DOI: 10.14267/phd.2014001

Kristóf Lehmann

Subjective well-being in the European Union

DOI: 10.14267/phd.2014001

World Economics Department

Supervisor:

Dr. Gáspár Tamás
associate professor

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Kristóf Lehmann

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Ph.D. dissertation

Budapest, 2013

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Figure 18 – Classification of countries based on the differences of the two estimated life satisfaction indices from Eurobarometer life satisfactions

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List of abbreviations

BES	Buddhist Economics School
CA	Capability Approach
CIS	Commonwealth of Independent States
CIS+M	Commonwealth of Independent States and Mongolia
DRM	Day Reconstruction Method
CEE	Central and Eastern Europe
EB	Euro-Barometer Survey
ESM	Experience Sampling Method
EU	European Union
EU10	10 new EU member states (2004 enlargement)
EU15	15 former EU member states (until the 2004 enlargement)
EU27	27 EU member states
FMRI	Functional Magnetic Resonance Imaging
GDP	Gross Domestic Product
GSP	German Socioeconomic Panel
HA	Happiness Approach
HDI	Human Development Index
LPM	Linear probability model
LS	Satisfied with life
OLG	Overlapping Generations (model)
NAAS	Not at all satisfied with life
SWB	Subjective well-being
US	United States of America
VS	Very satisfied with life.
WVS	World Values Survey

DOI: 10.14267/phd.2014001

Acknowledgments

I gratefully acknowledge the support of Dr. Tamás Gáspár, my supervisor for the detailed advices, the many year support and his patience.

Furthermore, I would like to say thank to Dr. András Blahó for the continuous help during the doctoral school and the research. I would like to thank to Dr. Yasumi Matsumoto for his general advices on the topic, Mr. Gábor Uliha and my colleagues for their suggestions regarding econometric analysis and modelling.

I also appreciate all the efforts Katalin Ferber, László Vigh, István Benczes, Balázs Forman, Róbert Veszteg, Pál Rozsnyói and József Nyers did to support my dissertation, my work and my career during my doctoral studies.

The author

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1. Introduction

1.1 Measuring social progress

During the past five decades one of the major questions in social sciences has been the methodological support for development: how can we measure economic and social development and well-being. After the Second World War several scientists attempted to set better approaches to measure economic and social progress. *"The largest centre for measuring social progress became the German and the Scandinavian School, with leading names like Wolfgang Zapf, Erik Allard and later Joachim Vogel. In Hungary such research began at the Central Statistical Office under the control of Rudolf Andorka, and not only the results of the research were published but also the strategy of social modernization. Later in the 90s the Social Report published by the social research institute TÁRKI and the Social Outlook series of the Central Statistical Office reported the results."* (Gaspar, 2013, p. 77, own translation)

There are three larger sets of approaches for measuring well-being. Objective measurements try to use several economic, social and environmental statistical data to interpret well-being. This method is mostly used by the Scandinavian school. The second approach focuses on subjective data and qualitative methods. The German school used this approach due to the lack of life quality information in objective statistical data. Finally, the component approach used by the UN and the OECD assumes that different components (households, healthcare, and education) may characterize social progress. (Gaspar, 2013)

As Gaspar (2013) summarized objective measurement used to focus on GDP. After the 1960s several scholar criticized the methodology of GDP. Most of these critics mentioned the lack of inequality and poverty, health, education, crime and later environmental information in GDP. Thus some measurement focuses on improving GDP, like the measured economic welfare, index of sustainable economic welfare, genuine progress indicator. Other methods unify GDP with other objective indices. Such composite indices are the Human Development Index and the physical quality of life index.

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Subjective measurement has also become important in the last three decades. Subjective well-being indicators measure the overall life quality of the individual. Usually surveys ask question about the respondent's happiness level or their level of satisfaction with their life. Despite the strong methodological fights and the concerns of economists the use of subjective well-being indicators in social sciences increased exponentially. The reason why it happened like that is based on two facts. First, the improvements measured in objective data sometimes were not followed by subjective reporting, and this gap required explanation. Secondly, methodological critics that emphasized the limits and the biasedness of subjective survey data became silent due to the rapidly increasing number of convincing empirical findings.

Our dissertation focuses on subjective well-being (life satisfaction), thus we would like to interpret one small detail of this well-being measurement classification. However, all our estimations and calculations try to build a bridge between objective and subjective data. Our model estimations and regressions will use objective statistical data to explain the changes in subjective well-being within the European Union.

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1.2 Motivation: why is the subjective approach relevant?

Empirical happiness (or life satisfaction) research found that after the Second World War reported happiness levels did not increase remarkably in any developed countries. However, real income rose, the quality of life improved, the number of working hours decreased without any positive avail to people's mood. These findings were published in several journal articles and books[1]. The result contradicts many principles of theoretical economics; furthermore, it suggests that our present theories about utility and economic goals need reconsideration.

Recent Eurobarometer (EB) and Word Values Survey (WVS) data[2] show not only that Hungary and Bulgaria are very dissatisfied societies in the EU, but also that transition economies lag far behind the former EU members (EU15) in reported subjective well-being level. These messages should not give a relevant message, but taking into account that more than 20 years ago the political and economic system of the Central and Eastern European (CEE) countries were changed, and during the so called transition life satisfaction has not increased remarkably, even after the EU accession, it should be taken seriously. The past two decades changed the everyday life, the mood and the motives for most of the people in CEE.

