unhappiness. The second type, named as component definitions, simply because those comprehensive definitions are break into pieces of defined dimensions or components or closer determine specific characteristics relevant to quality of life definition. This component - second type definitions are more useful in a research with empirical background in comparison to the first type definitions, because the operationalization of concept is better explained by component definitions.

Focused definitions, so called the third type, are very concentrated ones. They compose just from one or a very few components concerning the quality of life. This type is used predominantly for definitions formulating explicitly to health and operational ability, such as “health-related quality of life”. Another very common usage of focused definitions occurs in more micro-economic environment, where those definitions specify customer satisfaction reached by a consumption of market goods and services, public goods, leisure and so on.

The last but not the least is a type number four. So, called combination definitions, exactly because as the title says, those definitions are combinations of the first and the second type (global and component). So, those definitions are on one hand very broad and general, but on the other hand very specific as well (Woźniak and Tobiasz-Adamczyk, 2014).

### **3.2.1. Historical Development of a Term**

There must be pointed out, that even a term of Quality of life is used mainly in 20<sup>th</sup> century, the first mentions concerning one’s life satisfaction dates to classical Greek era several hundred years B.C. to Athenian philosopher Socrates. Who noted “the unexamined life is one unworthy of living” (Rapley, 2003: xiii). Ever since the Western literature and philosophy could be viewed from the perspective of life’s quality and its importance for human beings. Even though some people deprecate this as ‘worthless figment of philosophical musings’ the outcome of such a doubting has always been beneficial as well as practical and useful for further examination (Rapley, 2003: xiii-xv).

In 1929 the term Quality of Life by itself was firstly used by social scientist Pigou in connection to societal welfare and economics discussion. He was speaking about governmental welfare establishment for a lower class (Glatzer et all, 2004: 21-22).

Even the Second World War period can be involved. Where the Nazis interpreted the meaning of the quality of life in their own way. In the 1930s and 1940s German psychiatrics and doctors abundantly condemned people with mental disabilities, chronic diseases and prisoners to euthanasia. Because according to their conviction, those lives were 'unworthy to life'.

Robert Edgerton, the well-known ethnographer of 20<sup>th</sup> century focusing on the lives of people with mental disabilities, designated the term Quality of life as a "shibboleth of the 1990's" (Rapley, 2003: xiii). The phrase 'shibboleth' sheds light on this importance of this event as it demonstrated the permanent nature of the field and other needful potential research and analysis within this QOL concept. This term is frequently used in various discussions in civil life since 1960. From just a regular ability of living in countries, cities or villages to a comprehensive debate of politicians about social policies and services, personal outcomes of mental and physical health (Rapley, 2003: xiii-xv).

Idea to quantify the QOL is constantly involving. An effort to compile exact numerical parameters and identify the right dimensions that could clearly determine the life quality of selected person or nation. Between quality of life calculations can be also counted controversial study of bioethicists Helga Kuhse and Peter Singer in their book 'Should the Baby Live?: The Problem of Handicapped Infants' who tried to examined and calculate the possibility of normal life for foetuses diagnosed with Down syndrome (Louhiala, 2004: 131-132).

A great deal of analysis on quality of life has been the research of social psychologists Antaki and Rapley who in their literature review of 1996 published more than 2,500 articles during previous three years, dealing with QOL specification and problematics. 44 single definitions were defined in survey of Beverley Hughes between years 1970 – 1993. Cummins (1997) identified over 100 models and definitions in an effort to clarify the importance and measurability of QOL (Rapley, 2003: xiii-xv). Between years 1994 and 2001 the 'British Medical Journal' identified entire 702 journals that had 'quality of life'

keywords stated as a main title. Even when a person writes 'quality of life' into Google browser, the result of founded articles would count almost to an enormous number of 3,500,000 possible webpages. Rapley (2003) states that the QOL issue is clearly a very powerful and pervasive concept that is increasingly reflected in nowadays life. A prove of a still growing popularity is reflected in all the references stated in a fragmented literature. However, there cannot be forgotten the critical insights into QOL topics, measurements and related social policies. As Rapley (2003: xv) cited in his book words of research Cummins, that contemporary literature is too extensive for all the researchers to entirely accommodate within each other.

In the beginning of twentieth century it was Gross National Product (GNP) or often also called as "the material level of living" which was calculated as an indicator for a life quality, but clearly it cannot be used for such an indication. Cummins attributes the emergence of a concept of QOL, in the it is known in these days, to the speech of a former US President Johnson in 1964. Where in a section on improving a social agenda, he specified that it is not possible to indicate the population's satisfaction with the volume on their bank accounts, but there must be taken into consideration the quality of life of American citizens. Ever since this gave a political authority some kind of a very powerful instrument. When they provide people a lot of definitions and noble expressions about QOL improvement. Nevertheless, there is no such an exact definition of this term and a lot of people can understand it in their own ways. That is exactly what suits them the best (Rapley, 2003: xv).

In a middle of 1960s in the United States there started the beginnings of a social movement, later called as, 'social indicators movement'. It was provoked by the revelation of shortage of an adequate data as well as methodology and concepts. The project director Raymond Bauer, who also proposed the term of 'social indicators' defined them as a: "statistics, statistical series, and all other forms of evidence that enable us to assess where we stand and are going with respect to our values and goals." (Rapley, 2003: 5).

The overall term Quality of Life has become more and more wavering or global meaning over the time of its usage. Nowadays it is broadly used to describe wide range of social from social to economic indicators. From the satisfaction of individuals in connection to their lives to state bank balances. QOL is characterize for an evaluation of living in

different world's cities as well as for a description of result of a political project. The index concurrently demonstrates the levels of property holding, felony, also women's involvement in governmental operations and many other various indicators can be included.

### **3.3. Quality of Life Research Approaches**

The evolution of a modern concept of QOL was neither prompt nor inevitable. There were two main and contradictory concepts of viewing on a life quality. That perceived QOL for a whole population or at a societal-level' concern. One of the approaches is identified as a Scandinavian Model, where the well-being and welfare state is the main goal achieved by the equality, universality and objectivity of society as a whole. This model is well described by Erikson and Uusitalo in 1987. The research perceived the welfare as a mediator for resources with which people may control their 'living standard level'. Resources that citizens demand so they can ensure their personal welfare are mainly quantify in terms of money, ownership, education as well as individual relations, safety guarantee and so on (Rapley, 2003:4-10). However, on the other hand there is Noll's approach called the American Model.

#### **3.3.1. The Scandinavian Model**

As the name already reveals, the Scandinavian Model is popular for northern Scandinavian countries, even though each country interpretation is little bit different the main principles remains constant and applicable for all.

According to authors Robert Erikson and Hannu Uusitalo (1987: viii) the fundamentals of the Scandinavian Model rely on "a broad public participation in various areas of economic and social life, the purpose of which is to promote economic efficiency, to improve the ability of society to master its problems, and to enrich and equalize the living conditions of individuals and families. In a social policy, the cornerstone of the model is universalism." In accordance with this statement, it can be claimed that at least on a paper the Scandinavian countries laid down the foundations for a welfare nation, where the whole population is included.



It should work on a basis of preferences made for a people, which in a practise means to prefer comprehensive programs over personalised ones. There is a free of charge public education system available for everyone, which is discouraging from expensive privately-owned schools. As well as health care works on a similar basis. Everyone has a claim for a free or inexpensive health protection. The preference of all families with allowance for a child, instead of providing a financial support to the poor mothers. Of course, there is an assurance of universal pension, which supports also people who did not have such a profitable employment, including housewives with a right for a pension allowance. Also in a real estate sector, the priority has common housing policies instead of a “community housing” (Erikson at all, 1987: vii – ix).

Simply the main aim of the Scandinavian Model is to guarantee ‘egalitarian institutions’. In other words, those institutions providing an assurance of a minimum wages and general social services to the poorest. Which not only leads to increase an overall standard of living, stated very highly for those countries on the international rank, but also it decreases the need of developing some exclusive services and cause some aggregate redistribution of resources and revenues. Overall goal is to unify the population through social policies, rather than splitting it up into two contrary groups. One is “people who are receiving the benefits”, while the second one is “people who are the supporters and have to pay”. Services and allowances are perceived as a right for the whole nation, instead of charity for those who needs.

Indeed, there cannot be forgotten that all of these are just an ideology, which always look better and definitely easier when its set just on paper. In a reality, it does not work that smoothly. Erikson at all (1987) in a social policy study research proves repeatedly mistakes made by a government, that contradicts with a basis of the Scandinavian Model. The equal opportunities and allowances for everybody are rather unequal. Disparity remains and unfortunately the favouritism and misery can be seen, if ones look carefully. Many social policies in an attempt to be neutral, it has become too neutral, so therefore it comes to redistribution, is not clear where to implement that money. Also, the generality of individual social programs is not as general as it should be according to the Scandinavian ideology. There could be listed many other failures that hinder northern countries to become an absolute welfare countries.

But on the other hand, there must be pointed out, that there are still many evidences of a positive results after applying the Scandinavian Model, which is not definitely just an ideology. According to the evidence of Erikson at ell (1987) the effort of developing an ambitious and great welfare state established on a basis of parity and universalism brings outcomes.

### **3.3.2. The American Model**

As already mentioned above, on the other hand there is Noll's concept to quality of life research, which is more concern about the 'Western' world. Therefore, it focuses specially on American QOL – The American Model. In this research of life quality or measurement of welfare, the core for a model lies in a valuation of a subjective indicator of just one particular citizen, which measures their actual happiness and satisfaction (Scott, 2012: 20-21).

### **3.3.3. Social Indicators**

While in the text above, there is distribution between American and Scandinavian approaches to QOL researches. It is worth highlighting the relevance of further division to 'objective' and 'subjective' indicators of social welfare. According to Noll's earlier Scandinavian research concentrates on objective indicators such as poverty, unemployment, health, and other similar indicators that characterize social factors separately from personal evaluation of individual people. Which contrast to the American Model and its subjective indicators depending mostly on individual perception and evaluation of distinctive public well-being (Rapley, 2003: 10-12).

#### **3.3.3.1. Subjective Indicators**

In a short and in a simple terms subjective indicators are the opposite to objective ones, which means, they are based on the premise that well-being in its final essence must always be perceived only by an individual and can only be assessed by the very individual on the basis of his own experience and perception.

Subjective indicators, are indicators used primarily in an American quality of life bases measurements. According to a quote by social psychologist Thomas (1928: 571-572), cited in Noll (2004: 7): "if men define situations as real, they are real in their consequences", he defined welfare as a subjective indicator of well-being. The main idea behind this approach

underlying the fact that life quality and well-being are assumed to be judged and subjectively comprehended by the individual citizens who had have experienced it.

In accordance with this approach the subjective welfare of individuals is counted as the only and definite goal in development of society and as a milestone using for a quality of life measurement. The life quality and welfare must be gauged with the eyes of a personal experiences of an individual.

There must be underlined one of the founding of subjective indicators research, which is the fact that all the policy makers should have use subjective indicators together with the objective ones. Veenhoven, (2000: 6, cited in Noll (2004: 158) states the indispensability of subjective indicators in social policies, because of the increasing guarantee of success of a given policy as well as for a help with policy goals selection.

Of course, this position has also a lot of critiques mainly by those, who inclines to the opposed theory of objective indicators and connected Scandinavian approach, whereas these two branches of measurement of quality of life differ in the basic principles. One of the main critiques is R. Erikson, who criticizes the point of view from where people evaluate their satisfaction as “measuring how well they are adapted to their present conditions” (1993: 77, cited in Noll (2004: 8). Because in accordance with Erikson as a prominent figure of Scandinavian approach “people’s opinions and preferences should go into the democratic political process through their activities as citizens, but not through survey questions and opinion polls” (1993:78, cited in Noll (2004: 158).

Another criticism that subjective indicators must face is the growing suspicion of the inherent dignity and credibility of such a data and information. Nevertheless, there is no such a valid reason why subjective indicators should be questioned, inasmuch as there they are not less credible or valid than any other research data.

### **3.3.3.2. Objective Indicators**

The application of objective indicators is based on the hypothesis that living situations can be derived as beneficial or unbeneficial by comparing actual circumstances with normative principle such as values, objectives or aims.

A very important assumption is the presence of general or even political acceptance of three crucial issues. The first consensus focuses on selected dimensions that are relevant to

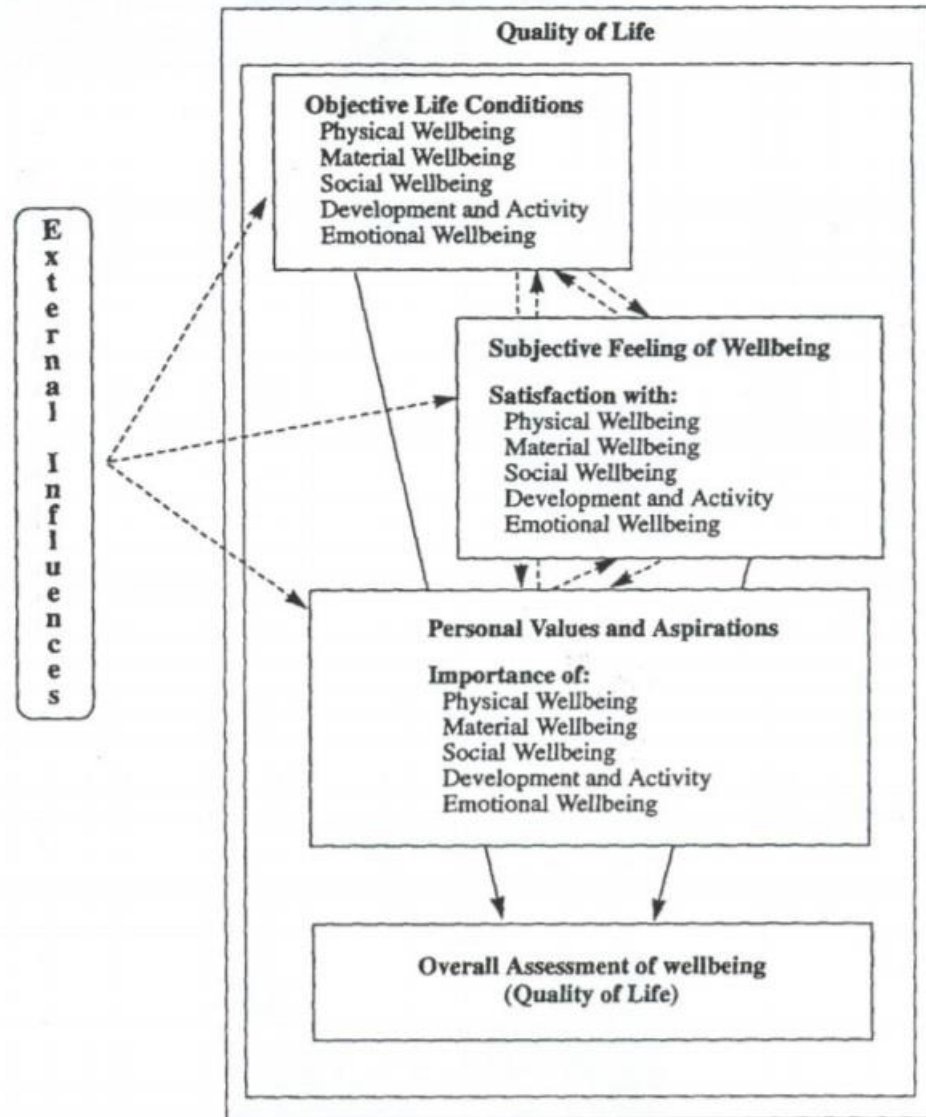
comparative welfare. The second one simply deals with a poor and bad conditions. The third one and the last on study the direction of the society to go. This can be occasionally the case that can be guided by these three issues. But, of course, it is not always upright. It can be certainly said that there will be a common consensus assessing the lowering of crime and unemployment rate along with the increasing average salary and level of education as progress and a clearly beneficial step forward in a society. However, other indicators, such as the retirement age, are considered here, with little certainty, and may be rather questionable (Noll, 2004)

Nowadays, there is a general consensus that most researchers have advocated is that the measurement of the quality of life requires a consideration of the two indicators mentioned above: objective and subjective. Similar living conditions are assessed quite differently on the basis of these two approaches. Even though, the usage of subjective and objective indicators in definitely the predominant one, of course, there exists other distinguishing features for a welfare measurements (Noll, 2004).

The Quality of Life Model presented by Felce and Perry (1995), cited in Woźniak and Adamczyk (2014: 9) shows, the life quality is formulated as an aggregate well-being that contains objective and subjective valuations of emotional, social, physical and material well-being. In a simple explanation well-being is considered as quality of life. An overall evaluation of well-being is divided into three following categories with different factors: Objective Life Conditions; Subjective Feeling of Wellbeing and Personal Values and Aspirations. Together those three groups of factors represent External Influences that affects the extensive quality of life model.

The first category Objective Life Conditions are indicators evaluated on the basis of personal set of experiences and values. Between those indicators there can be counted a physical well-being, emotional satisfaction, material conditions, development and activity as well as social well-being. The second one is Subjective Feeling of Wellbeing where is personal satisfaction valuated on the same above-mentioned indicators of Objective Life Conditions. In the third group, Personal Values and Aspirations there is considered the individual importance of those same indicators as mentioned in in the first and second group. See the Figure 1 for illustrative interaction between those three afore mentioned elements.

**Figure 1: The Quality of Life Model**



Source: Felce and Perry (1995), cited in Woźniak and Adamczyk (2014: 9)

Based on the Quality of Life Model above Felce and Perry (1995), cited in Woźniak and Adamczyk (2014: 9) there is presented 5 main indicators representing quality of life measurement. Those are emotional, social, physical and material well-being along with personal development and activity.

Between physical well-being there can be counted personal health and safety, fitness condition and mobility. Material circumstances (well-being) are based on income and financial conditions. But also, a very important role here plays the living quality connected to one's neighbourhood and environment, which providing a source of a perception of

stability and moreover the security. Also, aspects such as property, transportation, privacy and food quality should be considered.

Thirdly, social well-being could be investigated as two main domains, in connection to impact of interpersonal relationships and as an outcome of community involvement. Between significant important interpersonal relations belong those with families, relatives and acquaintances along with household's relations. On the other hand, community involvement embraces participation in several social activities. Also, the support and the acceptance level acquired must be taken into account. The self-respect or status, feeling of realization and personal satisfaction, confidence and belief, all those positive aspects belong to another domain concerning emotional well-being.

Lastly, development and activity is uptight with an ability to use gained experience from relationships to self-sufficiency. There is a sense of independence or competence and control or possibility of choice. Further, the effort of a functional activities including education, job, work in a household, hobbies and contribution or productivity.

### **3.4. Relevant Dimensions and Indicators for QOL**

#### **3.4.1. Health Related QOL**

There has always been an evidence for a relationship between well-being and health. This connection is fundamental and mutual, and of course, the life quality of populations has always had a great impact on a health sector for multiple matters:

- A big advantage that well-being measurement offers is more general and unified health model. One that combines the mind and body health into one.
- Well-being as a perception brought much more relevant concept to the people.
- The lower risks for a disease, sickness, injury or illness; improvement in functioning of immune; faster curing and recovery; all these progresses are associated with higher degrees of well-being.
- Well-being value is considered to be predictive. This predictability, for example, can help to show life satisfaction and to detect behaviours such as suicide on time.

It is still necessary to mention that as the figure of income cannot provide an indicator for showing progress in society, sickness and mortality are giving an insufficient picture of the health in a society. There are clear evidences confirming the reality that even there are people who suffer from diseases or mental disabilities, their quality of life and life satisfaction may show higher values than those, who have a very good mental health (WHO, 2015: 70-73).

Even though well-being has always been one of the most significant indicator for health measurements in World Health Organisation (WHO). There cannot be forgotten the main purpose for WHO (2015) goals, which are a reduction of death level as well as illnesses and disabilities in preference to complete well-being measurements.

There has been a research done by Finnish associate professor Markku Hyypä (2010) confirming an existing link between ones' health status and their overall satisfaction with life. Especially when older people are taken into a consideration. It could be said that affirmative well-being has a certainly positive impact on health condition. As a core component of ones' well-being is the perception of satisfaction of his life in connection to positive emotional experiences the one individual can possess. Of course, the whole satisfaction is affected with personal most relevant objectives and values.

**Figure 2: Conceptual Model of How Social Capital Impacts on Well-being and Health**



*Source: Hyypä (2010)*

As could be seen in a model above, a great emphasis on a health in connection to ones' quality of life have cultural activities. The research about quality of life perception among older people showed its enhancement. There is an increasing involvement over time in leisure and collective activities which helped to improve well-being perception of a given person (Woźniak and Adamczyk, 2014).

#### **3.4.1.1. Health 2020**

There should be also mentioned the European health policy framework Health 2020, which was introduced by World Health Organisation (WHO) Regional Committee for Europe in September 2012 for 53 Member States counting the Region and beyond as well. Its goals are: “to support action across government and society to: significantly improve the health and well-being of populations, reduce health inequalities, strengthen public health and ensure people-centred health systems that are universal, equitable, sustainable and of high quality” (WHO, 2017).

Health 2020 policy is underlined with the six outreaching goals (targets) under which the Regional Committee consented on the gradual adoption of measures and developments



leading to the success of the implementation of this health policy in a whole Europe. Strategic goals and policy preferences are tightly connected to the targets of Health 2020, this is considered to be a huge benefit of these targets (WHO, 2012).

In the Health European Report (WHO, 2012) there is a list of the six underlying targets:

1. In Europe by 2020 there should be a reduction of premature mortality.
2. Expectancy of life in Europe should be on higher levels.
3. Health equalities should be in a balance. With other words, there must be a reduction in European health inequality.
4. European population well-being should be improved.
5. The health coverage in Europe should be provided universally.
6. National targets should be established and compile by Member States.

### **3.4.2. Economic**

#### **3.4.2.1. Income and GDP**

When it comes to income and GDP as indicators of QOL measurements, there is no an easy definition about it. More about those indicators is later discussed in practical part of the thesis. Of course, the first of all there should be defined:

#### ***Economic Well-being and How Does It Differ from Economic Growth***

For the beginning, there must be mentioned the basics which is that economic growth increases over the time. Therefore, it is defined as a long run increase for a productive potential of a country. Economic growth is very important, it is needed for an enhancement of capital incomes, in order to prevent people from absolute poverty. Which is all connected to the increment of overall average living standard. As is known, GDP per capita is being often used as a basic measure of people's well-being and life quality, even there are being doubts about the accuracy of this measurement.

What are the most of economists concerned about is the reason why there is a consideration of economic welfare instead of a social welfare, which according them should better display the people's well-being situation. Economic welfare could be defined as of a broader measure of our happiness, including economic as well as social factors of a quality of life. But of course, not everything that people concern about is possible to measure, definitely not everything that matter has a materialistic measurable base. That is

why the economic welfare tries to capture the inequality, and tries to track how do people in the middle of the income distribution. Which means that economic welfare rather includes median incomes, rather than just their means.

From which it follows, that the best definition for an economic welfare is it is a multi-dimensional concept. Well-being of nation's measurement definitely goes beyond the rate and or the level of GDP growth. Even though, the GDP per capita is usually included in a well-being measurement, as well as an income per capita. But some very important basic cannot be forgotten and must be underlined here.

**Figure 3: Important Dimensions for Economic Well-being Measurement**



*Source: Riley (2016)*

For example, there must be taken into consideration not just an income per head but rather preferable a spending per head. Instead of searching for an average income, there should be a search for median income. Furthermore, look out for a household net wealth, which means, looking for people's value of assets not just in a physical and financial way, but there is taken into consideration how much people owe or in how big debt they are. Which unambiguously summarizing that wealth of household equals to value of people's assets minus their liabilities.

It cannot be looked just at value of output, but also on a people in work. There must be a look at an unemployment rate plus an employment rate – how many people are looking for a job or how many already has one.

A very crucial aspect is a properly look at a financial position of a household. What level of security they feel about their jobs, do they feel secure about their current household position and also is it going forward, do they count about a secure future?

So, those are all the evidence that economic well-being possessed more broader indicators capturing real satisfaction and picture about quality of life. So, well-being should capture more indicators, than just per capita GDP or income per head (Riley, 2016).

### ***Median Income***

One of those measures can be considered median income, which represented the middle households from all of the households rated from the lowest to the highest, simply what truly stands in the middle.

### ***Disposable Income***

There should be also look at the disposable income, which shows all the income included together. All the earnings and investments as well as private pensions. It also comprises cash benefits obtained by the state, minus the direct tax like income tax.

### ***Real Median Disposable Income***

So, it follows that the best is real median disposable income, which goes in a cycle improving over the time. If, there is a look at a real median disposable income after the year 2007, which was in the UK about 25 thousand pounds, and then the eight-continuing year there were just a lower numbers of real median disposable income. But in the same time, GDP for the United Kingdom is growing in the last years. It says that the economy is recovering, but the economic well-being measured by real median disposable income does not prove any significant improvement. This could serve as a prove that GDP cannot served as a best measure for a quality of life indicator. And that economic well-being possesses much broader range of perspectives and factors (Riley, 2016).

### **3.4.2.2. Employment and Job Security**

In terms of employment or unemployment, both are among the often-used indicators of QOL, as they play important role in individuals life. Having a job itself, has numerous economic benefits, but also being at work has plenty of other benefits from different spheres. Such as being connected to other people on daily basis, which mean to stay socialised, individual maintain his self-esteem as well as evolve useful skills and competencies. According to OECD's Better Life Index (2017), there have been proven, that politically stable and more healthy societies possess with higher levels of employment rate.

It must be also mentioned the job security factor. It also affects the quality of employment and the psychical well-being of individual. When one does not feel safe and secure about his job position, it has definitely negative affects concerning his overall life satisfaction. Also, it is connected to the fact, that many people might get immediately to a financial crisis, when they lose their job.

### **3.4.2.3. Housing Conditions**

Satisfaction with living condition should be also one of crucial aspects of personal well-being. Everyone should have a place to feel at home, feel safety, feel to be a part of family. This category is of course directly connected to the income of individuals and their ability to manage the money. When it comes to quality of life researches, this factor is usually measure in a form of rooms per person, squared metres per person and so on.

## **3.4.3. Social**

### **3.4.3.1. Time Balance of Work and Life**

Time balance of work and life if very crucial factor, as well as very hard to maintain these two aspects in balance. Both, work and life (here in meaning of leisure time spend with family and friends) require some quality time, which leads to personal happiness. This aspect is frequently measured in terms of working hours of employees and time one's dedicate to personal care or leisure activities.

### **3.4.3.2. Frequency of Socialisation**

Among social dimensions of life quality, should without any question be assigned frequency of socialisation in a meaning of quantity as well as quality time spend with friends, family and other acquaintances. There should be also included the frequency of

“going out” in terms of visiting theatres, cinemas, exhibitions, festival, restaurants, bars and so many others where people go for an entertainment and socialise.

### **3.4.4. Political**

#### **3.4.4.1. Political Stability and Safety**

Political stability is definitely important aspect when dealing with life satisfaction. If a country is politically unstable, there is always some pinch of tension and fear. This all negatively affects personal well-being.

There cannot be forgotten one very important factor, which is the feeling of safety and safety of individuals in general. It also brings a wide range of indicators such as just a feeling safe at home, school, job or outside, or in worse examples a homicide rates, rape rates, kidnapping levels and many other, which affects individual’s wellbeing in the worst case.

#### **3.4.4.2. Citizens Involvement**

Political situation of a country is also expressed by the involvement of citizens in a political process. This is very important since it may affect the shape of upcoming policies that after all defines life of inhabitants in given country.

There could be also included the transparency of government which is still more often requested from its citizens.

### **3.4.5. Educational**

#### **3.4.5.1. Educational Attainment**

When it comes to educational dimensions the one that always occurs is definitely an educational attainment. There has been proven that people who are more educated have longer lives as well as commit less crimes. Also, the education opens door to better pay jobs, better health care and is always being connected it usually brings higher wages.

#### **3.4.5.2. Years of Schooling**

The other aspect of educational dimension could be measured in terms of years of schooling. In general, it means how many years on average an individual spends in schools in order to get the wanted educational degree.

It is also connected to the different skills and received quality of education that one could obtain in different countries.

### **3.4.6. Environmental**

#### **3.4.6.1. Air and Water Pollution**

The quality of environment people live has outright impact on one's health conditions and overall life satisfaction. That is why the environmental quality and its protection should be between top priorities of every state policies. Due to a human activity, there has been an increase of water or air pollution around the world. Not just in an interest of individual, but all of the world there is a need of protection and sustainability of nature as well as its resources.

### **3.5. Measurements**

This part of the thesis is dedicated to an explanation and exploration of already existing Quality of Life measurements and indexes. There cannot be forgotten Eurostat's Quality of Life measurements and relevant indicators including countries of the European Union. Because one of the practical part of thesis is dedicated to aggregate quality of life index consisted from the other well know indicators such as Better Life Index (BLI), World Happiness Index, Quality of Life Index and Human Development Index, those indices have detailed explanation later in this thesis.

#### **3.5.1. Eurostat's Quality of Life Indicators**

Quality of life indicators present ongoing statistics about quality of life in a state of the European Union. It is an online publication provided by Eurostat, the statistical office of the EU situated in Luxembourg. This publication is consisting of 8+1 dimensions that are statistically measurable in order to provide information about various aspect of QOL in the EU. The purpose of those dimensions is considered to be a supplementary measure to the traditional indicator for social and economic development – GDP. The first eight dimensions include a functional ability that EU citizens should possess in order to define life satisfaction by their own priorities and principles. The plus one dimension indicates to a achievement of a person determining his well-being.

To every single life quality dimension has its own set of properly selected statistical factors that are analysed in a following step. Emphasis is placed on time trends and differences between countries or also demographic groups. Eurostat tends to concentrate on showing interesting findings, rather than providing an aggregate presentation of all data (Eurostat, 2015).

#### **3.5.1.1. 8+1 dimensions**

The 8+1 dimensions are listed below. Just to be mentioned they should be taken concurrently, as there should still be the possibility of reciprocal trade-offs.

##### ***Material Living Conditions***

The very first dimension could be divided into three specifying sub-dimensions. Those are income, consumption and material conditions such as housing and deprivation. The most influential and important indicator is income, because of its high impact on a majority of indicators. Income as a sub dimension consists of a various scale of indicators considering both survey of households as well as national accounts (household disposable income, net national income). Consumption, as other sub indicator possessed some similar patterns as income. Some of summary indicators are withdrawn from national accounts – the total consumption or household consumption per head, other indicators focusing rather on households are withdrawn from the Household Budget Survey. The perfect supplementary role plays material conditions, which supplement previous money based attitudes.

##### ***Productive or Main Activity***

There are plenty of activities that fills everyday life of a person. Where a work is considered to be a leading activity in a day. Therefore, those indicators serve for measurement of the quality and quantity of available jobs. Some of them are working hours, balance between work and non-working life, and the question of safe and ethics in a work.

##### ***Health***

Health has the right of basis for measuring the quality of life. When poor health is presented in a society the overall well-being is affected. Very harmful effect on personal satisfaction also have mental or physical problems. Health as an indicator of QOL for EU is mainly composite from statistical factors such as expectancy of life, healthy life years

number, mortality of infants. Healthcare accessibility or own evaluation of their health is included between rather subjective indicators of health.

### ***Education***

Nowadays, in economies based on knowledges, education hold a very relevant role as a base factor affecting life satisfaction of citizens. A job one's can have is determined by his education level. Some individuals, who do not hold such a skills or experiences could be excluded from a broad amount of jobs and sometimes could be omitted from the opportunity to reach precious goals in society. The economic prosperity is also limited for them. The relevant data connected to education and a personal well-being are as followed: an educational attainment of population, the number of people who leave school earlier and life-long learning participation.

### ***Leisure and Social Interactions***

Social networks and connections crated an enormous power over the person's life satisfaction. This is measured in terms of a frequency one is spending time with others at cultural or sports events.

### ***Economic and Physical Safety***

Economic safety in a meaning of economic stability, where the citizens are able to plan forward and overcome unexpected spending, definitely affects the quality of life. Physical safety includes the security in each country, such as the number of murders. A major backlash for quality of life was the crisis. This has shown how influential economic security is.

### ***Governance and Basic Rights***

Even the ability to influence public policies and have the right to be part of open debates are important aspects of well-being. It is equally important to oversee basic democratic elements in legislation and society. Strong governance is always dependent on an involvement of citizens in things like trade unions or political parties. Of course, it is embedded in satisfaction with public services, the level of discrimination and belief in state institutions. Unadjusted pay gap represents the only indicator in a subdimension concerning gender discrimination. Thus, several indicators should be counted.



### ***Natural and Living Environment***

The environmental protection has always played very important role all over the EU. Polluted water or air a result in a reduction in the health, thus reducing the overall prosperity of society. Among indicators there is counted both objective (how many pollutants are in the air) and subjective (how the individuals perceive it).

### ***Overall Experience of Life***

This special dimension focuses on individual perceptions of well-being. It is composed from three sub-dimensions: satisfaction with life (subjective recognition), affect (such as positive or negative feelings of individual) and eudemonics (to have a meaning or goal in a life) (Eurostat, 2015).

## 4. ANALYSIS

The analytical part of this diploma thesis is mainly dedicated to the study about quality of life measurements as well as its definition of right dimensions that determine this broad term. In order to make the analysis more concrete and detailed, the research is done for nine European countries, which are compared at followed. Those countries are Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands and United Kingdom. Autor picked those countries because of their high developed economies, which dominated in the European Union furthermore the Europe. Another common factor connecting those countries is the fact that six of them were the establishing countries of European Coal and Steel Community founded in 1951, the organization that led to the establishment of the EU. The United Kingdom, Ireland and Denmark were in the first, so called Northern, enlargement in 1973.

Simply put, the practical part is divided into three parts of a research. The very first analysis is concerned about different types of already existing measurements engaged with QOL, which are subsequently counted into one aggregate quality of life index. From various QOL measures, this analysis contains from four world-wide and well-known indexes: World Happiness Report (WHR), Human Development Index (HDI), Quality of Life Index (QOLI) and Better Life Index (BLI). All of the them are from year 2015 and are described as ranks of the nine European countries listed above.

Secondly, it follows with a regression analysis framework with a panel data. As the dependent variable, there is a life satisfaction as a whole. It is examined its relationships with exogenous variables such as educational attainment, unemployment level, life expectancy at birth, inequality of income distribution, intentional homicides and very debatable dimension of gross domestic product. Data set contains from already known nine countries between years 1975 and 2016 for all of the variables.

At last, the third part is based on the findings from part of the regression analysis between GDP and life satisfaction. There is broadly examined GDP as a factor affecting quality of life and its frequency of usage as a quality of life indicator. The example on the Easterlin Effect is included.

## **4.1. Aggregate Quality of Life Index (AggQOL)**

The very first part of analysis is dedicated to the Aggregate Quality of Life Index (AggQOL), which is derived by authors own calculations on a basis of rankings from world-renowned and adequate indices. All the calculations are done for nine well established European countries: Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands and United Kingdom. Four selected indexes are first introduced, followed by a sub-chapter with the methodology and counting of the AggQOL for 2015.

### **4.1.1. Indexes of QOL Measurements**

For the AggQOL measurement, there were picked carefully four already existing approaches dealing with life satisfaction as well as quality of life. They are well-known Better Life Index (BLI) yearly published by OECD, the Sustainable Development Solutions Network (SDSN) gathering all the sufficient data for World Happiness Report (WHR) measurement, simply called Quality of Life Index (QOLI) done by Inter Nations, or Human Development Index (HDI) compounded by United Nations Development Programme.