These changes were not always positive. Millions of people lost their jobs, became unemployed and lost their meaning of life. Thank to the opportunities, some became rich, started flourishing enterprises or found better career opportunities. The economic structure changed significantly during the 90s and most CEE economies reached the pre-transition GDP-level again by 1998-1999.

The same GDP-level was produced in an economically more effective way, which logically means that less people were employed compared to 1989 situation. The income differences changed radically in the CEE region, inequality increased radically during the transition. Poor became poorer, while some became very rich. These phenomena are inherent in such transitions. The new free market system brought a huge variety of products, which increased the number of choices and people could experience what economic freedom may give them.

[1] See Layard (2005a), Bruni and Porta (2005), Bruni, Comim and Pugno (2008) or Frey (2010)
[2] All EB since 2004 and the latest World Values Survey

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Approximately 20 years after the transition, surveys carried out independently[3] reported that a relevant part of people living in the transition countries prefer the pre-transition economic situation to the present ones (see Table 1). Besides, some of them reported significantly lower subjective well-being than that before the transition[4]. Despite these facts several objective indices[5] represent a successful socio-economic process during the previous two decades. We believe this puzzle makes it necessary to study subjective well-being in the European Union and in the CEE region.

Table 1

Views on living standards and economic situation compared with 1989 (survey based on 2007)

	Economic situation worse than in 1989	Living standards worse than in 1989
Bosnia and Herz.	86	67
Bulgaria	65	47
Croatia	66	53
Czech Rep.	33	28
Estonia	16	25
Hungary	75	61
Latvia	40	41
Lithuania	31	37
Poland	41	33
Romania	52	38
Russia	42	42
Slovak Rep.	46	28
Slovenia	43	25
Ukraine	70	53

Source: EBRD (Life in Transition Survey)

Furthermore, the latest data suggest that many countries suffered a huge subjective well-being loss due to the crisis (for instance Greece, Portugal). In these countries unemployment has increased to historical heights, while their GDP contracted by 20-40 percentages. Such a shock to the economy affects individual mood and subjective well-being as well, but the decline in subjective well-being is much below that of objective economic indices. These correlations among socio-

[3] EBRD Transition Report (2007), Washington Institute and Eurobarometer
[4] Transition Report 2007, 48-61.
[5] See Guriev and Zhuravskaya (2009) for details.

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economic variables and subjective well-being are very important to deal with as general policy making should have a clear view on the effect of different economic scenarios.

Finally Kopp and Martos (2011) studied the relationship between economic growth, social well-being and life quality in Hungary. They argued that the modern consumption based culture people live their life as more income and consumption would result in a better life quality. Meanwhile the increase in the number of depressive symptoms shows that adaptation tensions exist. Pursuing more consumption is not a solution for the life quality puzzle. Their approach used subjective health indicators. They found that generally the health situation in Hungary improved since the transition. Furthermore they found that Hungarians are not more depressed than citizens of other countries. However, chronic stress and negative mood is very usual among those groups of the society who live in uncertain situation. That leads to a negative subjective life quality.

We could have collected several further examples, but we believe these examples are interesting puzzles and suggest that we have to study and try to get any further details about the correlations between subjective and objective indicators.

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1.3 Goal of the dissertation

The contradictions and findings we mentioned are shocking. We believe that all further findings of subjective well-being measurements are needed to be summarized to rethink some basic principles and assumptions of economics. My goal is to give an insight to subjective well-being based research, summarize several economics related findings of it. I would like give more information on Europe by using Eurobarometer data for econometric modeling to find the strongest ties among objective socio-economic variables and Eurobarometer's life satisfaction.

The socioeconomic developments are difficult to be evaluated. In case of a progress some groups of the society lose while others win. Generally socioeconomic developments are extremely complex and complicated, thus we have to be careful when we would like to analyze them or conclude any inference. Our dissertation uses Eurobarometer data and the whole database covers the 27 EU member states. Since the first year in our dataset several major economic and social changes happened, which may have had a significant effect not only on socioeconomic indices, but also on subjective well-being. Such events were the transition in CEE, the German reunification, the enlargements of the EU (especially the 2004), the adaptation of the euro or the global financial crisis since 2008. We chose some of these events are tried to estimate there effects on subjective well-being.

As subjective well-being is a relatively new tool for economists we would like to use it strictly for economic research. Subjective well-being data may be very useful for studying the individual well-being effect of economic processes and decisions. Monetary policy related decision making is a rule-based one, but monetary economics suffers from the lack of empirical evidence about the social utility function. As usually model estimations and simulations need a good goal function such empirical results are important to get an impression about the social preferences among macroeconomic variables. For this goal we will use subjective well-being data as utility surveys and assume that the SWB answers can reflect the subjective effects of different macroeconomic developments. With these

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assumptions we will be able to estimate such preferences and results may be supportive for monetary policy decisions.

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1.4 Hypothesis

One of the fastest scientific improvements in social sciences and in applied psychology has been experienced in the field of happiness research. Since the Cognitive Revolution in psychology sociologists and economists have started to use the psychological tools to evaluate human well-being and to reconstruct some models. These studies suggest strong revising of basic principles and theories, for instance the utility concept in economics.

Mainstream economics can't represent and model all the socioeconomic processes like the transition in CEE. To understand such developments better we think it is necessary to give insights into the major findings of subjective well-being research and also to show its consequences on economics.

Subjective well-being gives the chance to deal with human well-being effects of several economic factors and historical changes. We do not want to give an attempt to deal with all the interesting questions and all the possible usage of subjective data in Europe. As standard economics do not use subjective data we believe that the effect of events like the EU enlargement, the adaptation of the euro should be studied by such a tool. Based on arising questions we put the following hypothesis into shape:

1. **EU accession in 2004 and 2007 has not increased life satisfaction on average in new EU member states (EU12).**

2. **Adopting the euro increased life satisfaction in the participating countries**.

3. **Real GDP growth has a significant effect on life satisfaction of the new member states (EU12).**

For monetary policy decision making the preference between inflation and employment is crucial. The fourth hypothesis focuses on this relationship:

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4. Employment is more relevant for life satisfaction than inflation.

Hypothesis number one and three focus on the new member states only, while hypothesis number two is for the euro zone countries. Yet, hypothesis number 4 is generally for the whole European Union.

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1.5 Content of the dissertation

In the second chapter the Reader can get an insight into the scientific development of happiness research based on the work of former and present scholars. We try to expound the appearance of the Happiness Approach in comparison to Sen's Capability Approach, and introduce the major schools, their basic methods and assumptions. Chapter two furthermore, explains the different definitions, which are widely used as synonyms in the literature. To make the present text transparent we introduce a structure of definitions and use these terms strictly in the dissertation.

The third chapter tries to explain the methodological background of subjective well-being. It is not a goal of the present dissertation to defend the methodological approach of subjective well-being. Frey (2010), Bruni and Porta (2005), Bruni, Comim and Pugno (2008) framed the basic principles and methodological facts about happiness economics. Further studies[6] detailed its methodological background, the critics regarding subjective well-being and proved the suitability of the Happiness Approach. We will only summarize the major points of the discussion and explain why we think that subjective reporting is useful. We believe that the introduction of the methodological debate may be useful to underpin our research and the models we used to analyze the European Union.

The fourth chapter aims at explaining the most relevant findings of happiness research. We find it necessary to get to know these results, because they may explain several problems and difficulties especially why standard economics misunderstood some relevant questions during the CEE transition. Questions like 'can money buy happiness' are answered by empirical results of the literature. We try to summarize all the relevant findings of happiness research and all remarkable relationship that scholars could prove. Besides income we will show the most important results regarding other facts and variables which affect subjective well-being. Adaptation is

[6] Ditella and MacCulloch (2006), Kahneman ad Krueger (2006)

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relevant as individuals can get used to social conditions. Rivalry or relative income is also an important factor in understanding subjective well-being. Other factors like unemployment, inflation, religion, marriage, crime, corruption or income mobility also affect self reported well-being. We also show results that may be useful to rethink some economic principles, the form of the utility function or the decision making in public policy. Mainstream economics uses different assumptions and in some cases consequences may not be true for real life or regions like the CEE region. We would like to collect the new findings that may be important to understand the region's difficulties.

In the fifth chapter we summarize how these findings may affect the utility function and our understanding of utility. We give an attempt to explain why utility based on the revealed preferences theory is not appropriate and effective in explaining human well-being. The difference between experienced and decision utility is based on a preference ordering and memory failure. The mistake may be very significant and none of the globally used mainstream models can deal with it. Furthermore, these mistakes may result a bias in human well-being and thus can be important for the transition economies.

The sixth chapter will turn the topic to the major issue. This part will demonstrate examples for applying subjective well-being surveys. We regressed life satisfaction survey data of Eurobarometer for the 27 European Union member states. We chose some models and estimated them for the EU12 and the EU15 group and compared the differences between the results. We also analyzed the Eurobarometer 69 survey results to find out important consequences about preferences on happiness within the EU27. This data was used for backwards estimation to check the relevance of the variables people think are important for their happiness and compare them to the reported life satisfaction levels. On the other hand, we made econometric regressions to find correlation between variables that may be important for explaining subjective well-being.

During the model estimations we faced several methodological challenges. As the variance in subjective well-being among EU member states are larger than the variance in time. As argued by Diener and Suh (1999) a large part of the

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variation can only be explained by unobservable country specific variables, thus we used different type of econometric models to fight this challenge. Due to the number of observations, the number of cross sections and periods the most trustful model results come from fixed effect panel models. However, the subjective well-being differences among the examined countries should be analyzed by other type of models as well. We used cross section estimations as well to have a more detailed view on effects on well-being of the socioeconomic differences. We also gave an attempt to use data for estimations supporting economic policy decision making with a special focus on monetary policy decision making.

The findings of the dissertation hopefully may be useful for economic modeling and for understanding utility and human feelings. Results for the CEE economies may shade that freedom, democracy and market economy system does not obviously mean a higher well-being level for a society. The usage of subjective well-being spreads rapidly, but there are further dimensions to develop new frameworks in economics and sociology.