#### **4.1.1.1. World Happiness Report**

Since April 2012, there has been an annual release of World Happiness Report representing an overall world-wide cross-country research about life satisfaction published by United Nations Sustainable Development Solution Network (SDSN). In every report, there can be found deeply described chapters concerning well-being measurements analysed by experts, economics, psychologists and so on with newly obtained outcomes.

#### ***Happiness Score***

The crucial outcome from this report is so called “happiness score” which underlay on a data gathered by Gallup World Poll. Gallup survey collects data from more than 155 countries in more than 140 languages with typical sample size of 1,000 people per year per country. All the people are asked to answer the following question:

“Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?” (Ortiz-Ospina and Roser, 2017).

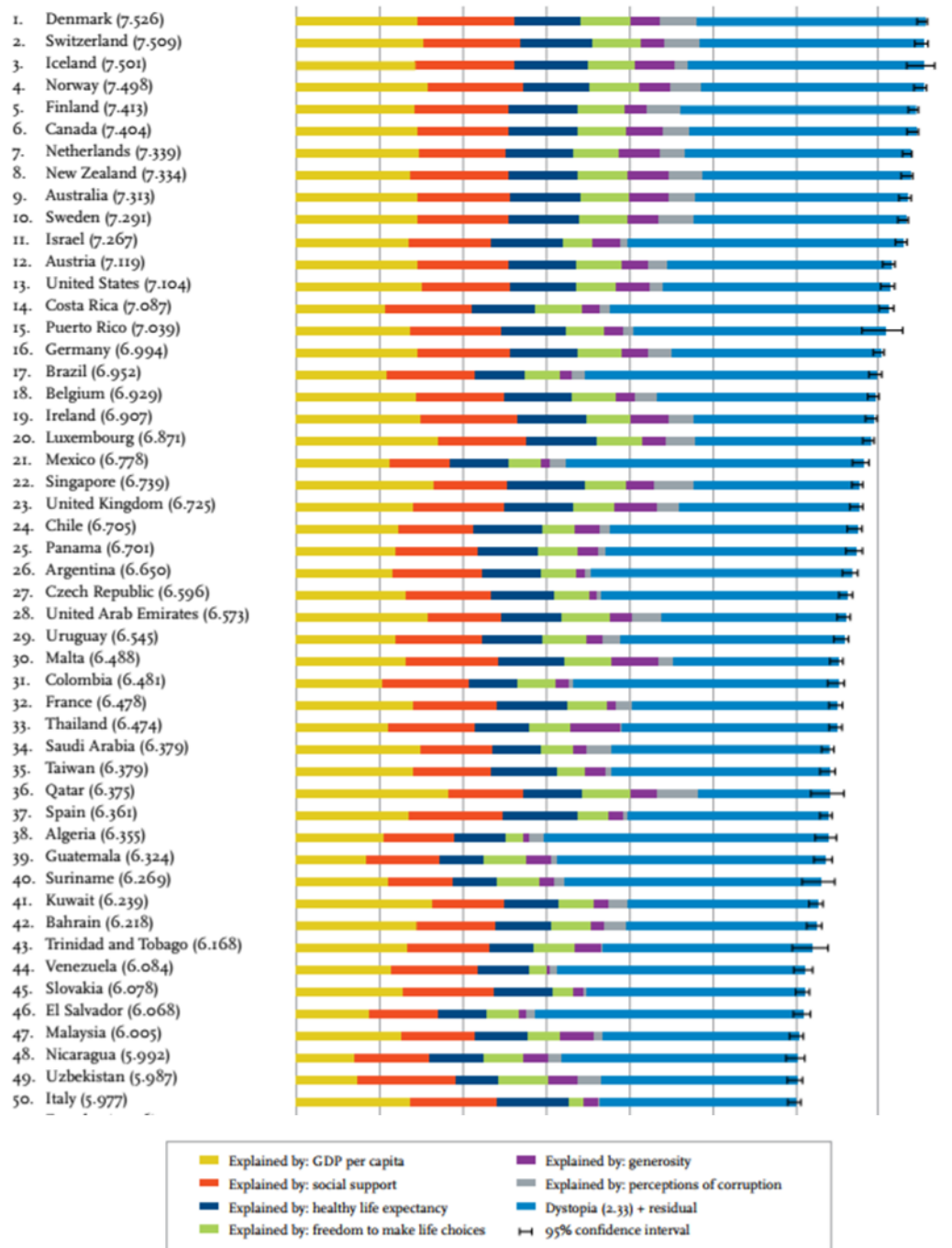
It is also called as “Cantril ladder”. World Happiness Report ranks all of the states according to survey scores and with the usage of Gallup ’s weighting system ranks countries in happiness scores explained by six sub-bars variables. National representative samples from the years 2014-2016 provide solid base for the rankings.

6 factors:

- GDP level
- Life expectancy
- Generosity
- Social Support
- Freedom
- Corruption

The sub-bar of a given country shows to which from those six factors it inclines the most. This could be seen in a figure below. After all every single country is compared to the fictional state called Dystopia, representing the lowest averages of national surveys in those six categories plus possible residuals (World Happiness Report, 2017).

**Figure 4: Happiness Ranking of the First 50 countries, 2013-2015**



Source: Helliwell, Huang and Wang (2016)

#### 4.1.1.2. United Nations – Human Development Index

HDI also called as Human Development Index is one of the quality of life measurements and wellbeing index. The HDI was developed mainly to show that people and their satisfaction and abilities are the main criterion for assessing the country's development. It

argues that this indicator is not just the economic growth itself. For 2015 there had been covered 188 countries around the world. The HDI could be also helpful for governments when a policy choices are made. Because from this index could be seen that two countries having totally same level of GNI per capita, have after all various outcomes of human development.

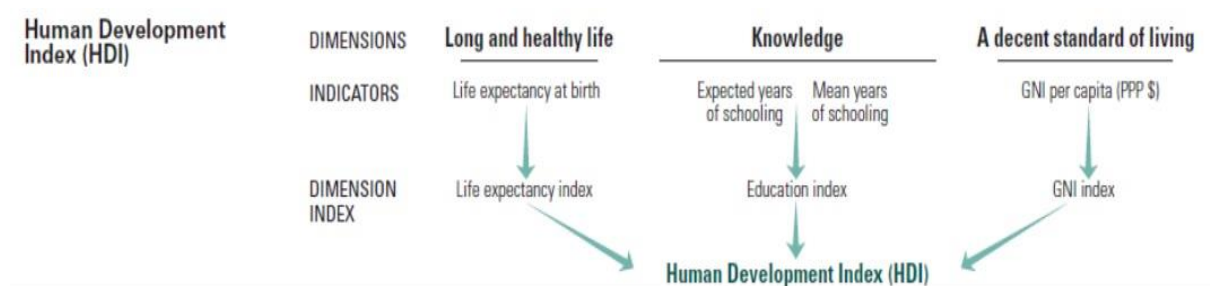
### ***Human Development Index***

Human Development Index is composed from three main dimensions. Respectively, three main indexes:

- Life expectancy index
  - o Life expectancy at birth describes health dimension
- Education index
  - o Education dimension represented by
    - mean of years of schooling for adults over 25 years and more
    - expected years of schooling for children in entering school age
- Income index
  - o Living standard dimension is measured with gross national income per capita

(United Nations Development Programme, 2017a).

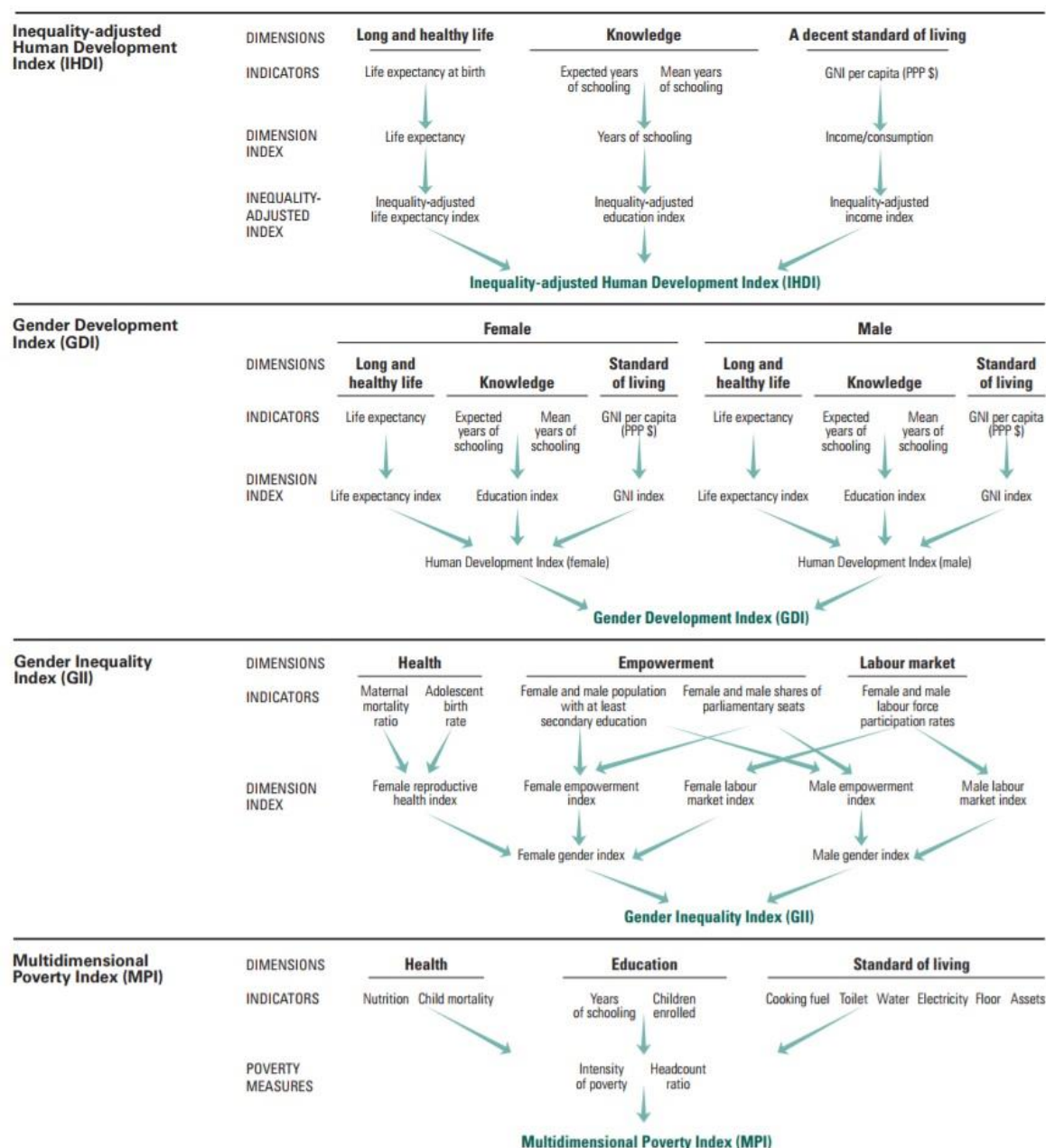
**Figure 5: Dimensions of HDI**



Source: United Nations Development Programme (2016)

In 2010 a new method of HDI computation was introduced – an equation with the geometric mean. The advanced methodology with the help of economic mean results in no longer inequality in compounded dimensions. Now, when there occurs a very low output in dimension one, there is no longer linear connection to high value growth in another dimension. The substitutability level of all four dimensions is reduced due to the geometric mean computation. For example, the one percent decrease in an income index has absolutely same effect on life expectancy index and also totally same one percent decrease of HDI as well as index of education, all of it at the same time (United Nations Development Programme, 2017b).

**Figure 6: Calculation of Other Human Development Indices**



Source: United Nations Development Programme (2016)

Human Development Index itself does not include any of inequalities, empowerment, security of human or neither poverty level. That is why United Nations Development Programme introduced other indices, in order to consider the reflection of those different dimension mentioned earlier (shown in Figure 7 above).

The other human development indexes are: Inequality-adjusted Human Development Index (IHDI), which has the same index base as classical HDI just all of those known



dimension are in terms of adjusted inequality indices (inequality-adjusted life expectancy index, inequality-adjusted education index and inequality-adjusted income index). Another one is Gender Development Index (GDI) which base consists of primary diversification of all known dimensions between males and females. Third special HDI index is called Gender Inequality Index (GII) containing more complex methodology of index calculation. The base here includes health, empowerment and labour market dimension considered as disadvantages on gender basis. GII show decline in potential of human development, just because of the inequality between the achievements of males and females in these dimensions. The last one is Multidimensional Poverty Index (MPI) representing the presence of multiple deprivations of household in dimensions such as health, living standard and education level.

#### **4.1.1.3. Inter Nations – Quality of Life Index**

Inter Nations is a worldwide platform for sharing a numerous information about 195 countries and 170 nationalities through the eyes of expats. Inter Nations platform was founded in May 2007, when two German friends decided to create a network and place here all the people living abroad could find all the needed information about the country they would live in. Since, that time a platform grows rapidly and it is ranked as number one platform for communities living abroad and global minds around the world.

From 2014 on a yearly basis Inter Nations produces so called Exact Insider. It contains a broad international survey about the living situation, happiness or quality of life of expatriates. In an Expat Insider 2015, there could have been found numerous rankings about 64 countries around the world in a contest of different topics, which are presented as indices such as: ease of settling in, the best place for expat men vs. women, family life, personal finance and cost of living, working abroad or finally quality of life index.

#### ***Quality of Life Index***

The Quality of Life Index (QOLI) as one of Expat Insider's index measures the life satisfaction and happiness of given country from the perspective of a living abroad expat. QOLI encompasses 64 countries, which are rated according to various factors including:

- Happiness of individual
- Leisure time quality
- Transportation and traveling

- Health
- Safety
- Wellbeing

2015 sample size consists of at least 50 participants in given survey for a specific country, but the vast majority of countries had more than 100 participants. Respondents were asked to rate different viewpoints of their life in a foreign country on a scale of one to seven. This rating scale has highlighted participants' satisfaction and quality of life abroad.

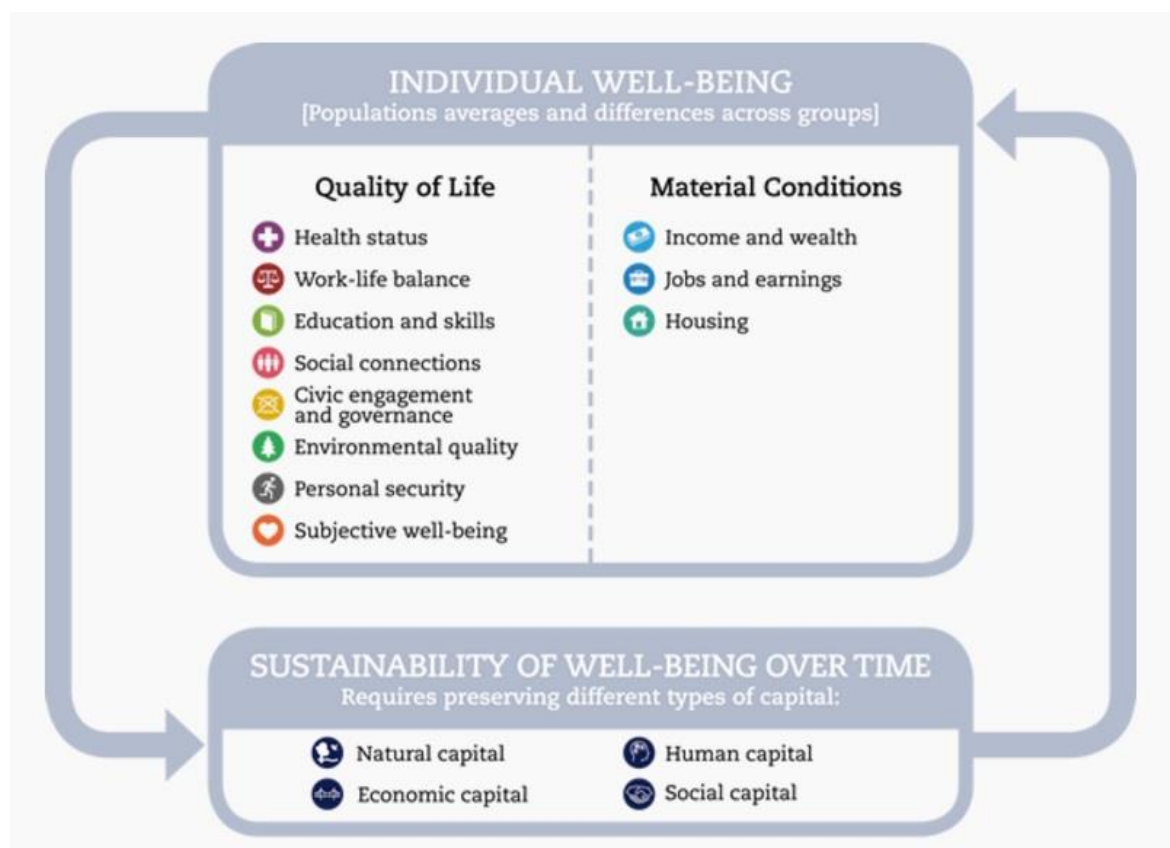
The overall ranking of country was derived from averages of individual responses to the major question: “How satisfied are you with life abroad in general?”. Although in year 2015, besides classical aspects of survey, there were some new questions encompassed. The participants of survey were asked to rank the topics about “healthcare affordability” and “environmental quality” on a range from one to seven. Furthermore, in the Expat Insider 2015 there were recognised two independent factors of “peacefulness” and “political stability” rather than one common aspect (Plato and Zeeck (2015), Expat Insider (2017)).

#### **4.1.1.4. OECD - Better Life Index**

OECD was founded in 1961 and ever since its mission is helping governments to arrange policies, that would have enhanced better live of their citizens. Better Life Index (BLI) is relatively new, since it was launched in 2011 by Organization for Economic Cooperation and Development (OECD) in order to introduce global aggregate measurement of well-being (OECD, 2017b). Nowadays it covers 35 OECD member states, which together count up for the most of developed economies in the world, plus crucial partners such as Russia, South Africa and Brazil. The future is planned to add other major partner countries such as India, Indonesia and China (OECD, 2017c).