I hope that the dissertation and its results may have essential messages to decision makers to understand why CEE countries and Hungary is ranked so low in life satisfaction surveys.

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2. The development of happiness research

2.1 Human needs and happiness

Standard economics is based on the assumption that the road to human development or higher well-being is paved with wealth. Individuals can improve their situation or get to a higher utility level by consuming more goods or services. Economics is trying to explain human well-being by the utility function, which is not only used for representing the immediate joy of consumption, but also to materialize the life-long benefits of the individual (for instance in OLG models). It is not necessary to be an economist to state the question: can utility demonstrate both the immediate joy of individuals and the generation long benefit to them?

Mainstream economics is using models to simplify the complex real-life situations and behavior of individuals. The assumption of the wealth needed is based on classical economics thought, which was conceived to the utility concept by Jeremy Bentham. Bentham founded the utilitarianism philosophy based on "the greatest happiness principle" (Veenhoven, 2004).[7] Despite the strong debates about utilitarianism and the fact that economists admit individual preferences are different, standard economic models still focuses on utility maximization. Economics integrated and simplified the utility theory as a concept in which utility depends on consumption of tradable goods. As mainstream economics still assumes that consumption and income are the factors that matter for human well-being, standard economics got too simplified results from the utility maximization in models. The major mistake in such modeling method is that economics uses utility as a general goal, while the utility maximization concept may only work for consumption utility, which is only a tiny part of human well-being. Thus, we have to rethink formulas to extend consumption utility to a wider range concept.

As opposed to the prevalent assumptions of standard economics in the past decades several independent approaches had emerged to represent a different point of view about human well-being.

[7] 'The greatest happiness principle' is based on Bentham's argument that the right policy causes the greatest good for the greatest number of people.

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The concept of human well-being was attached to the modern theories of economic development. After the Second World War several concepts appeared that focused on the development of the third world. Modernization theories, dependency theories, post-keynesianism and neomarxism were pioneers to represent the standard of living difficulties in developing countries. Basically these approaches were precedents of the human needs approaches. These new theories focused on inequality and poverty, while gave an attempt to improve standard of living in the absence of a remarkable economic growth. The basic needs approach was grounded on the assumption that poverty can be defined in terms of a given income level that is necessary to secure the basic human requirements of food, clothing and accommodation. According to Allen and Thomas (2000) the human development theory focuses on poverty in terms of capacity and of the lack of choices, instead of the poor material living standards. From the 1990s the United Nations adopted the human development approach as a development strategy and has annually published the Human Development Report.

The tenet of capability approach (CA) was shaped by Amartya Sen, who was a Nobel Laureate in economics. Sen (1992) criticized the use of income and utility as appropriate information for well-being analysis. He argued that the same level of opulence can be related to two different levels of well-being as human conversion rates differ and preferences are adaptive. Although the CA sees income as a tool to achieve greater well-being, it emphasizes that health and education are also relevant requirements.

On the other hand a different concept appeared based on the experience of industrialized Western countries. Tibor Scitovsky (1976) pointed out the paradox of continuously increasing (or already high) income and stagnating self-reported well-being. He used psychology to explain his argument that material comfort will ultimately lead to boredom, and consequently the failure to find active interests resulted in negative feelings, because stimulation is a biological need for human.[8] Furthermore, Richard Easterlin (1974) published an article with the conclusion that self reported well-being had not increased with income (national averages), but richer households reported higher well-being within a given country[9]. The

[8] The definition of happiness by Thomas Jefferson was very close to Scitovsky's idea: 'It is neither wealth nor splendor, but tranquility and occupation, which gives happiness.' (Morris, 2004, pp. 180)
[9] Also known as the Easterlin-paradox

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publications of Scitovsky and Easterlin gave the general idea for the concept, which developed the happiness approach (HA) in economics.

Recently both concepts have expanded with applications and further theoretical results[10]. I believe that research and further results in these two new approaches are essential. Mainstream economics needs to understand more details about consumption utility, the general utility or individual decision making. The following part summarizes the differences and the similarities between the two approaches.

[10] See 1.2 or the detailed discussion in Bruni-Comim-Pugno (2008).

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2.2 Capabilities and Happiness

Economics is interested in happiness since the utility theory is conceptualized Aristotle's argument saying that "the object of life is eudaimonia"[11]. Mainstream economics aims at maximizing the individual's utility function to achieve the greatest individual happiness. The CA and HA come from different origins, but both concludes that utilitarianism and thus conventional economics is simplifying well-being to consumption utility, and therefore their results should be reconsidered accordingly.

The HA is mostly based on self reported well-being.[12] The basic idea came from the assumption that subjective measures examine new problems. It is difficult to derive human motives from observations and objective indices, because choices do not necessarily reflect human preferences. As for instance Bruni et al. (2008) explains observations contrasts with the theory of revealed preferences.

The scientific explosion of the HA derived in two different variants of the happiness approach. The hedonic variant is based on utilitarian traditions and assumes that individual decision making process is driven by pleasure and pain, but may be measured objectively (Kahneman and Krueger, 2006). The eudaimonic variant, on the other hand, is based on the assumption that individual decision making process is guided by the evaluation of what constitutes a 'good life' and thus both material and non-material rewards become valuable.

While the CA defines human well-being as a dimension of moral thought and political philosophy, the HA emphasizes the psychological aspects in understanding individual well-being. The CA according to the works of Sen and Nussbaum is mostly related to empirical studies in the developing world. Functionings and capabilities explain human well-being by showing that different forms of deprivation and exclusion are not only material phenomena. On the contrast happiness research represents the well-being illusion mostly in rich countries (in the USA, the EU and Japan), but distinctly not in third world. Despite high income and material resources, besides human rights and liberties, human well-being could not

[11] Eudaimonia was a central concept in ancient Greek ethics. Means happiness or 'human flourishing'.
[12] Today five techniques are used for measuring happiness or life-satisfaction and some uses objective data (see Frey, 2010).

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increase. However, empirical and methodological difficulties exist both concepts had similar conclusion about the transformation of resources into human well-being.

The CA is normative theory, which focuses on substantive freedoms and by using functionings tries to provide appropriate information for policy actions. On the contrary, the HA argues that individuals are not able the use existing material resources and freedoms efficiently to increase their well-being. The HA is rather an empirical approach for defining what human well-being (in industrialized countries) is about.

The most insurmountable difference between the two approaches comes from the different view about subjective perception of well-being. The CA is based on objectivity, while the HA gives a preference to self reported well-being data as the only source of information about the individual. This critical point may be true and it raises many validity questions (see part 3 for detailed discussion). On the other hand, when using objective indices, the hundreds and hundreds of methodological and calculus problems arise. The questions are: Who is the evaluator and what is the criteria for choosing the right indices? There is always an evaluator the subjectivity problem is a crucial one. What was the reason underlining the selection of the chosen indicators? What are the ideal numbers or values based on his subjectively built index? For instance: is there a poverty rate that we could call an ideal one? All objective indices can be criticized because of the paternalistic approach used to select them. If scholars criticize HA because of the measurement failures that it is based on feelings and bias, they have to take into account that this criticism is also true for any objective index as well, because it is based on the idea, the preferences or the knowledge of an individual.

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2.3 The terminology of the Happiness Approach

Defining the often used terms of happiness research is crucial to understand the methodology, the criticism and the results of happiness research. In the literature the terms are not clearly used and usually satisfaction, happiness, affect and utility are all used as synonyms. To avoid misunderstandings we define the terms the following way based on the literature and our definitions:

Affect and *elation* stand for short-run happiness, which depends on recent life events.[13]

Baseline mood and *set-point* is the general mood depended on personality, health, nutrition and entertainment[14].

Decision utility[15] is an estimation of pleasure derived from observed preferences.

Experience utility stands for the benefit we get from experience.

Predicted utility is the ex ante utility estimation of the individual for a later event or the consumption of goods.

Utility is the abstract economic measure of pleasure, which is simplified to be affected by consumption of goods and services and spending leisure time.

Life satisfaction and *satisfaction* represent how satisfied people feel with their life as a whole.

Subjective well-being is the general name of happiness or satisfaction reporting based on individual judgment or self reporting. Some paper uses subjective well-being as a definition for the average of reported happiness and life satisfaction levels.

The definition of the term *happiness* is the most complex from all of the terms. Giving an attempt to define all kind of happiness represents how

[13] Definition of Frey (2010), Bruni and Porta (2005), Kimball and Willis (2006)
[14] Baseline mood is the term used by Kimball and Willis (2006), set-point is used by Easterlin (2005)
[15] Decision utility, experienced utility and predicted utility are the definition created by Kahneman and Thaler (2006).

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psychologists and economists wanted to characterize these moods and mental states by creating the terms we used above.

The English term happiness and the same word translated to other languages respectively mean more than one thing. Based on Tatarkiewicz's (2010) great philosophical study about happiness the term can mean:

1. An intense delight or joy, which lasts only for a short period. It is a momentous state of pleasure. Epictetous said not to stick strongly to anything, which is like a pottery or a glass chalice. (Scientific terms used to cover this meaning of happiness: affect, elation, experienced utility)

2. A general satisfaction with human subsistence. This meaning of happiness focuses on life instead of joy or pleasure. Therefore, it refers to the philosophical meaning of happiness and represents a positive general mood, which is the result of a satisfaction with the whole life. The ancient Greek term "eudaimonia" covers this second meaning of happiness as according to eudaimonia human happiness (Scientific terms used to characterize this meaning of happiness: satisfaction, happiness)

3. The hedonistic definition of happiness is based on the experienced positive feelings (pleasure) and negative feelings (pain). This definition relies on events and human's inner life or feelings. Scholars of the hedonistic school suggest that an individual is happy if they experience more pleasure than pay.

4. Happiness may also mean success or luck. The Oxford English dictionary and the American Heritage Dictionary also have one definition of happiness saying that someone is happy if he is successful or used to be lucky in his life. Yet we have to add that someone who is lucky or successful is not necessarily happy. For instance Gardner and Oswald (2006) studied lottery winners and Frey (2010) examined the answers of successful individuals surveyed by the Fortune Magazine. Both found that they were not significantly happier in the long term than control group respondents.