BLI is measured according to 11 main topics, well prepared according to its relevance to well-being of people. As is show in a figure 4 below, the main framework is divided into two basic frames. First one is Quality of Life with 8 dimensions (health, work-life balance, education and skills, social connections, civic engagement and governance, environmental quality, personal security and subjective well-being) the group summarizes Material Conditions including just 3 dimensions (income and wealth, jobs and earnings and housing) (OECD, 2017a).

**Figure 7: Better Life Index Framework Measurement**



Source: OECD (2017a)

As written in OECD (2017c) article: “The data mostly come from official sources such as the OECD or National Accounts, United Nations Statistics, National Statistics Offices. A couple of indicators are based on data from the Gallup World Poll a division of the Gallup Organization that regularly conducts public opinion polls in more than 140 countries around the world. More than 80% of the indicators in Your Better Life Index have been already published by the OECD.”

### ***11 Topics of Better Life Index***

#### ***Housing***

As mentioned earlier, this dimension falls between the Material Conditions part of BLI. Housing as itself is very crucial aspect in people’s well-being. Having a suitable living condition which are satisfactory for its inhabitants is necessary for people’s basic needs. Of course, having a shelter where to sleep is important, but it is not only about that. One need to feel safe, have some privacy, be able to rest or rise a family there, it is needed to feel

like it is his home. BLI counts three sub-dimensions in here: Rooms per person and dwelling with basic facilities and Expenditure connected with housing.

### ***Income***

Even though happiness cannot be bought, income represents very important role in people's life. Because it helps achieve better standards of living together with higher well-being. Greater economic self-sufficiency opens the door to quality healthcare, housing and education. This topic is further divided to Household net adjusted disposable income which represents all the money earned by given household per year after taxes. In other words, those are money that a household possess for a goods and services spending. And Household net financial wealth representing the overall worth of household in terms of financial value.

### ***Jobs***

Having a job is obviously considered as a source of economic wealth, but also it is a way how individuals connects to the society and how they foster new skills and experiences. It is also proven societies with lower unemployment are rather stable by political site of a thing. Within this topic should be covered Employment rate and unemployment rate in a long term. Also, sub-indicators such as Average earnings and Job security are presented.

### ***Community***

From now, all the following topic belong to the group of topics connected to Quality of Life Indicators. There has always been a significant role of social relationships in a life satisfaction of a person. The quantity and quality of a personal contact and relationships should be considered. Studies declare more of positive feelings were measured when a person spent time together with friends, rather than alone. Social support network is an indicator representing a feeling of reliability on other person, if there is someone among a person's acquaintances he could really rely on.

### ***Education***

Another topic is education. It stands as a crucial step in a life of everybody, because it opens new possibilities and one's can acquire a lot of useful skills further necessary for an effective life in a society. Again, there are studies showing that individuals who are educated are living longer lives, engage more often in a politics, prove lower crime

commitment rates and they are more self-sufficient. So, it is clear that between its subtopics belong number of Years in Education as well as Educational Attainment.

There is one important dimension counted – Student's skills. In 2012 Programme for International Student Assessment (PISA) operated by OECD examined students finishing compulsory education from 65 countries. They were tested students in math skills, ability to read and science knowledges.

### ***Environment***

Person's well-being and health is directly connected to the environmental quality one's is living in. An untouched clean environment mutually follows up on the improvement of the mental satisfaction, takes on stress and improves the physical health. According to OECD's studies quality of life is also affected by accessible green spaces in one's environment. Furthermore, life satisfaction also relies on a protection of natural resources. Air pollution and Quality of water are essential indicators to the environmental topic.

### ***Civic Engagement***

Nowadays, there is a need of transparency among government and its decisions more than ever. Life satisfaction and overall well-being is associated in a trust of the people in a government. Turnout of voter level in other words voters' participation is one of the subdimensions. The other one is Stakeholder engagement for developing regulations in a meaning of participation of citizens within laws and regulations.

### ***Health***

When there is any quality of life measurement an aspect of health cannot be missing. Health of individual plays an essential role in his life well-being. There are dimensions such as Expectancy of life, in other word the age people usually live in a given country. And Self-reported health, those data are simply gathered by asking people very simple question: *How is your health?*. Of course, there must be taken into account the different meaning of perception between individual nations.

### ***Life Satisfaction***

Even though life satisfaction measures more subjective feelings of individual rather than objectives, but still via those measurements there can be gathered more objective results concerning quality of life surveys. Life satisfaction is meant by its whole principle, simply how the individual evaluates his life, instead of just some present feelings.

### ***Safety***

Also, security is a key element for quality of life measuring. Stress, physical pain, property or even life loss in all of those things crime could have resulted. Therefore, one of a subtopic is called Feeling safe walking alone at night. There could be counted big differences between countries. Scandinavian countries report high rate of safety feelings, on the other hand countries such as South Africa or Brazil has the percentage of feeling safe significantly lower. Another subtopic is Homicide rate, gathered in a number of homicides per 100 000 residents.

### ***Work-life Balance***

The last, but not least topic is called work-life balance. As the name already reveals, it measures the balance between working and personal life. The equality between those two important aspects of everyday life is very important, as it affects personal well-being. Employees working long hours, represent the time one must spend in work per week. The second sub-dimension is Time devoted to leisure and personal care. It must be highlighted that even there could be a lower working time for women, which does not automatically mean they have more leisure time.

A very interesting thing is, that Better Life Index gather and operated by OECD does not assigned anything like the best country to live. They just provide a wide range of databases and topic a one could assign different weight to those indicators as see how is the ranking changing.

#### **4.1.2. Computation of AggQOL index**

As was already stated AggQOL consists from four dimensions (indexes) World Happiness Report, Human Development Index, Quality of Life Index and Better Life Index for 2015 for 9 European countries. All of previously mentioned indices has its own special calculations and final rankings, except of BLI. This index does not show which county is the best in Better Life Index, as there is a possibility of choosing different weights to each dimension in order to calculate own index for everyone. That is why the author, calculated and ranked the BLI of those 9 countries as a total of all the measured rankings in every sub-dimension. The year 2015 was chosen for the latest available data of four indexes of interest. More specifically because HDI data for 2016 will be available by the end of year 2017.

**Table 1: Data Set for AggQOL**

country/ index (2015)	WHR	HDI	QOLI	BLI
Belgium	6.929	0.896	36	77.8
Denmark	7.526	0.925	23	86.9
France	6.478	0.897	14	72.9
Germany	6.994	0.926	9	79.2
Ireland	6.907	0.923	51	76.2
Italy	5.977	0.887	32	60.6
Luxembourg	6.871	0.898	20	79.4
Netherlands	7.339	0.924	16	80.1
United Kingdom	6.725	0.91	31	76.3

Source: data collected from Helliwell, J., Huang, H. and Wang S. (2016), *Inter Nations* (2017), *OECD* (2017c), *UNDP* (2017)

In order to compute AggQOL firstly, there was found the values of those nine countries in specific indexes and every single country was ranked for a given index in a group of countries from 1 to 9.

The dimension index for each of four indexes (dimensions) and 9 countries was calculated, in order to unify the dimensions, expressed in various units, to be able to work with them later for creation of AggQOL. The dimension index works on a basis of maximum and minimum values, based on the basic groups of these nine countries and their subsequent ranking. The index transforms values to indices on a scale from zero to one. Minimum and maximum values differ for each index (dimension) in connection to ratings of given index and country.

$$\text{Dimension index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

**Table 2: Dimension Index of WHR**

	WHR	rank	dimension index
<b>Belgium</b>	6.929	4	0.615
<b>Denmark</b>	7.526	1	1
<b>France</b>	6.478	8	0.323
<b>Germany</b>	6.994	3	0.657
<b>Ireland</b>	6.907	5	0.6
<b>Italy</b>	5.977	9	0
<b>Luxembourg</b>	6.871	6	0.577
<b>Netherlands</b>	7.339	2	0.879
<b>United Kingdom</b>	6.725	7	0.483

*Source: own calculations using Microsoft Excel, data collected from Helliwell, J., Huang, H. and Wang S. (2016), Inter Nations (2017), OECD (2017c), UNDP (2017)*

The table above shows the maximal and minimal values for each dimension. In case of World Happiness Report its minimal values is 5.977 in case of Italy and maximal as 7.526 in case of Denmark. So, it is logical, that after dimension index computation Denmark has index value 1 and Italy has 0. On higher ranks in WHR are Netherlands and Germany followed by Belgium. Lower ranks after Italy are awarded to Italy, France and the UK.

**Table 3: Dimension Index of HDI**

	HDI	rank	dimension index
<b>Belgium</b>	0.896	8	0.231
<b>Denmark</b>	0.925	2	0.974
<b>France</b>	0.897	7	0.256
<b>Germany</b>	0.926	1	1
<b>Ireland</b>	0.923	4	0.923
<b>Italy</b>	0.887	9	0
<b>Luxembourg</b>	0.898	6	0.282
<b>Netherlands</b>	0.924	3	0.949
<b>United Kingdom</b>	0.91	5	0.59

*Source: own calculations using Microsoft Excel, data collected from Helliwell, J., Huang, H. and Wang S. (2016), Inter Nations (2017), OECD (2017c), UNDP (2017)*

The dimension indexes of Human Development Index were calculated on a same basis. But here, in comparison with WHR, on the first place with the highest value 0.926 stands Germany and the lowest one 0.887 is again assigned to Italy. Although, as could be seen HDI shows relatively high values among all chosen countries, as the lowest value is still just a little below 0.9. Even though, here is on the first place Germany, Denmark with the



second highest value is just 0.001 lower. It is followed by one thousandth decrease in Netherlands then Ireland. But, in case of dimension index, there have occurred bigger differences among countries dimensions. Lower ranks are occupied by Belgium, which in comparison with WHR dropped by 4 places. Then France with Luxembourg which stands in a bottom of scale in both cases.

**Table 4: Dimension Index of QOLI**

	QOLI	rank	dimension index
<b>Belgium</b>	36	8	0.357
<b>Denmark</b>	23	5	0.667
<b>France</b>	14	2	0.881
<b>Germany</b>	9	1	1
<b>Ireland</b>	51	9	0
<b>Italy</b>	32	7	0.452
<b>Luxembourg</b>	20	4	0.738
<b>Netherlands</b>	16	3	0.833
<b>United Kingdom</b>	31	6	0.476

*Source: own calculations using Microsoft Excel, data collected from Helliwell, J., Huang, H. and Wang S. (2016), Inter Nations (2017), OECD (2017c), UNDP (2017)*

The Quality of Life Index brought some kind of different information, that mixed a little with “common” rankings. It could be said, on the first position there is Germany, but surprisingly the second one is occupied by France, which was in other indexes rated rather on lower ranks. On the other hand, Ireland came up with the worst score, which is usually in upper part among these countries. This is with the highest probability because of the different approach that Inter Nations uses for their QOLI calculation. They focus on a quality of life through expat eyes. So, here could be definitely said, that there is a significant difference between regular approach of citizens and expats of given country.

The calculation of QOLI was also different. It was due to the fact that here the lowest value represents the best result and the highest the worst. That is why, dimension index was a little modified, and the whole formula was taken reverse, instead of minimum there was calculated with maximum value and vice versa. So, at the end Germany has an index value of 1 as the best possible option and 0 for Ireland as the worst.

**Table 5: Dimension Index of BLI**

	BLI	rank	dimension index
<b>Belgium</b>	77.8	5	0.654
<b>Denmark</b>	86.9	1	1
<b>France</b>	72.9	8	0.468
<b>Germany</b>	79.2	4	0.707
<b>Ireland</b>	76.2	7	0.593
<b>Italy</b>	60.6	9	0
<b>Luxembourg</b>	79.4	3	0.715
<b>Netherlands</b>	80.1	2	0.741
<b>United Kingdom</b>	76.3	6	0.597

*Source: own calculations using Microsoft Excel, data collected from Helliwell, J., Huang, H. and Wang S. (2016), Inter Nations (2017), OECD (2017c), UNDP (2017)*

The Better Life Index again shows the rankings, where a deal the higher the better is applicable. On the first place there is Denmark, followed by Netherlands and Luxembourg. Surprising result shows the fourth position of Germany, which is the lowest from all of four indexes. More presumed result shows Italy as it is on the last rank, followed by France and Ireland.

**Table 6: AggQOL ranking**

	Agg QOL	rank
<b>Belgium</b>	0.464	8
<b>Denmark</b>	0.91	1
<b>France</b>	0.482	7
<b>Germany</b>	0.841	3
<b>Ireland</b>	0.529	6
<b>Italy</b>	0.113	9
<b>Luxembourg</b>	0.578	4
<b>Netherlands</b>	0.851	2
<b>United Kingdom</b>	0.536	5

*Source: own calculations using Microsoft Excel, data collected from Helliwell, J., Huang, H. and Wang S. (2016), Inter Nations (2017), OECD (2017c), UNDP (2017)*

Finally, there could be seen a table representing the results of Aggregate Quality of Life Index, calculated on a basis of ranking of four different indexes. AggQOL was withdraw with a help of arithmetic mean, where all of the dimension indexes for every dimension and country were sum up together and successively multiplied by one-quarter. So, there table 6 shows a ranking of nine European countries from the one which happened to have

the best score in overall quality of life to the one with lowest. The method of geometric mean was considered for usage, but as the index numbers of dimension index consist also zero values, the geometric mean would have had distorted and impenetrable results.

Even though, Germany and Denmark were both rated on high positions in most of the indexes, eventually a country with the highest score of QOL is Denmark. It could not be a surprise, as Denmark showed very high position in all of the indexes. It should be remembered that, even in the individual dimensions of given indexes, the rating of Denmark was high. The above average scores in dimension such as educational skills, the security, quality of environment, balance of work-life, earnings or social connections. There cannot be forgotten that Denmark is among the northern countries where the Scandinavian Model has a major influence on state institutions. As already mentioned in the theoretical part of this paper, it prioritises the needs and satisfaction of the population as a whole.

The second place, surprisingly goes to Netherlands. Even though, Netherlands has never took the first highest rank, it still shows an above average results in most of the subdimensions of most of the indices. For example, housing, jobs, educational system and overall well-being of inhabitant is rated on high levels throughout the indexes. Although it did not show an above average result in income earning, they are still very high and the gap between the poorest and highest is very low, which help to better QOL achievements.

The third highest score belongs to Germany with AggQOL of 0.841. As, what was obvious Germany as well scores on high positions in most of dimension indexes. The one dimension where the ranks were lower occurred in the BLI, where it stands for only fourth position. But even so, of course, Germany excels in many important indicators of quality of life above all. Must be mentioned the high level of employment as well as education or high living standards alongside with higher score of life expectancy at birth which is about 81 years.

A quite a big step is moving on a fourth place with 0.578 from the fourth with 0.841. Luxembourg shows quite a straight position in most of the sub-dimensions such as very high income per capita and although there is a saying about happiness that cannot be bought by money, this founding cannot exactly prove it. The life satisfaction of inhabitants

is also greater than average. Just one drawback expressed mainly in the BLI is its educational skills, which according to OECD goes beyond its average.

Not that far from Netherlands, the United Kingdom earned 0.536 and the fifth place in AggQOL index. While in this concept, it is the average results, there cannot be forgotten that on a worldwide range, all of these countries belong in high above average in QOL measurements. The same with the UK, which it still excels in subdimensions such as the quality of the living environment, the safety of the population, the high inclusion of the population in political events, as well as the quality of housing and health. The only thing that keeps the Great Britain back is surprisingly lower average income than the OECD average.

The score of 0.529 in AggQOL belongs to Ireland, which is as usual very close to the UK. In all of the counted indexes Ireland stands on lower positions. But the worst rank has in case of the QOLI in 2015. But on the other hand, from citizens perspective, life satisfaction is perceived on a higher position. Lower scores reflect in average income dimension and the engagement of citizens.

France with below an average score of 0.482 in AggQOL stands for seventh place. Even though France scores very well in subdimensions such as the balance of work and life or civic security, the dimension such as employment are below OECD average. For example, in case of World Happiness report, from these 9 countries France is ranked on 8<sup>th</sup> ranked. Despite all the unfortunate events of 2015 that have fallen in France and endangering the safety of citizens, the overall security of France is still more than average.

The eight position belongs to Belgium with a score of 0.464, which is very close to France. Though, the HDI and BLI shows very lower scores in comparison to e.g. the WHR, where the rank of overall happiness was slightly above average. The subdimensions indicators such as income, housing conditions, GDP, health of citizens or education report above average values on world measures.

Finally, there is Italy with AggQOL score of 0.113 which is definitely the lowest. Even from penultima Belgium there is a gap of 0.35. Among these nine countries and four indexes, Italy was in three cases on a last position, except the QOLI where it stands on 7<sup>th</sup>. In some of QOL dimensions Italy stands above level. Those are socialisation between

citizens, health or work-life balance. On the other hand, dimensions such as housing conditions, quality of environment, earnings and jobs, educational attainment or overall subjective wellbeing are considered to be below the OECD average.

**Table 7: WHR and AggQOL Ranking Changes**

<b>WHR+Agg QOL</b>	<b>WHR</b>	<b>Agg QOL</b>	<b>change</b>
Belgium	4	8	<b>-4</b>
Denmark	1	1	<b>0</b>
France	8	7	<b>1</b>
Germany	3	3	<b>0</b>
Ireland	5	6	<b>-1</b>
Italy	9	9	<b>0</b>
Luxembourg	6	4	<b>2</b>
Netherlands	2	2	<b>0</b>
United Kingdom	7	5	<b>2</b>

*Source: own calculations using Microsoft Excel, data collected from Helliwell, J., Huang, H. and Wang S. (2016), Inter Nations (2017), OECD (2017c), UNDP (2017)*

The table 7 above shows ranking changes of World Happiness Report and AggQOL index with all nine countries. The overall absolute sum of changes goes to 10, which is the second-best result. Three zeros by Denmark, Germany and Italy states the same rankings in these two indexes, declaring the objectivity of WHR. Alongside with just one positional change of France or Ireland. The UK have improved by two places as well as Luxembourg. The biggest change brings Belgium where the total change is a drop by four places down. It could have resulted in a fact that overall life happiness according to its citizens is much higher, than the actual indicators shows in other indexes.

**Table 8: HDI and AggQOL Ranking Changes**

<b>HDI+Agg QOL</b>	<b>HDI</b>	<b>Agg QOL</b>	<b>change</b>
Belgium	8	8	<b>0</b>
Denmark	2	1	<b>1</b>
France	7	7	<b>0</b>
Germany	1	3	<b>-2</b>
Ireland	4	6	<b>-2</b>
Italy	9	9	<b>0</b>
Luxembourg	6	4	<b>2</b>
Netherlands	3	2	<b>1</b>
United Kingdom	5	5	<b>0</b>

*Source: own calculations using Microsoft Excel, data collected from Helliwell, J., Huang, H. and Wang S. (2016), Inter Nations (2017), OECD (2017c), UNDP (2017)*

The changes between HDI and AggQOL do not report any extreme changes. Four countries out of nine did not “move” at all, which proves an objectivity of HDI. The interesting observed fact is that the lower is a score the more similar the ranking of these two indexes is. This could be applied for a case of Italy, Belgium and France as three last countries in both rankings. Similarly, with the United Kingdom.

So, despite the HDI index faces several criticisms, such as poor identification of indicators or insufficient number of scrambled data, as well as poor determination of the rate for calculation. In this given calculation of AggQOL, HDI turned out that, in the case of more developed countries, it shows very similar outcomes to this composite index for quality of life.

**Table 9: QOLI and AggQOL Ranking Changes**

<b>QOLI+Agg QOL</b>	<b>QOLI</b>	<b>Agg QOL</b>	<b>change</b>
Belgium	8	8	<b>0</b>
Denmark	5	1	<b>4</b>
France	2	7	<b>-5</b>
Germany	1	3	<b>-2</b>
Ireland	9	6	<b>3</b>
Italy	7	9	<b>-2</b>
Luxembourg	4	4	<b>0</b>
Netherlands	3	2	<b>1</b>
United Kingdom	6	5	<b>1</b>

*Source: own calculations using Microsoft Excel, data collected from Helliwell, J., Huang, H. and Wang S. (2016), Inter Nations (2017), OECD (2017c), UNDP (2017)*

Table 9 depicts the ranking changes between QOLI and AggQOL, as it could be obvious the changes are definitely the biggest among the four indexes. The sum of all the changes goes to 18 points, which is more than one times higher, than the best match with HDI and BLI. The most significant difference could be found in case of France, where it was ranked as the second in QOLI and as the seventh when AggQOL ranking. Also, a big “improvement” could be seen in case of Denmark, when in rise up about 4 ranks from QOLI to AggQOL. All of these changes emphasize the situation that the level of quality of life from the point of view of the expats is significantly different than the overall level and satisfaction of the population of that state. As another three indexes compounded in AggQOL index are HDI, BLI and WHR which represents QOL as a whole for all country on a basis of country’s various available indicators.

**Table 10: BLI and AggQOL Ranking Changes**

<b>BLI+Agg QOL</b>	<b>BLI</b>	<b>Agg QOL</b>	<b>change</b>
Belgium	5	8	<b>-3</b>
Denmark	1	1	<b>0</b>
France	8	7	<b>1</b>
Germany	4	3	<b>1</b>
Ireland	7	6	<b>1</b>
Italy	9	9	<b>0</b>
Luxembourg	3	4	<b>-1</b>
Netherlands	2	2	<b>0</b>
United Kingdom	6	5	<b>1</b>

*Source: own calculations using Microsoft Excel, data collected from Helliwell, J., Huang, H. and Wang S. (2016), Inter Nations (2017), OECD (2017c), UNDP (2017)*

OECD's Better Life Index ranking changes in comparison to AggQOL index could be seen in a table 10 above. The absolute sum of all the differences shows the lowest value of 8 together with HDI. Which means, that BLI shows rather similar outcomes of QOL of these nine countries as calculated AggQOL index. There are three country rankings that were not affected at all, it occurs in case of two best results of Denmark and Netherlands and the worst one – Italy. It follows with many differences in one rank. Which mostly get worse by the one rank in case of final AggQOL. The biggest difference is represented by 3 ranks decrease of Belgium. The overall dimensions of BLI shows the objectivity of an index itself. It might be said, that BLI is well build and adequate index with regard to its determination of quality of life.



## **4.2. Panel Data Regression Analysis**

The second analytical part is dedicated to a regression framework analysis, more specifically to a one-equation model. The main objective of this part is to analyse the relationship between the life satisfaction in nine European countries in a period from 1995 to 2016 and six specifically picked explanatory variables. The goal of this regression analysis is to specify quality of life indicators from the other side of view. Therefore, the endogenous variable is represented by the life satisfaction data, derived from the questionnaire done by Eurobarometer about individual wellbeing in given countries, which shows how much is this variable explained by exogenous variables. Which are in this case represented by the most common indicators for quality of life measurements.

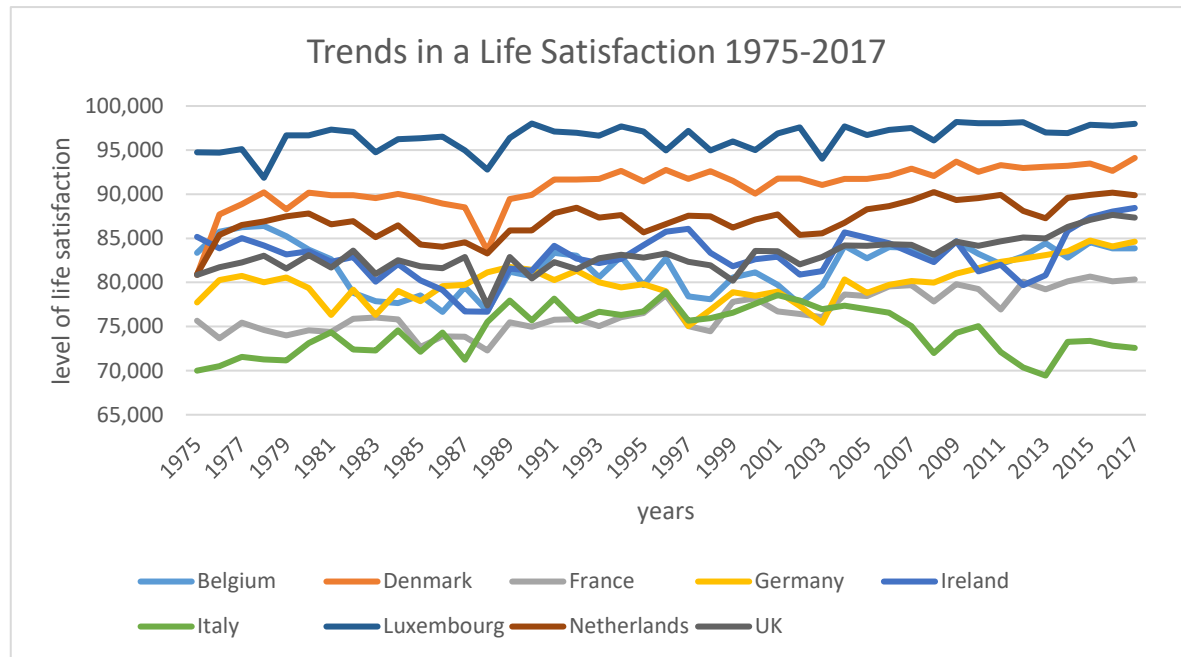
### **4.2.1. Variables of Life Satisfaction - Its Dataset and Methodology**

Life satisfaction represents an endogenous variable in this regression analysis framework. More specifically, the data are in a form of answers about the life satisfaction survey done by the Standard Eurobarometer since 1974 (European Commission, 2017b). The survey is done and consists of roughly 1.000 face-to-face interviews in every country within the European Union. In this case of a regression analysis, the topic of interest is Life Satisfaction in nine European countries for the last 22 years. Data were gathered on a basis of interview, where respondents answer the question: “How are you satisfied with the life you lead?”. Answers were gathered as a categorical data and divided into five categories “very satisfied”, “fairly satisfied”, “not very satisfied”, “not at all satisfied” and “DK – don’t know”. Therefore, the author took always just a data from the beginning of the selected year and then all of them were transferred to the quantitative data type. Firstly, for each year and each country, the individual categories were gradually assigned a weight starting from the category "very satisfied" with weight 5 and ending with "DK don't know" with the weight one. Then multiplied the given data from each category with corresponding weight and for the one year and one country sum up all of five newly obtain numbers. Subsequently, multiply by one hundred for a clearer view in percentage and divided by five. All of this was done for each country and each year independently.

Life satisfaction in this case represents the quality of life in given countries. As there is a presumption, that people are having the exact quality of life as they are satisfied with their lives. Thus, the author is trying to figure out what are the most relevant dimension for

quality of life measurements. That is why, the regression analysis is used here, in order to find out possible relationship between QOL, here as life satisfaction, and the most often used dimensions for QOL measurements around the world. Even most of them used in a four QOL indexes studied in a previous part. Therefore, the endogenous variables are as followed.

**Figure 8: Trends in a Life Satisfaction 1975-2017**



Source: own calculations using data collected from European Commission (2017)

Figure above shows the life satisfaction involvement in nine countries of interest from 1975 till 2017. As could be seen, life satisfaction perception is not stable over the years. In all of the countries could be seen its volatility, which improves or worsen during the time. And yet, although small, there is a growing trend of life satisfaction in most of the countries. But the exception is Italy, where, around 1995, the curve from the increment in the beginning breaks and falls. Although in recent years it has been booming again.

***Educational Attainment***

As the first independent variable which is definitely the one that occurs in most of the QOL measurements is the educational attainment. This variable represents an important component of life and education. As there is an increasing emphasis on higher education at this time, so this indicator also shows higher educational attainment. More precisely, the

educational attainment level of tertiary education (levels 5-8 ISCED 2011) in percentages. The exact definition of those levels is: “Tertiary education builds on secondary education, providing learning activities in specialised fields of education. It aims at learning at a high level of complexity and specialisation. Tertiary education includes what is commonly understood as academic education but also includes advanced vocational or professional education.” (UNESCO Institute for Statistics, 2017). The problem of missing values in case of Germany, Ireland, Luxemburg and the United Kingdom for 1998 was solved by usage of interpolation of time series.

### ***Unemployment Level***

Among quality of life indicators should have been counted an influence of a job that it has on an individual. Therefore, this is why for this aspect there is an often use of either employment or unemployment level in many of QOL measurement. The reality of having a job, represents both a certain income for an individual, but also some personal satisfaction about the completion in a life. The unemployment level was picked for this analysis. There is a complete dataset for all the countries and years.

### ***Life Expectancy at Birth***

Another exogenous variable life expectancy at birth represents the health area of quality of life measurements. This could be definitely considered as one of most common indicator for a human well-being measurement, as it predicts the expectancy of life for given individual at birth. Its calculation includes the possible factors affecting one’s life as well as a trend in a life expectancy in a given country.

### ***Inequality of Income Distribution***

As income definitely belongs among a life quality indicators, as it represents the economical part of it. There cannot be forgotten about the unequal distribution of income, mostly displayed in a form of Gini Index. But in this thesis author used an index calculated by European Eurostat called S80/S20 income quintile share ratio. Its proper definition is as followed: “...is a measure of the inequality of income distribution. It is calculated as the ratio of total income received by the 20% of the population with the highest income (the top quintile) to that received by the 20% of the population with the lowest income (the bottom quintile). “(Eurostat, 2017). It perfectly displays the inequality of income distribution in chosen European Countries. Problem of missing values in this variable

occurs with several countries in some years. All of it was solved by interpolation of time series.

### ***Intentional Homicides***

As it is known among the quality of life indicators, criminality must also be included. In this regression, it is represented by the number of intentional homicides per hundred thousand inhabitants in the country. This indicator is often used in QOL measurements as well.

### ***Gross Domestic Product***

Even though, GDP is a very controversial indicator, and there are many discussions, whether it is a relevant dimension or not, it is still calculated among many of worldwide quality of life measurements. So, that is why it is included among exogenous variables in this framework. Author tries to find out from the other side, if there is some relation between life satisfaction and GDP.

## **4.2.2. Relationships Between Life Satisfaction and Its Indicators**

This one-equation model is considering the relationship between life satisfaction and six independent variables, which are educational attainment, unemployment level, life expectancy, inequality of income distribution, intentional homicides and GDP. Data set is in a form of panel data compounded of 22 years (1995-2016) and Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherland and the United Kingdom (later referred as nine European countries).

### **4.2.2.1. Economic and Econometric Model**

#### ***Assumptions***

##### ***Assumption 1: Life satisfaction and educational attainment***

An increase in an educational attainment will lead to an increase in a life satisfaction.

= From the economic point of view, with the higher education attained, there are supposed to be higher changes to get a better paid and as well as more satisfied job, as a person could have.

Therefore, it is an assumption of POSSITIVE sign.

---

##### ***Assumption 2: Life satisfaction and an unemployment level***

An increase in an unemployment level will lead to a decrease in a life satisfaction.

= Generally, could be said that one thing that must be in balance it one's work-and-life balance. Of course, there is the assumption to have a job, which lowers the stress of an individual. So, being unemployed does not bring higher life satisfaction.

Therefore, it is an assumption of NEGATIVE sign.

---

*Assumption 3: Life satisfaction and life expectancy at birth*

An increase in a life expectancy at birth will lead to an increase in a life satisfaction.

= Logically, the higher age one could reach, the more satisfied he could get in a life. If there is an increasing trend in life expectancy, it means that people are living longer, which means there are more suitable conditions for a life in many aspects.

Therefore, it is an assumption of POSITIVE sign.

---

*Assumption 4: Life satisfaction and inequality of income distribution*

An increase in an inequality of income distribution will lead to a decrease in a life satisfaction.

= If there is higher disparity between income distribution and the income gap is getting bigger, it definitely brings more people to have less money and their economic conditions are getting harder. It does not enrich overall life satisfaction.

Therefore, it is an assumption of NEGATIVE sign.

---

*Assumption 5: Life satisfaction and intentional homicides*

An increase in intentional homicides will lead to a decrease in a life satisfaction.

= There are no doubts, that an increase in a criminal behaviour in this case an intentional homicides rate will lead to a drop in a life satisfaction level. Because to live in a fear does not go down well with anybody. Even more, it lowers good health conditions ones get.

Therefore, it is an assumption of NEGATIVE sign.

---

*Assumption 6: Life satisfaction and GDP*

An increase in GDP per capita growth will lead to an increase in a life satisfaction.

= Even though, it is very difficult to determine whether there is any relationship between GDP and life satisfaction. With the assumption there is some, it is assigned to be positive, as it occurs in many of economic and life quality measurements. With everything what GDP represents, it will have positive aspect on a life satisfaction.

Therefore, it is an assumption of POSSITIVE sign.

---

### ***Economic Model***

The life satisfaction in % per year is influenced by educational attainment level in tertiary education (level 5-8 in ISCED 2011) in % of total population, total unemployment level in % of a total labour force, life expectancy at birth for total (male and female) in years, inequality of income distribution in form of income quintile share ratio S80/S20, intentional homicides per 100.000 people and GDP per capita growth annual % for nine European countries.

$$y_{1t} = f(x_{1t}, x_{2t}, x_{3t}, x_{4t}, x_{5t}, x_{6t}, x_{7t})$$

$$LSat = f(UV, EdAtt, UNE, LExp, InIn, IntHom, GDP)$$

### ***Econometric Model***

$$y_{1t} = \psi_1 x_{1t} + \psi_2 x_{2t} + \psi_3 x_{3t} + \psi_4 x_{4t} + \psi_5 x_{5t} + \psi_6 x_{6t} + \psi_7 x_{7t} + u_{1t}$$

### ***Declaration of Variables***

#### Endogenous:

$y_{1t} \dots LSat$  Life Satisfaction of nine European countries\* in per year (%)

#### Exogenous:

$x_{1t} \dots UV$  Unit Vector

$x_{2t} \dots EdAtt$  Educational Attainment level in tertiary education (level 5-8 in ISCED 2011) of total population for nine European countries\* (%)

$x_{3t} \dots UNE$  Unemployment level of a total labour force for nine European countries\* (%)

$x_{4t} \dots LExp$  Life Expectancy at birth for total (male and female) for nine European countries\* (%)

$x_{5t} \dots \text{InIn}$	Inequality of income distribution in form of income quintile share ratio S80/S20 for nine European countries*
$x_{6t} \dots \text{IntHom}$	Intentional Homicides for nine European countries* (100.000 people)
$x_{7t} \dots \text{GDP}$	Gross Domestic Product per capita growth annual for nine European countries* (%)

\*for nine European countries in a meaning of Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherland and the United Kingdom

### **Data Set**

Data set is presented in form of panel data; thus, it combines time series and cross-sectional data. More specifically, data set is in form of long panel data, as its 22 years as time period is higher than number of entities (nine countries). The data set is in a balanced form, as there are no missing values. Some problems with missing values were solved by interpolation of time series. Detailed description of every data entity is described in a chapter above called indicators of life satisfaction. Data were modified to have maximal three numbers after the decimal point. These are fixed panel data, as it consists of same entities observed for each period. And the finally, these data could be also called pooled data, because it consists of countries as entities and time series.