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5. Happiness may be defined as an emotional state. This can have two understandings. Firstly, it may mean that someone is happy if he feels happy or positive. This emotional state is attributed to inner life and feelings. However a great trap exists in this definition. We should deal with the so called happiness illusion. Happiness illusion means that someone feels happy, experiences a positive emotional state, but this can be attributed to drugs, a bad marriage (that he does not realize), alcoholics, or other judgment mistakes. Secondly, this emotional state can be a result of fulfilled desires. In this approach desires and thus expectations are crucial. One with lower claims may become happy easier, while others with great desires may be unhappy. As our approach will use self reported data these approaches may be very important for our understanding of happiness.

6. Happiness can stand for a different experience as well. Csikszentmihalyi (1990) collected all of his research in the well-known book 'Flow'. Flow is optimal experience for people; a special mood that needs a challenging but not impossible task for the individual. According to Csikszentmihalyi (1990) flow experience is very often reported by artists, athletes, musicians, surgeons, in other words people who seemed to spend their time in those activities they preferred. Thus Csikszentmihalyi argues that this experience is "something we make happen" (Csikszentmihalyi [1990] 3.). Csikszentmihalyi believes flow is the key factor for human happiness. Despite the fact that measuring these activities does not seem easy, Csikszentmihalyi created a method for that (see part 2.1.4 for further details).

A different somewhat more simple classification was showed by Seligman (2002). He argued that three different types of life forms exist that may result in individual happiness.

1. Pleasant life. Experiencing as many pleasure as possible.

2. Good or engaged life. Finding out individual strengths, and then living life by using those strengths. (This approach is somewhat close to Csikszentmihalyi's flow.)

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3. Meaningful life. Using strengths in the service of something that is thought to be greater than the individual level. This third meaning is close to the term eudaimonia used by Aristotle. Eudaimonia stands for well-lived life with a purpose of life, self-acceptance, and psychological vitality. This means the individual lives an active life and permanently improves his skills or knowledge. This meaning of a happy life was found to be attached to better health conditions (Kopp and Martos, 2011).

We believe that affect and experienced utility are not truly important terms for social sciences, as these concepts are short term phenomenon. They can be useful for understanding short term effects of events or consumption, but less useful for understanding well-being. It is a very important notation as this approach is different than the general view of mainstream economists. In the last decade various numbers of papers studied the utility concept, but standard economics has not changed its views yet. This practically means that the definition of John Locke is still a basic principle in current economics. Locke argued that satisfaction with life can be attributed to intense delights of human life. We think this idea was a strong step towards utility summing models[16], which are misleading due to human preference ordering, perception and memory mistakes. Thus most of the consequences of standard models do not give an appropriate solution for decision problems. That is why we argue that decision makers or even individuals should not deal with economic growth and income as much as they usually do in Western countries.

As happiness and life satisfaction have many meaning we believe the terms happiness and life satisfaction are needed to be used in economics and social sciences with definitions. As Gaspar (2013) argued subjective happiness questionnaires measure the affect, while life satisfaction cognitive evaluation. In model estimations we used life satisfaction data. We find life satisfaction as the most important for social sciences for analysis.

Since the beginning of our research, OECD published a new index[17] recently in 2011. However this concept has the same complexity and uses both subjective and objective data, it is based on an entirely different understanding of well-being.

[16] Utility based models that usually optimize utility over time. This means that the long term or lifetime utility is the result of a utility summation. Despite the fact that these models are widely used in economic theories and research, we believe they can not represent human decisions. (See chapter 4 for further details.)

[17] OECD's Better Life Index created for the „Better Life Initiative".

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OCED uses satisfaction with life data as one factor of nine. In comparison, we focus on the subjective well-being data and use objective indices as factors to exclude happiness illusion. In this chapter we discussed the major definitions about happiness.

DOI: 10.14267/phd.2014001

3. The methodological background

3.1 Measuring subjective well-being

Economist usually emphasize that happiness can not be measured. We can hardly agree with this view, however, we agree that some methodological questions regarding happiness measurement need answers. In this section we argue that psychologists as well as social scientists can reliably measure happiness, in the carefully defined sense of how people feel at a given time. Of course, this does not obviously mean that the question *what happiness is* have already been answered scientifically.

Happiness (current affect) is one of the easiest of all subjective concepts to measure. What is true (that these economists are intuiting) is that once happiness is measured, we don't know what it means or how to use the data set in terms of economic theory.

A widely used way for measuring happiness is experience sampling, where people are signaled at random intervals to report their current happiness. Kahneman, Krueger, Schkade, Schwarz and Stone (2004) argue that the day reconstruction method is a close second. Measuring happiness as part of a large-scale survey presents an extra issue in that the survey itself may represent a significant slice of a day. To avoid too much emphasis on the feeling states engendered by the interview process itself one can ask about happiness over a longer, but still relatively short span of time.