### **Figure 9: Correlation Matrix**

Correlation coefficients, using the observations 1:01 - 9:22  
5% critical value (two-tailed) = 0.1395 for n = 198

LSat	EdAtt	UNE	LExp	InIn	
1.0000	0.4029	-0.6551	-0.1476	-0.5050	LSat
	1.0000	-0.1448	0.3596	-0.2336	EdAtt
		1.0000	0.2253	0.3169	UNE
			1.0000	0.2759	LExp
				1.0000	InIn
			IntHom	GDP	
			-0.2786	0.1003	LSat
			-0.1051	-0.0532	EdAtt
			0.1791	-0.0503	UNE
			-0.2477	-0.3163	LExp
			-0.0350	-0.0094	InIn
			1.0000	-0.0026	IntHom
				1.0000	GDP

*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

There is a need to define a correlation matrix in order to find out if there is/is not multicollinearity among independent variables. Correlation coefficient (R) is a measure of multicollinearity. The correlation matrix in figure 8 confirms, there is no multicollinearity presented. Since, there is are no correlation coefficients in absolute values higher than 0.9 respectively 0.8. As there is not any strong relationship between two exogenous variables, the data set is valid for parameters' estimation.

#### **4.2.2.2. Parameters' Estimation**

Due to the panel data set, firstly, there must be decided the most appropriate approach for a regression run. There exist three types of tests: pooled OLS, fixed effects or random effects, when it comes to panel data regression frame work. Generally, this is the basic definition of these three approaches. Pooled OLS regression model assumed, that all of the entities are the same or at least very similar. Fixed effects, also called as LSDV model (least square dummy variable) allows for heterogeneity or individuality between these nine countries, because it allows to have own intercept values. But even though intercept may differ across countries, it is still the same over the time, that is why it is called fixed effects. And the last one is random effects model, where is the intercept value common for all the entities (here as nine European countries) (Hossain, 2013). Firstly, the OLS method was used in order to run a regression and after the panel diagnosis for the model was done for a purpose to choose the best method.



### Figure 10: Panel Diagnosis, part 1

Diagnostics: using n = 9 cross-sectional units

Fixed effects estimator

allows for differing intercepts by cross-sectional unit

	coefficient	std. error	t-ratio	p-value	
const	56.3975	14.3489	3.930	0.0001	***
EdAtt	0.0530676	0.0656635	0.8082	0.4200	
UNE	-0.189659	0.0660254	-2.873	0.0046	***
LExp	0.378780	0.198799	1.905	0.0583	*
lnln	-0.412340	0.442964	-0.9309	0.3531	
IntHom	-0.265583	0.424846	-0.6251	0.5327	
GDP	0.153402	0.0461565	3.324	0.0011	***

Residual variance:  $559.671 / (198 - 15) = 3.05831$

Joint significance of differing group means:

$F(8, 183) = 112.917$  with p-value 1.31885e-066

(A low p-value counts against the null hypothesis that the pooled OLS model is adequate, in favor of the fixed effects alternative.)

Variance estimators:

between = 21.6784

within = 3.05831

theta used for quasi-demeaning = 0.920177

*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

## Figure 11: Panel Diagnosis, part 2

Random effects estimator

allows for a unit-specific component to the error term

	coefficient	std. error	t-ratio	p-value	
const	64.4215	14.1919	4.539	9.97e-06	***
EdAtt	0.0888464	0.0642122	1.384	0.1681	
UNE	-0.214661	0.0666191	-3.222	0.0015	***
LExp	0.276183	0.195529	1.412	0.1594	
lnln	-0.519099	0.445269	-1.166	0.2451	
IntHom	-0.326285	0.430205	-0.7584	0.4491	
GDP	0.151820	0.0468911	3.238	0.0014	***

Means of pooled OLS residuals for cross-sectional units:

unit 1: -1.4891  
unit 2: 1.7583  
unit 3: -1.9101  
unit 4: -4.015  
unit 5: -0.54036  
unit 6: 0.46076  
unit 7: 7.6017  
unit 8: -1.505  
unit 9: -0.36123

Breusch-Pagan test statistic:

LM = 622.803 with p-value =  $\text{prob}(\text{chi-square}(1) > 622.803) = 1.8373\text{e-}137$

(A low p-value counts against the null hypothesis that the pooled OLS model is adequate, in favor of the random effects alternative.)

*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

### Figure 12: Panel Diagnosis, part 3

Hausman test statistic:

H = 13.1776 with p-value =  $\text{prob}(\text{chi-square}(6) > 13.1776) = 0.0403013$

(A low p-value counts against the null hypothesis that the random effects model is consistent, in favor of the fixed effects model.)

*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

Panel diagnosis tested the data in order to choose the best regression estimation method. Three tests were done and three hypotheses set.

#### ***F-test***

H<sub>0</sub> ... use of pooled OLS

H<sub>1</sub> ... use of fixed effects

---

p-value  $1.31885e-066 < \alpha = 0,05$   $\longrightarrow$  H<sub>0</sub> is rejected: better to use **fixed effects** model

#### ***Breusch-Pagan test statistic***

H<sub>0</sub> ... use of pooled OLS

H<sub>1</sub> ... use of random effects

---

p-value  $1.8373e-137 < \alpha = 0,05$   $\longrightarrow$  H<sub>0</sub> is rejected: better to use **random effectsmodel**

#### ***Hausman test statistic***

H<sub>0</sub> ... use of random effects

H<sub>1</sub> ... use of fixed effects

---

p-value  $0.0403013 < \alpha = 0,05$   $\longrightarrow$  H<sub>0</sub> is rejected: better to use **fixed effects** model

Therefore, it could be seen that fixed effects should be the best option for a regression estimation method.

**Figure 13: Model 2 Fixed Effect Estimation**

Model 2: Fixed-effects, using 198 observations  
 Included 9 cross-sectional units  
 Time-series length = 22  
 Dependent variable: LSat

	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	56.3975	14.3489	3.930	0.0001	***
EdAtt	0.0530676	0.0656635	0.8082	0.4200	
UNE	-0.189659	0.0660254	-2.873	0.0046	***
LExp	0.378780	0.198799	1.905	0.0583	*
InIn	-0.412340	0.442964	-0.9309	0.3531	
IntHom	-0.265583	0.424846	-0.6251	0.5327	
GDP	0.153402	0.0461565	3.324	0.0011	***
Mean dependent var	84.46259	S.D. dependent var	6.794775		
Sum squared resid	559.6706	S.E. of regression	1.748802		
LSDV R-squared	0.938466	Within R-squared	0.237213		
LSDV F(14, 183)	199.3542	P-value(F)	1.1e-102		
Log-likelihood	-383.8189	Akaike criterion	797.6378		
Schwarz criterion	846.9618	Hannan-Quinn	817.6025		
rho	0.528771	Durbin-Watson	0.905757		

Joint test on named regressors -  
 Test statistic:  $F(6, 183) = 9.48497$   
 with p-value =  $P(F(6, 183) > 9.48497) = 4.53149e-009$

Test for differing group intercepts -  
 Null hypothesis: The groups have a common intercept  
 Test statistic:  $F(8, 183) = 112.917$   
 with p-value =  $P(F(8, 183) > 112.917) = 1.31885e-066$

*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

Figure 13 above depicts the fixed effects estimation model. Firstly, there must be checked the significance of parameters, which was unluckily lost in case of educational attainment, inequality of income distribution and intentional homicides. On the other hand, this proves high significance of alpha 0.001 with a GDP, but this result is not desirable. The life expectancy coefficient, on the other hand, improved its sign, in behalf of approving the assumption. LSDV R-squared is a pretty high, as it reaches 93.85%.

Therefore, the model 1: Pooled OLS and the model 2: Fixed effects were compared. And it was on a basis of Schwarz criterion, where model 1 reaches 1157.310 and model 2 846.9618, it deals the lower the better. It is the same for the other two, Akaike criterion

for model 1 is 1134.292 versus model 2 797.6378 and Hannan-Quinn for model 1 1143.609 versus model 2 817.6025.

But besides this, the author leans and puts great emphasis on the results of the economic and statistical verification, which emerged clearly better for model 1, where the pooled OLS method was used. Therefore, as the resulting figure, model 1 will be used.

**Figure 14: Model 1 Pooled OLS Estimation**

Model 1: Pooled OLS, using 198 observations Included 9 cross-sectional units Time-series length = 22 Dependent variable: LSat					
	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>	
const	132.264	15.6823	8.434	<0.0001	***
EdAtt	0.282523	0.0495542	5.701	<0.0001	***
UNE	-1.12369	0.118039	-9.520	<0.0001	***
LExp	-0.388454	0.209944	-1.850	0.0658	*
InIn	-2.71963	0.515015	-5.281	<0.0001	***
IntHom	-3.03387	0.711251	-4.266	<0.0001	***
GDP	0.124053	0.104418	1.188	0.2363	
Mean dependent var	84.46259	S.D. dependent var	6.794775		
Sum squared resid	3322.360	S.E. of regression	4.170678		
R-squared	0.634716	Adjusted R-squared	0.623241		
F(6, 191)	55.31354	P-value(F)	3.27e-39		
Log-likelihood	-560.1460	Akaike criterion	1134.292		
Schwarz criterion	1157.310	Hannan-Quinn	1143.609		
rho	0.864081	Durbin-Watson	0.245593		

*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

***Final Model Estimation***

$$y_{1t} = 132.264x_{1t} + 0.282523 x_{2t} - 1.12369 x_{3t} - 0.388454 x_{4t} - 2.71963 x_{5t} - 3.03387x_{6t} + 0.124053x_{7t} + u_{1t}$$

### 4.2.2.3. Model verification

#### *Mathematical Verification*

Mathematical verification proves the correctness of estimation parameters numbers, as well as it checks the calculations. Although, in this case, there is no need of mathematical calculation, as all the calculations were processed by Gretl software.

#### *Economic Verification*

One of the most important part of regression analysis is an economic verification. Based on theory, the relations between endogenous and exogenous variables as well as parameters of estimation are explained by economic verification. The following table describes an economic verification.

**Figure 15: Economic Verification**

<b>Parameter</b>	<b>The value</b>		<b>Assumption</b>
$\gamma_1$	132.264	Ceteris Paribus: If all other exogenous variables remain zero, life satisfaction will be 132.264 % per year.	Positive sign <b><i>Confirmed</i></b>
$\gamma_2$	0.282523	If an educational attainment increases by 1 % per year, the life satisfaction will increase by 0.282523 % per year.	Positive sign <b><i>Confirmed</i></b>
$\gamma_3$	- 1.12369	If an unemployment level increases by 1 % per year, the life satisfaction will decrease by 1.12369 % per year.	Negative sign <b><i>Confirmed</i></b>
$\gamma_4$	- 0.388454	If a life expectancy increases by 1 year, the life satisfaction will decrease by 0.388454 % per year.	Positive sign <b><i>Not Confirmed</i></b>
$\gamma_5$	- 2.71963	If an inequality of income distribution increases by 1 income quantile share ratio, the life satisfaction will decrease by 2.71963 % per year.	Negative sign <b><i>Confirmed</i></b>

$\gamma_6$	-3.03387	If intentional homicides increase by 100.000 people per year, the life satisfaction will decrease by 3.03387 % per year.	Negative sign <b>Confirmed</b>
$\gamma_7$	0.124053	If GDP increases by 1 % per capita growth, the life satisfaction will increase by 0.124053 % per year.	Positive sign <b>Confirmed</b>

*Source: own calculations, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

As could be seen in a figure above, the six out of seven estimated parameters fulfilled its assumption. As well as the economic theory of these parameters was confirmed. The only one, which was not confirmed is the negative value of an estimated parameter of life expectancy. According to an economic theory, as the life expectancy increases the life satisfaction should have as well. The result testifies to the opposite. It might verify, that the prolonging of a life is not always the best option for an individual happiness. That even having a longer, do not need to mean to have a satisfied one. But also, there could be a problem with data as well, as this refers to the total males and females, it might be different in case just men or just women.

It should be highlighted the most significant impact on a life satisfaction has parameter 6 the intentional homicides, followed by parameter 5 the inequality of income distribution. On the other hand, the least significant impact on a life satisfaction has GDP, which is in a confirmation with further research.

### ***Statistical Verification***

In a statistical verification, there is a big emphasis on a result of statistical significance of parameters as well as the equation. The author in this thesis decides about the result of statistical significance (SS) and statistical insignificance (SI) based on p-value and the level of significance - alpha.

**Figure 16: Statistical Verification**

<b>Parameter</b>	<b>p-value</b>	<b><math>\alpha</math></b>	<b>SS / SI</b>
<b><math>\gamma_1</math></b>	<0.0001	0.01	SS
<b><math>\gamma_2</math></b>	<0.0001	0.01	SS
<b><math>\gamma_3</math></b>	<0.0001	0.01	SS
<b><math>\gamma_4</math></b>	0.0658	0.1	SS
<b><math>\gamma_5</math></b>	<0.0001	0.01	SS
<b><math>\gamma_6</math></b>	<0.0001	0.01	SS
<b><math>\gamma_7</math></b>	0.2363	0.1	SI

*Source: own calculations, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

Statistical verification confirmed the statistical significance within six of the parameters. Moreover, five of them are significant with the 1% level of significance, and one with 10%. Just the one parameter, the GDP per capita growth proves as statistical insignificant.

Coefficient of determination

The coefficient of determination from the Gretl output in model one is  $R^2 = 0.634716$ .

In other words, it could be said, that 63.4716 % of variance of endogenous variable is explained by this relationship. Or 63.4716 % of variance of life satisfaction in nine Europeans countries is explained by educational attainment, unemployment level, life expectancy at birth, inequality of income distribution, intentional homicides and GDP per capita growth. The adjusted R squared is equal to  $Adj. R^2 = 0.623241$ .

### ***Econometric Verification***

The econometric verification consists a checking the requirements for the whole model. Simply said, it wants to have the parameters estimate to be best, unbiased and consistent. No autocorrelation, no heteroscedasticity and a normal distribution are desirable results of following tests. Three tests for previous mentioned requirements were done, with a usage



of software Gretl and a Durbin Watson statistics for autocorrelation of residuals, Breusch-Pagan test for heteroscedasticity and White's test for normality.

#### Autocorrelation

The autocorrelation of residuals is tested by Durbin Watson's statistics. It measures the autocorrelation of 1st order, in other words it there is any association between  $u_t$  and  $u_{t-1}$ . According to following table, the author decides whether there is an autocorrelation.

DW statistic is near to 2	no autocorrelation
DW statistic $\rightarrow$ 0:	positive autocorrelation
DW statistic $\rightarrow$ 4:	negative autocorrelation

**Figure 17: Durbin Watson Statistics**

Durbin-Watson statistic = 0.245593

p-value = 2.77556e-016

*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

Unfortunately, as the Gretl output shows, the Durbin-Watson Statistics in not near to 2, so there occurs an autocorrelation. And as the number 0.245593 is closer to zero, it could be said, there is a positive autocorrelation. Because this is not a desirable result, there is an option, how to solve the autocorrelation problem. Including the lagged values of the  $y_t$  endogenous variable among the regressors (exogenous variables). In case that would not work, there should be used delayed variables of longer period (t-2, t-3...) until the problem is solved.

#### Heteroscedasticity

The heteroscedasticity tests are testing that the variance of residuals is not constant over time, the covariance matrix is biased. The White's test for heteroscedasticity is used in this case.

$H_0 = 0$  ... There is no heteroskedasticity in the model.

$H_A \neq 0$  ... There is heteroskedasticity in the model.

### Figure 18: White's Test, part 1

White's test for heteroskedasticity

OLS, using 198 observations

Dependent variable: uhat^2

	coefficient	std. error	t-ratio	p-value	
const	6885.48	4958.64	1.389	0.1668	
EdAtt	-55.7399	26.9016	-2.072	0.0398	**
UNE	153.622	40.1085	3.830	0.0002	***
LExp	-137.215	135.514	-1.013	0.3127	
Unln	-224.445	224.166	-1.001	0.3181	
IntHom	-1501.86	304.255	-4.936	1.89e-06	***
GDP	-35.5560	35.7884	-0.9935	0.3219	
sq_EdAtt	-0.146068	0.0517838	-2.821	0.0054	***
X2_X3	0.0414325	0.100191	0.4135	0.6797	
X2_X4	0.924154	0.379520	2.435	0.0159	**
X2_X5	-1.50845	0.752884	-2.004	0.0467	**
X2_X6	-4.98553	1.13581	-4.389	1.99e-05	***
X2_X7	0.0174110	0.110038	0.1582	0.8745	
sq_UNE	0.379535	0.222547	1.705	0.0899	*
X3_X4	-1.92929	0.536194	-3.598	0.0004	***
X3_X5	1.08921	1.56386	0.6965	0.4871	
X3_X6	-12.2954	2.07309	-5.931	1.64e-08	***
X3_X7	-0.194003	0.288900	-0.6715	0.5028	

Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)

**Figure 19: White's Test, part 2**

sq_LExp	0.532350	0.936373	0.5685	0.5704
X4_X5	4.77245	3.17456	1.503	0.1346
X4_X6	21.7589	4.06386	5.354	2.75e-07 ***
X4_X7	0.406033	0.466733	0.8699	0.3856
sq_Unln	-11.4896	4.64544	-2.473	0.0144 **
X5_X6	-13.5578	9.50273	-1.427	0.1555
X5_X7	0.300656	1.57372	0.1910	0.8487
sq_IntHom	17.0883	5.40194	3.163	0.0018 ***
X6_X7	1.30626	1.88972	0.6912	0.4904
sq_GDP	0.0273537	0.0661022	0.4138	0.6795

Unadjusted R-squared = 0.418483

Test statistic:  $TR^2 = 82.859628$ ,

with p-value =  $P(\text{Chi-square}(27) > 82.859628) = 0.000000$

*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

As a result of White's test shows, the p-value is equal to zero, which means it is lower than alpha value 0.05, therefore  $H_0$  is rejected and it is proven that the model contains heteroscedasticity. The consequence of such a problem means, parameter estimate is no still unbiased and consistent, but no longer the best. For solving such a problem, it is recommended to make a square term for a dummy variable (in case of cross-sectional data) or to include dummy variable among regressors.

Normality

The last part of econometric verification consists of test for normality of residuals.

$H_0$ : there is a normal distribution of a  $u_t$  in the model

$H_A$ : there is not a normal distribution of a  $u_t$  in the model

### Figure 20: Normality Test, part 1

Frequency distribution for uhat1, obs 1-198

number of bins = 15, mean = -3.25845e-014, sd = 4.17068

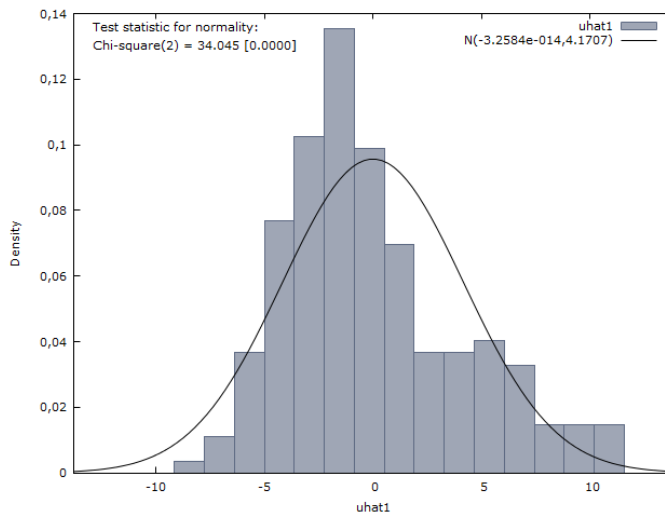
interval	midpt	frequency	rel.	cum.	
< -7.7680	-8.4585	1	0.51%	0.51%	
-7.7680 - -6.3868	-7.0774	3	1.52%	2.02%	
-6.3868 - -5.0057	-5.6962	10	5.05%	7.07%	*
-5.0057 - -3.6245	-4.3151	21	10.61%	17.68%	***
-3.6245 - -2.2434	-2.9340	28	14.14%	31.82%	*****
-2.2434 - -0.86224	-1.5528	37	18.69%	50.51%	*****
-0.86224 - 0.51891	-0.17166	27	13.64%	64.14%	****
0.51891 - 1.9001	1.2095	19	9.60%	73.74%	***
1.9001 - 3.2812	2.5906	10	5.05%	78.79%	*
3.2812 - 4.6623	3.9718	10	5.05%	83.84%	*
4.6623 - 6.0435	5.3529	11	5.56%	89.39%	*
6.0435 - 7.4246	6.7341	9	4.55%	93.94%	*
7.4246 - 8.8058	8.1152	4	2.02%	95.96%	
8.8058 - 10.187	9.4963	4	2.02%	97.98%	
>= 10.187	10.877	4	2.02%	100.00%	

Test for null hypothesis of normal distribution:

Chi-square(2) = 34.045 with p-value 0.00000

*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

**Figure 21: Normality Test, part 2**



*Source: own calculations using Gretl, data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)*

Unfortunately, as the p-value almost approaching the zero value, it is not inferior to level of alpha 0.05, there must be said there is not a normal distribution of residuals in the model.

### **4.3. GDP as Quality of Life Indicator**

National quality of life is frequently evaluated according to Gross Domestic Product (GDP) of a given country. This index is classified among objective indicators of quality of life. But is this indicator relevant?

According to a research *The Economic Well-being of Fender, Haynes and Jones (2011)* this measurement has various drawbacks and limitations and it opens to many important discussions: “Perhaps, the most commonly cited of all these statistics is Gross Domestic Product (GDP). This is a measure of the output of an economy expressed in money units and as such is useful for summarising economic activity. For many years, GDP has been used as a proxy for well-being, despite GDP not being developed for that purpose. Increases in GDP provide the resources for additional expenditure on goods and services to satisfy individuals’ needs. Moreover, increases in GDP have been associated with improvements in other indicators of well-being, such as life expectancy and educational attainments.”

The speculative connection of GDP and well-being has brought growing interest in this topic and has opened many interesting debates. Very influential and significant paper written by Easterlin (1974) who firstly determine so called “The Easterlin Paradox”. It defines the relation between average national happiness and income per capita. Easterlin research prove indirect proportionality between these two parameters. Even though there is an overall increase in per capita income, there is no significant increase in an average national happiness. (This topic is detailly discussed further in a text.) Ever since many researches have inspected the connection between income and subjective well-being measurements.

Sacks, Stevenson and Wofters (2010) hold the opposite opinion with providing a substitute interpretation of income and national well-being data. They oppose with the information that an absolute income has an important influential function in satisfaction measures. And in the face of the fact that those countries are experiencing faster economic growth and also tend to grow faster in life satisfaction.

It is still on-going study, which already brought many important highlights limitations of GDP in a role of national happiness indicator.

- GDP ignores elements that influence personal satisfaction out of the production limit. Such as production of household, one's leisure time, externalities, social relations quality, health condition and longevity as well as the quality of institutions.
- On the other hand, GDP covers such economic activities that may lower well-being or oppositely corrects expenditures of economic growth. These includes pollution, war, warfare, and overall crime all of that force people to spend more money, and as all of them have direct connection to GDP, it grows. Of course, here comes to mind the question, if Gross Domestic Product is really the eligible indicator of a nation's well-being.
- As it comes to public services and its output, there is imperfect measurement of the correct effect on well-being with such activities within the production boundary.
- And the last but not the least, GDP does not provide the information about a long-term continuance of well-being.

With the recognition of these spread absences in well-being measurement, there has begun extensive interest in establishing an alternative measurement of economic well-being (Fender, Haynes and Jones, 2011).

#### **4.3.1. The Easterlin Paradox**

As was stated earlier in a text, in a middle 1970s' the economist Easterlin Richard had presented his research based on a growth in an American economy in the last decades and the overall happiness of the people. He claimed, that even if American economy is growing, the happiness of citizens remains the same. Based on this knowledge, he asserted there is no relationship between the overall happiness of Americans and the economic development level of a society. It is not like life satisfaction does not grow at all along with rising average income, it is, but only until a certain time. At one specific point, this feature changes and life satisfaction does not increase with a growing income anymore (Economic and Social Research Council, 2017). It is called the Easterlin paradox or simply Happiness-Income Paradox.

In response to Happiness-Income Paradox, Richard Easterlin and Laura Angelescu (2009) published a paper discussing the happiness and economic growth over the world. It proves and brings the evidence about no existing relationship between these two in a time series

based regression analysis. Specifically, they investigated the relation among the improvement in happiness and the growth of GDP per capita in a long as well short term. Analysed 37 countries were divided into three groups 9 developing, 17 developed and 11 countries in a transition.

Firstly, the regression of time series evidence with long series, where the range of observed years varies from minimal 12 to maximum 34. Individual estimations were done for different groups of countries, but the result was the same in all cases. “There is no significant between the rate of improvement in life satisfaction and the growth rate of GDP per capita.” (Easterlin and Angelescu, 2009). So, there is no difference, whether it is a developed country, where the rate of GDP growth indicated between 1.5 and 3 %, or developing countries, either countries in transition, where the economic growth rates indicates from negative to possible 3%. Even if you run the regression for all 37 countries together the outcome about non-existing relationship among these two variables is confirmed.

On the other hand, if there is a short time span of time series in consideration, the estimated results are quite different. In a short run, these two variables are positively associated. As Easterlin and Angelescu (2009) reported in their results: “In the short run a negative change in GDP per capita is associated with a negative change in life satisfaction and the recovery of GDP per capita is associated with a recovery of life satisfaction.”. In case of mix of S-T with L-T time series evidence, there will always be a dominance of the short term positive association.

There arose a question why there is such a difference between the S-T and L-T outcomes. In a research, it is explained by so called “loss aversion” phenomenon from the Easterlin paradox. People are better adapting to the fact of rising income from its initial level, as their aspirations increase together with income. And as it is true, the downward of aspirations are definitely less flexible. Because once people have experienced that level of income they take it as a reference point – so called “endowment effect”. Thus, as income decreases the people feel deprived, and in a same time their level of life satisfaction decreases as well. In case of recovery of income level, the life satisfaction rises again.



Of course, there must be taken into consideration the result of a cross-sectional estimates. If there are compared the same two variables in a cross-sectional relation, the happiness and income reports a positive relationship between them. Which is in contradiction to time series relation, where the relationship was not confirmed. Thus, this discrepancy between these two approaches is explained by the happiness – income paradox.

## 5. RESULTS AND DISCUSSION

### 5.1. Aggregate Quality of Life Index Summary

The very first part of practical analysis is a calculation of so called Aggregate Quality of Life index on a basis of four well-known indexes measuring QOL in a world. AggQOL was calculated for a year 2015 for nine European countries with highly advanced economies with the help of dimension index and arithmetic mean. The results of AggQOL index clearly showed Denmark as the country with the highest level of a life quality. The ranking was as followed from the best: Denmark (0.91), Netherlands (0.851), Germany (0.841), Luxembourg (0.578), United Kingdom ((0.536), Ireland (0.529), France (0.482), Belgium (0.464) and very low score of Italy (0.113). This shows that even between developed European countries could be seen a difference in case of life quality.

Denmark as country with the highest AggQOL score, could be explained by its affection for the Scandinavian model as one of northern European countries. This model perceives society as a whole who seeks to enjoy the same conditions and life satisfaction. This greatly affects decision-making on economic and, above all, common social policies. This result confirms the Erikson at all (1987) theory of Scandinavian Model which simply try to create a welfare nation. It should work on preferences of people's wants instead of preferring individual plans. Also, subdimensions of quality of life computation should be mentioned, because in case of Denmark most of them showed the above average scores in areas such as educational skills, security, quality of environment, balance of work-life, earnings or social connections in comparisons to OECD's average.

There must be highlighted the fact that Italy from all nine examined countries has a significantly lowest score of AggQOL. This could also be confirmed by current economic as well as political position of a given Mediterranean country. As Martin (2017) mentioned in his article, the Italian economy is a major issue for a whole Europe. Because since the time of Italian last financial crisis, the country was not able to recover and set up strong and sustainable growth. Which only led to a deepening of the state debt, to the point that Italy now has the second worst debt in the eurozone, right behind Greece. Martin (2017) quoted "Debt to GDP stands at 133%, with only Greece, Japan, and Lebanon having higher ratios globally". Perring (2017) stated the debt as EUR 349 billion and both the economic and political uncertainty from the third biggest eurozone economy should be a warning

according to Deutsche Bank's strategists. All these aspects of course must be reflected in an overall life satisfaction of an Italian population. As the study examined many of dimension affecting quality of life, economic aspects play a crucial role. As well as political or more precise the civic engagement in case of Italy in form of a rise of a populist party. But it is known, that such a populist country cannot be the one who lead the country.

Another part of AggQOL calculation is a comparison of countries rankings between the Aggregate index and one index of the calculated ones. The most similar rankings provide HDI together with BLI. Thereby it could be said, those two indexes provide the most objective rankings of life quality when it is compared to AggQOL index.

On the other hand, the biggest significance differences occurred while comparing the ranking of Quality of Life Index and AggQOL. In case of QOLI France is ranked as the second-best country, whereby in AggQOL it occurs five ranks lower. Or Denmark which is overall rated as a country with the best quality of life, in QOLI it occupies fifth rank. And many other differences. These changes prove the disparity between quality of life from the expats point of view and the overall life satisfaction in given country. Since, QOLI is compounded in dependence on expats' experiences abroad.

## **5.2. Panel Data Regression Analysis Summary**

The other part of analysis studied the relationship between life satisfaction and other six variables in a same nine European countries, as examined in previous part. The main goal was to find out its possible connections between life satisfaction data, represented the life quality in given countries, and the most often used indicators measuring quality of life around the world in well-known indexes. The regression analysis proves that there is a strong relationship with several of them. The most significant one is with the intentional homicides, representing the criminal effect to QOL. It could be said, if intentional homicides increase by 100.000 people per year, the life satisfaction will decrease by 3.03387 % per year. It is followed by a quite strong relation with inequality of income distribution. If an inequality of income distribution increases by 1 income quantile share ratio, the life satisfaction will decrease by 2.71963 % per year. Another part of life satisfaction was described with the level of unemployment. If an unemployment level increases by 1 % per year, the life satisfaction will decrease by 1.12369 % per year. Unfortunately, the assumption of life expectancy was not fulfilled, as the economic

verification declares. There is not a positive relation among life satisfaction and life expectancy. Results show, if a life expectancy increases by 1 year, the life satisfaction will decrease by 0.388454 % per year. So, even though, an increasing life expectancy representing the health dimension of QOL here, which refers to an increasing quality of health care, according to a result, it negatively affects life satisfaction of a citizens. So, it must be said, that longer life does not step up life satisfaction. Which is at loggerheads with Helliwell, Layard and Sachs (2015: 26-27), who claim that people with happier lives are living longer and moreover proved higher probability to meet their life demands. Another proven relation represented the educational aspect of QOL. The outcome is interpreted, if an educational attainment increases by 1 % per year, the life satisfaction will increase by 0.282523 % per year. It considered the tertiary education attainment, where it proves that having a higher education may result in more quality and desirable life, when counting in also economic aspects, thus having a greater life satisfaction. The last exogenous variable represented GDP of all nine countries. As the positive assumption and economic verification confirm. It could be said that, if GDP increases by 1 % per capita growth, the life satisfaction will increase by 0.124053 % per year. Although, the other verification must be taken into consideration.

Statistical significance was confirmed in all five cases. Four of them with a level of significance 0.001. Just in case of GDP the statistical insignificance of parameter occurs. So, it cannot be said that this exogenous variable reflects the characteristics of the whole population. It was not proven this relation exists. Which is after all a very desirable result, as a part of the thesis is declaring an unsuitable usage of GDP as quality of life indicator. It proves the hypothesis of Easterlin and Angelescu (2009), who claim that in case of developed countries there is no relationship between national happiness and GDP per capita.

The coefficient of determination of a whole model is 0.634716. Which refers to the fact that 63.4716 % of variance of life satisfaction is explained by educational attainment, unemployment, life expectancy at birth, inequality of income distribution, intentional homicides and GDP. Even though, it is not a significantly high number, this is still ongoing process, which needs to be considered from so many aspects. One of them was to choose

the right dimensions for QOL measurements and check the validity of the most used in world-wide QOL indexes.

### **5.3. GDP as Quality of Life Indicator Summary**

This part of analysis is dedicated to a qualifying GDP as quality of life indicator. Several reasons why GDP as an economic indicator is not suitable for illustrating people well-being were listed. To sum it up, after the detailed analysis and gathered information there must be said, there is no relation among GDP growth and life satisfaction. Thus, if all of the factors listed earlier are take into an account, gross domestic product is not a suitable indicator for measuring quality of life. As the outcome of panel data regression analysed above reveals, there is no significant relationship among life satisfaction in nine developed European countries and GDP per capita growth. This result is in recognition with a finding of Easterlin and Angelescu (2009) that in case of long time series estimates, there is no relation among these two. Which cannot be claimed in case of cross-sectional relation. When Easterlin and Angelescu took into consideration different data estimation, the positive relation between income and happiness was confirmed. Thus, these two contradicting results are explained by happiness-income paradox.

## 6. CONCLUSION

Quality of life is rather a multidimensional and subjective term that should be counted for everybody individually. In order to define it, there must be considered broad perspective of factors which consists of both negative and positive aspects of life. Although it should be mentioned that QOL measurement is very fragile and dynamic in term of durability. Any kind of unexpected circumstance in one's life, affects his life satisfaction heavily. It could be unstable family relationships, health issues, changes in a work life or finances. To sum it up, QOL is a very individualistic perception of one's position in life in a context of his value system and his goals.

However, there is a high demand for an overall QOL measurement and ranking for a whole countries or societies, which is supplied by many world-wide organisations. Outcomes of AggQOL index implies that the country with the highest life quality is Denmark with a value of 0.91. As it proves high rankings in other QOL indices and it belongs among countries of Northern Europe, author inclines to the application of the Scandinavian model as an explanation. Countries rankings and international comparison is as followed Netherlands (0.851), Germany (0.841), Luxembourg (0.578), United Kingdom ((0.536), Ireland (0.529), France (0.482), Belgium (0.464) and on the last rank there is Italy (0.113). Very low score of this country might be reflected in its current economic and political crisis, which could be also seen in a life satisfaction of inhabitants.

Another interesting finding in AggQOL index is the objectivity of BLI and HDI. These two provides the most similar ranking outcomes in comparison with the aggregate one. On the other hand, diametrical differences arose in case of Quality of Life Index. Where, for example, Denmark as the number one in AggQOL, here it occupies the fifth position. That emphasizes the disparity between the quality of life perception from citizens of given country and expats, who live there.

The regression analysis implies that life satisfaction of nine European countries from 1995 to 2016 is interrelated with educational attainment, unemployment level, life expectancy at birth, inequality of income distribution and intentional homicides. As all of these exogenous variables showed its statistical significance of parameters. The most influential variable has turned out to be intentional homicides. Where could be said, if intentional homicides increase by 100.000 people per year, the life satisfaction will decrease by

3.03387 % per year. Followed by strong interconnection with inequality of income distribution. If an inequality of income distribution increases by 1 income quantile share ratio, the life satisfaction will decrease by 2.71963 % per year. This is a very crucial step of this work, as it proves the reliability and suitability of the most used indicators for QOL measurements. Also, the unconfirmed relation among life satisfaction and GDP per capita growth should be mentioned. If GDP increases by 1 % per capita growth, the life satisfaction will increase by 0.124053 % per year. It is considered as desirable outcome, as it is connected to the last part of study, where author condemns GDP as a QOL indicator. As was already stated, GDP is not a suitable dimension for illustrating life satisfaction. It is proven by several points highlighted by Fender, Haynes and Jones (2011) and also a study of Easterlin and Angelescu (2009).