3.1.1 Survey methods

To give some practical examples we start the ranking with surveys. For instance the Health and Retirement Study measures affect[18] (mood) by the following series of questions:

"Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of the time this past week:

[18] See chapter 2.3. for the definition

DOI: 10.14267/phd.2014001

a. Much of the time during the past week, you felt you were happy. (Would you say yes or no?)
b. Much of the time during the past week, you felt sad. (Would you say yes or no?)[19]
c. Much of the time during the past week, you enjoyed life. (Would you say yes or no?)
d. Much of the time during the past week, you felt depressed. (Would you say yes or no?)"

Operationally, one can treat happiness as the latent variable behind these four yes/no questions. This series of questions on the Health and Retirement Study is a subset of a series of questions that represent one version of the Center for Epidemiologic Studies Depression (CES-D) measure of depressive symptoms.[20] These questions illustrate what we mean when we say that the concept of happiness we are referring to is about current feelings. These questions ask about easily accessible feelings and memories of feelings in the past week, thus everyone can answer them. Furthermore, as survey questions are about feelings and mood, replies can reflect the subjective part of individual opinion about there life and their utility.

In terms of external validity, self-reported current happiness measures of this general type are strongly correlated with frequency of smiling, others' ratings of how happy someone is social rank and high activity in the left pre-frontal cortex and low activity in the right pre-frontal cortex (Layard, 2005a). Brain activation patterns can be seen as a validation of a happiness measure since high activity in the left pre-frontal cortex and low in the right can also be induced by seeing pictures of a smiling baby, while the opposite can be induced by seeing pictures of a deformed baby.[21]

Some use different type of survey methods, which measure life satisfaction, a slightly different type of subjective well-being definition. Such surveys are carried out on the German Socioeconomic Panel, "On a scale from 1 to 10, how satisfied are you with your life?"

[19] In the first wave respondents were instead asked "*Please tell me how often you have experienced the following feelings during the past week: all or almost all of the time, most of the time, some of the time or none or almost none of the time."*
[20] See Steffick (2000) for a detailed description and assessment of the CES-D questions in the HRS.
[21] See Layard (2005a).

DOI: 10.14267/phd.2014001

The Euro-Barometer Survey or the World Values Survey (WVS) uses a very similar technique, called "global happiness" questions. These approaches aim at capturing happiness data by asking a representative sample of individuals about their overall satisfaction with their lives. In the WVS life satisfaction is measured on 1 (dissatisfied) to 10 (satisfied) scales.[22] WVS is carried out in different waves but sometimes the time differences between two consecutive waves is more than 5 years. On the other hand it has two important advantages. Firstly, WVS is a global survey. Secondly, it is very complex and contains a great set of information about details of the respondent's life and their culture. The EB covers all EU member states. It is carried out two times a year (spring and autumn). Its subjective well-being questionnaire asks: "On the whole, are you very satisfied, fairly satisfied, not very satisfied, or not at all satisfied with the life you lead?" Thus, EB is a 4-level scale measurement of well-being. Generally individuals are considered to be satisfied with their life if their responses are "very satisfied" or "fairly satisfied".

Our dissertation uses survey data. Accordingly, later we discuss the difficulties and the advantages of well-being surveys. Despite the fact that none of the statistical estimations and techniques can demonstrate well-being perfectly[23] we believe survey data is necessary to find access to human well-being. Before we explain subjective well-being surveys we summarize other methods to measure happiness or individual mood.

3.1.2 Day Reconstruction Method (DRM)

The DRM uses data that people report the following day about their experience by reconstructing the particular day. (Kahneman et al, 2004) It is an approximation to experience sampling and it gives information about how much time individuals spend on different activities and what levels of positive/negative affects were experienced during the activities.

The DRM was applied to sampling women in Texas. According to their survey results the activity with the highest positive affect was sexual contact, which on average took up about 10 minutes a day. Less intense but still positive pleasure

[22] „All things considered, how satisfied are you with your life as a whole these days:"
[23] See case studies in later chapters.

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was experienced during socializing or relaxing, which took more than 2 hours a day, followed by praying (25 minutes) and watching television (more than two hours a day). The least pleasurable activities were housekeeping, working and commuting.

DRM is a useful tool to understand the relationship between mood or feelings and different daily activities. This method is less affected by memorial mistakes and can give details about preferences and utility related to everyday life.

3.1.3 U-Index

Kahneman and Krueger (2006) proposed a new method, called the U-Index, to avoid cardinality problems. Methodological critics argued that there is no guarantee that the scales of the surveys about human feelings or SWB can be compared interpersonally.

The U-Index is defined as the time that a person spends in an unpleasant mood. Kahneman and Krueger had an observation: the dominant mood for most people is positive. Thus, they changed the method and approaching positive psychology from the opposite side.

3.1.4 Experience Sampling Method

The method was used by Csikszentmihalyi (1990), who studied the perfect experience. The ESM means the researcher collects real time information on individuals' experiences.

This practically means that people who are asked to participate in the research are given a machine. This machine gives a signal (sound) at random time and individuals have to answer some questions about what they were doing and whether they experienced positive or negative feelings due to their activity. According to Frey (2010) this method is more expensive than conducting a survey.

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3.1.5 Brain Imaging

Scanning the brain's activity may be the future approach to measure happiness or other positive/negative feelings. Brain scientists can measure the activity of different parts of our brain by more techniques. For instance the FMRI (functional magnetic resonance imaging), which percepts the magnetic changes in different parts of the brain due to the blood oxygenation.