Thus, for an overall summary, there exists several indexes interpreting the life quality of countries or region. As all of them using different approaches, there could be counted one aggregate index comparing all of them, to get higher objectivity of given rankings. There is also very important to include as much as the significant and influential indicators as possible, even it encounters the problem of lack of data. Though, thanks to the continuing, interconnecting and more globalizing world over recent years, developments in life quality measurements have greatly evolved, and the collection of data of a different kind goes much further in places where it has not been possible before. Nowadays, it is possible to find out whether there is any interconnection between the real-life satisfaction of people and used dimensions. It is still ongoing research to chase the most suitable and mostly measurable dimensions. The question is whether, quality of life is that much connected to the accumulation of goods and to the economic aspects. There is a need for a deeper and broader examination of countless ways other than hitherto counted dimensions, which affect human life.

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## 8. APPENDIX

### Appendix 1: Data Set for Regression Analysis

Country	year	LSat	EdAtt	UNE	LExp	InIn	IntHom	GDP
ID		y1	x1	x2	x3	x4	x5	x6
		%	%	%	years	income quintile share ratio	per 100.000 people	per capita growth %
BEL	1995	79,700	20,5	9,339	76,841	4,5	1,4	2,17
BEL	1996	82,750	21,7	9,483	77,187	4,2	1,2	1,40
BEL	1997	78,423	22,5	8,956	77,371	4,0	1,4	3,46
BEL	1998	78,101	22,3	9,322	77,473	4,0	1,8	1,76
BEL	1999	80,557	23,1	8,649	77,620	4,2	1,8	3,33
BEL	2000	81,153	23,8	6,586	77,722	4,3	2,1	3,38
BEL	2001	79,737	24,4	6,178	77,973	4,0	2,7	0,47
BEL	2002	77,554	24,9	6,91	78,076	4,2	3,1	1,33
BEL	2003	79,639	25,6	7,68	78,129	4,3	2,2	0,35
BEL	2004	84,168	26,8	7,363	78,878	3,9	2,6	3,19
BEL	2005	82,734	27,2	8,44	78,980	4,0	2,1	1,53
BEL	2006	84,008	27,9	8,246	79,380	4,2	2,1	1,83
BEL	2007	83,933	28,1	7,458	79,783	3,9	2,0	2,64
BEL	2008	82,395	28,4	6,976	79,680	4,1	1,9	-0,05
BEL	2009	84,664	29,4	7,908	79,983	3,9	1,7	-3,07
BEL	2010	83,230	30,7	8,292	80,183	3,9	1,7	1,76
BEL	2011	82,082	30,4	7,14	80,585	3,9	1,9	0,39
BEL	2012	82,971	31,3	7,542	80,385	4,0	1,9	-0,59
BEL	2013	84,459	31,5	8,425	80,588	3,8	1,8	-0,55
BEL	2014	82,794	32,6	8,523	81,288	3,8	1,9	1,41
BEL	2015	84,539	32,7	8,482	81,288	3,8	1,9	0,89
BEL	2016	83,855	33,2	8,256	81,519	3,8	2,0	0,53
DNK	1995	91,451	22,3	6,992	75,213	2,9	1,1	2,49
DNK	1996	92,771	23,1	6,844	75,591	2,9	1,3	2,32
DNK	1997	91,728	21,1	5,4	75,945	2,9	1,7	2,83
DNK	1998	92,615	21,2	5,039	76,139	3,0	0,9	1,85
DNK	1999	91,522	22,3	5,141	76,341	3,0	1,0	2,61
DNK	2000	90,060	22,0	4,476	76,593	3,0	1,1	3,40
DNK	2001	91,781	24,1	4,164	76,793	3,0	1,0	0,46
DNK	2002	91,762	25,1	4,274	76,895	3,3	1,0	0,15
DNK	2003	91,053	27,2	5,398	77,144	3,6	1,2	0,12
DNK	2004	91,751	27,9	5,204	77,493	3,4	0,8	2,40
DNK	2005	91,725	28,5	4,83	77,844	3,5	1,0	2,06
DNK	2006	92,112	29,3	3,897	78,095	3,4	0,5	3,57
DNK	2007	92,913	26,0	3,801	78,195	3,7	0,7	0,46
DNK	2008	92,070	26,3	3,434	78,446	3,6	1,0	-1,09
DNK	2009	93,696	26,9	6,007	78,598	4,6	0,9	-5,41

DNK	2010	92,545	27,5	7,464	79,100	4,4	0,8	1,42
DNK	2011	93,294	27,9	7,573	79,800	4,0	0,8	0,92
DNK	2012	92,967	28,6	7,526	80,051	3,9	0,8	-0,15
DNK	2013	93,127	29,1	6,997	80,300	4,0	0,9	0,51
DNK	2014	93,214	29,8	6,589	80,700	4,1	1,3	1,16
DNK	2015	93,487	30,7	6,168	81,100	4,1	1,0	0,89
DNK	2016	92,657	31,2	6,051	81,365	4,1	0,8	0,45
FRA	1995	76,517	16,7	12,04	77,751	4,5	2,3	1,72
FRA	1996	78,546	15,8	12,845	77,954	4,3	2,0	1,03
FRA	1997	75,050	16,5	13,056	78,305	4,4	1,7	1,98
FRA	1998	74,466	18,5	12,615	78,605	4,2	1,6	3,18
FRA	1999	77,783	19,2	12,514	78,756	4,4	1,6	2,88
FRA	2000	78,218	19,8	10,743	79,056	4,2	1,8	3,17
FRA	2001	76,711	20,7	9,11	79,159	3,9	1,8	1,22
FRA	2002	76,416	21,5	9,169	79,261	3,9	1,9	0,39
FRA	2003	76,068	22,2	8,794	79,115	4,1	1,6	0,11
FRA	2004	78,646	22,7	9,402	80,163	4,2	1,6	2,03
FRA	2005	78,454	23,4	8,946	80,163	4,0	1,6	0,84
FRA	2006	79,543	24,0	8,936	80,812	4,0	1,4	1,66
FRA	2007	79,691	24,4	8,054	81,112	3,9	1,6	1,73
FRA	2008	77,838	24,8	7,484	81,215	4,4	1,6	-0,36
FRA	2009	79,788	25,9	9,147	81,415	4,4	1,3	-3,44
FRA	2010	79,247	26,2	9,304	81,663	4,4	1,3	1,46
FRA	2011	76,919	26,7	9,248	82,115	4,6	1,4	1,59
FRA	2012	80,079	27,7	9,815	81,968	4,5	1,2	-0,30
FRA	2013	79,221	28,9	10,352	82,220	4,5	1,2	0,06
FRA	2014	80,119	29,7	10,305	82,671	4,3	1,2	0,44
FRA	2015	80,663	30,4	10,359	82,671	4,3	1,6	0,62
FRA	2016	80,140	30,9	9,965	82,873	4,3	1,2	0,78
GER	1995	79,790	19,3	8,158	76,422	4,5	1,7	1,44
GER	1996	79,000	18,8	8,825	76,673	4,3	1,7	0,53
GER	1997	75,055	19,6	9,863	77,073	4,4	1,5	1,70
GER	1998	76,902	20,15	9,788	77,476	4,2	1,2	1,96
GER	1999	78,902	20,7	8,855	77,727	4,4	1,2	1,92
GER	2000	78,501	21,4	7,917	77,927	4,2	1,2	2,82
GER	2001	78,968	20,0	7,773	78,329	3,9	1,1	1,52
GER	2002	77,319	18,9	8,482	78,229	3,9	1,2	-0,17
GER	2003	75,416	20,3	9,779	78,380	4,1	1,1	-0,76
GER	2004	80,324	21,1	10,727	78,680	4,2	1,1	1,19
GER	2005	78,801	20,6	11,167	78,932	4,0	1,1	0,76
GER	2006	79,725	20,1	10,25	79,132	4,0	1,0	3,82
GER	2007	80,159	20,4	8,658	79,534	3,9	0,9	3,40
GER	2008	79,974	21,4	7,525	79,737	4,4	0,9	1,27
GER	2009	81,012	22,3	7,742	79,837	4,4	1,0	-5,38
GER	2010	81,604	22,7	6,966	79,988	4,4	1,0	4,24

GER	2011	82,329	24,3	5,824	80,437	4,6	0,9	5,60
GER	2012	82,714	24,9	5,379	80,539	4,5	0,8	0,30
GER	2013	83,098	25,2	5,231	80,490	4,5	0,8	0,22
GER	2014	83,518	23,2	4,981	81,090	4,3	0,9	1,17
GER	2015	84,751	23,8	4,624	81,090	4,3	0,8	0,84
GER	2016	84,078	24,4	4,311	81,287	4,3	0,7	0,66
IRL	1995	84,224	17,7	11,983	75,618	5,1	1,2	9,07
IRL	1996	85,733	20,1	11,717	75,832	5,1	1,2	8,23
IRL	1997	86,068	19,8	10,203	75,985	5,0	1,0	9,64
IRL	1998	83,356	18,7	7,699	76,180	5,2	1,0	7,10
IRL	1999	81,820	17,6	5,804	76,083	4,9	1,0	9,62
IRL	2000	82,610	19,2	4,318	76,537	4,7	0,1	8,46
IRL	2001	82,901	20,9	3,683	77,134	4,5	1,3	4,38
IRL	2002	80,896	22,0	4,215	77,634	4,7	1,3	3,81
IRL	2003	81,299	23,5	4,478	78,139	4,9	1,1	2,00
IRL	2004	85,666	24,9	4,491	78,539	4,9	0,7	4,79
IRL	2005	85,074	26,1	4,342	78,944	5,0	1,2	3,49
IRL	2006	84,460	27,7	4,415	79,241	4,9	1,4	3,05
IRL	2007	83,337	28,9	4,674	79,641	4,8	1,8	0,84
IRL	2008	82,302	30,3	6,399	80,095	4,4	1,1	-6,30
IRL	2009	84,652	31,4	12,008	80,190	4,2	1,2	-5,53
IRL	2010	81,251	32,7	13,854	80,744	4,7	1,1	1,48
IRL	2011	82,010	33,3	14,625	80,746	4,6	0,9	-0,40
IRL	2012	79,680	34,7	14,672	80,846	4,8	1,2	-1,32
IRL	2013	80,797	36,3	13,044	81,000	4,7	1,1	0,85
IRL	2014	85,874	35,8	11,263	81,349	4,9	1,1	8,02
IRL	2015	87,390	37,4	9,396	81,502	4,5	0,6	24,67
IRL	2016	88,032	37,7	8,089	81,693	4,5	1,1	3,09
ITA	1995	76,700	6,0	11,669	78,171	5,9	1,8	2,89
ITA	1996	78,893	6,4	11,874	78,522	5,6	1,7	1,26
ITA	1997	75,667	6,7	11,999	78,824	5,3	1,5	1,78
ITA	1998	75,951	7,3	12,119	78,976	5,1	1,5	1,59
ITA	1999	76,564	7,9	11,69	79,424	4,9	1,4	1,54
ITA	2000	77,571	8,1	10,842	79,778	4,8	1,3	3,66
ITA	2001	78,571	8,3	9,595	80,127	4,8	1,2	1,72
ITA	2002	77,956	8,6	9,208	80,229	5,2	1,1	0,10
ITA	2003	76,979	9,1	8,866	79,983	5,4	1,2	-0,29
ITA	2004	77,353	10,0	7,866	80,780	5,6	1,2	0,93
ITA	2005	76,963	10,8	7,73	80,783	5,6	1,0	0,45
ITA	2006	76,584	11,4	6,777	81,283	5,4	1,1	1,70
ITA	2007	75,043	12,0	6,075	81,434	5,4	1,1	0,96
ITA	2008	71,977	12,7	6,723	81,485	5,2	1,0	-1,70
ITA	2009	74,286	12,8	7,749	81,637	5,3	1,0	-5,91
ITA	2010	75,039	13,0	8,362	82,037	5,4	0,9	1,37
ITA	2011	72,112	13,2	8,359	82,188	5,7	0,9	0,40



ITA	2012	70,349	13,9	10,655	82,239	5,6	0,9	-3,08
ITA	2013	69,440	14,4	12,149	82,690	5,8	0,8	-2,86
ITA	2014	73,248	15,0	12,683	83,090	5,8	0,8	-0,80
ITA	2015	73,379	15,5	11,896	83,490	5,8	0,8	0,88
ITA	2016	72,818	15,7	11,541	83,777	5,7	0,7	1,10
LUX	1995	97,126	14,0	2,918	76,512	4,3	0,5	0,02
LUX	1996	94,958	14,8	3,286	76,520	4,0	1,0	0,02
LUX	1997	97,191	17,2	2,527	76,880	3,6	1,0	4,39
LUX	1998	94,982	16,95	2,763	77,017	3,7	0,9	4,73
LUX	1999	95,993	16,7	2,39	77,771	3,9	1,4	7,03
LUX	2000	95,010	16,7	2,345	77,873	3,7	1,4	6,79
LUX	2001	96,887	16,0	1,805	77,824	3,8	1,5	1,32
LUX	2002	97,582	16,2	2,621	77,966	4,0	1,5	2,74
LUX	2003	94,041	12,6	3,675	77,727	4,1	1,5	0,40
LUX	2004	97,689	20,8	5,113	79,122	3,9	1,5	2,15
LUX	2005	96,712	23,0	4,488	79,432	3,9	1,5	1,61
LUX	2006	97,280	20,5	4,731	79,288	4,2	1,5	3,51
LUX	2007	97,525	22,7	4,065	79,383	4,0	1,5	6,69
LUX	2008	96,080	23,7	5,06	80,539	4,1	1,6	-3,03
LUX	2009	98,189	30,2	5,122	80,637	4,3	1,0	-6,11
LUX	2010	98,051	30,3	4,361	80,632	4,1	2,0	2,97
LUX	2011	98,068	31,7	4,901	80,988	4,0	0,8	0,29
LUX	2012	98,164	33,4	5,14	81,393	4,1	0,0	-2,72
LUX	2013	97,008	35,2	5,848	81,800	4,6	0,2	1,61
LUX	2014	96,923	39,6	5,852	82,229	4,4	0,7	3,17
LUX	2015	97,870	35,2	6,669	82,229	4,3	1,0	1,58
LUX	2016	97,769	36,4	5,942	82,724	4,3	1,0	1,79
NLD	1995	85,666	18,6	7,157	77,405	4,2	1,9	2,61
NLD	1996	86,617	19,3	6,421	77,436	4,4	1,4	3,09
NLD	1997	87,549	20,5	5,511	77,794	3,6	1,3	3,76
NLD	1998	87,497	18,7	4,394	77,883	3,6	1,1	3,88
NLD	1999	86,217	19,4	3,622	77,837	3,7	1,3	4,35
NLD	2000	87,111	20,6	2,725	77,988	4,1	1,1	3,50
NLD	2001	87,704	20,8	2,119	78,190	4,0	1,3	1,36
NLD	2002	85,374	21,6	2,554	78,293	4,0	1,2	-0,53
NLD	2003	85,560	23,8	3,593	78,493	4,0	1,2	-0,19
NLD	2004	86,759	25,7	4,646	79,095	4,0	1,2	1,68
NLD	2005	88,300	26,2	4,724	79,346	4,0	1,1	1,92
NLD	2006	88,656	26,2	3,905	79,698	3,8	0,8	3,35
NLD	2007	89,313	26,7	3,179	80,098	4,0	0,9	3,47
NLD	2008	90,240	27,8	2,75	80,251	4,0	0,9	1,30
NLD	2009	89,349	28,4	3,413	80,549	4,0	0,9	-4,26
NLD	2010	89,577	27,7	4,45	80,702	3,7	0,9	0,88
NLD	2011	89,930	28,0	4,977	81,205	3,8	0,9	1,19
NLD	2012	88,110	28,6	5,821	81,105	3,6	0,9	-1,42



NLD	2013	87,289	29,3	7,243	81,305	3,6	0,7	-0,48
NLD	2014	89,604	29,7	7,416	81,707	3,8	0,7	1,06
NLD	2015	89,932	30,5	6,872	81,707	3,8	0,6	1,50
NLD	2016	90,188	31,0	6,166	81,888	4,2	0,6	1,67
UK	1995	82,815	19,4	8,694	76,837	5,2	1,5	2,24
UK	1996	83,267	20,1	8,192	77,088	5,0	1,3	2,29
UK	1997	82,352	20,7	7,072	77,211	4,7	1,4	2,86
UK	1998	81,954	22,65	6,203	77,190	5,2	1,5	2,89
UK	1999	80,213	24,6	6,043	77,390	5,2	1,5	2,94
UK	2000	83,565	25,7	5,562	77,741	5,2	1,7	3,37
UK	2001	83,522	25,9	4,696	77,993	5,4	1,8	2,33
UK	2002	82,049	26,7	5,037	78,144	5,5	2,0	1,96
UK	2003	82,892	25,5	4,807	78,446	5,7	1,7	2,99
UK	2004	84,198	26,3	4,594	78,746	5,8	1,6	1,95
UK	2005	84,164	26,8	4,75	79,049	5,9	1,5	2,27
UK	2006	84,327	27,6	5,35	79,249	5,4	1,4	1,75
UK	2007	84,254	28,7	5,262	79,449	5,3	1,4	1,76
UK	2008	83,150	28,7	5,615	79,600	5,6	1,2	-1,41
UK	2009	84,630	30,0	7,537	80,051	5,3	1,1	-5,05
UK	2010	84,138	31,6	7,787	80,402	5,4	1,2	1,12
UK	2011	84,649	33,2	8,037	80,951	5,3	1,0	0,72
UK	2012	85,107	34,6	7,886	80,905	5,0	1,0	0,61
UK	2013	84,977	35,6	7,526	81,005	4,6	0,9	1,23
UK	2014	86,287	36,6	6,111	81,305	5,1	0,9	2,30
UK	2015	87,098	37,6	5,301	81,605	5,2	1,0	1,39
UK	2016	87,655	38,3	4,849	81,666	5,1	1,0	1,02

Source: data collected from European Commission (2017), Eurostat (2017), Nation Master (2017), World Bank (2017)