According to Pugno (2004) the brain of individuals experiencing happiness is more active in the left pre-frontal cortex, than in the right. This asymmetry exists also for happier people and the FMRI data correlates with self-reported well-being data, with behavioral activity as Kahneman et al (2004) and Urry et al. (2004) argued.

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3.2 Methodological criticism of surveys

The survey method is the generally used technique to get data about subjective well-being of individuals. This is the easiest and the cheapest way to get useful information. On the other hand this method faced many methodological critics about the universal usage of the data we can win by using this method. An extensive body of psychological research and papers explored the cognitive processes underlying global judgments of happiness and life-satisfaction. Critics converged on the following conclusions:

1. Reported life-satisfaction does not reflect stable states of respondents. Instead, these judgments are formed on the spot. Thus replies depend on which aspects of life come to mind at the time of judgment, which gives rise to pronounced context effects.
2. The use of comparison standards is similarly context dependent. People can evaluate their current lives relative to their expectations, their past situation, the situation of others, resulting in considerably different judgments. Strack, Schwarz, Chassein, Kern and Wagner (1990) argue that the mere presence of a handicapped other in the room is sufficient to increase global life-satisfaction. Furthermore, according to Strack, Schwarz and Gschneidinger (1985) one's current life looks good or bad depending on which aspect of one's past was brought to mind during reporting.
3. People can simplify the complex task of evaluating their life-as-a-whole by drawing on their current feelings as an indicator of their overall well-being. Clore and Schwarz (1983) suggest that survey respondents report higher life-satisfaction when called on sunny rather than rainy days – unless a preceding question about the weather makes them aware that their current mood may not provide diagnostic information about the overall conditions of their lives.
4. Due to contextual difficulties or translation problems people may not be able (or do not have the will) to give meaningful answers to questions about their happiness or life-satisfaction.

DOI: 10.14267/phd.2014001

The relationship of such context-dependence to decision-making may be an important research question. On the other hand we believe that the effect of current life events on mood and thus on survey replies is exaggerated, because causally very questionable and globally impossible statistical relationships were also proved. For instance Hirshleifer and Shumway (2003) indicate that sunny days have a detectable effect on stock-market trading. As globally weather is different and daily stock market prices correlate this statement is very unscientific even if the statistical relationship is strong.

According to Kahneman (1999) the context-dependences of evaluative well-being measures attenuate any meaningful relationship with objective circumstances of life and motivate approaches to the measurement of well-being based on people's momentary affective experience. However, Kahneman and Krueger (2006) summarize many articles that proof the validity of reported well-being data.

Diener, Sandvik and Seidlitz (1993) tested self-reported and objective well-being data. They used factor analyses and there tests suggest that subjective survey data are valid. Ehrhardt, Saris and Veenhoven (2000) found that subjective well-being data are moderately stable and are sensitive to changing life situations. Helliwell (2006) found a strong negative correlation between reported life satisfaction statistics and national suicide rates. However, suicide rates represent only the extremely negative side of mental well-being they may be a useful variable to test subjective data.[24] Lepper (1998) tested self reported happiness data by asking friends and family members to rate the respondents' happiness level. The experiment proved that self reported happiness was in line with the rates given by family members and friends.

Even if someone thinks these arguments can not reasonably prove the validity of surveys, we still try to answer the question why we should use subjective well-being data. To give a short answer, we would argue that subjective data can interpret that people have their own ideas about happiness and good life. This answer unfortunately does not answer the scientific difficulties suggested by the critics above, but well-being can not exist without emotions, feelings and especially not without a subjective component. We agree with the findings and the opinion of

[24] Tests showed that in Scandinavian countries high suicide rates are attached to high levels of reported well-being. This may be attributed to low rates of religious people and high divorce rates.

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Di Tella and MacCulloch (2006). They argued that subjective wellbeing data should be treated critically and cautiously. *"But the two main alternatives for determining social welfare – either trying to back social welfare out of observed behavior or simply giving up and leaving it to the politicians – surely need to be treated critically and cautiously, too." (Di Tella, MacCulloch [2006], p. 43.)*

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3.3 Methodological debates about the Happiness Approach

The previous part tried to answer all the relevant criticism regarding the measuring of happiness. We focused on the survey technique as this method will be used in our tests. This part moves on to the topic of the whole happiness approach and its criticism. Despite the fact that we have to study the results of policies, long term events and life styles in developed or semi-developed countries, the happiness approach (HA) faced much criticism. Recently, the HA is relatively approved as a new approach. The EBRD has been using the HA for five years and the OECD also started the HA approach for modeling well-being and life quality since early 2011. In the United Kingdom David Cameron asked the statistical agencies to work on a subjective based methodology to change from the GDP based analysis. However, these practical results are the consequences of strong debates. This chapter will summarize the criticism of the HA.

According to Sen (1992) the subjective well-being is biased as it relies excessively on individual's feelings or mental states. Evaluation of well-being is not an objective process and underestimates the key role of preference adaptation. He argues that happiness can be very important, but other factors also matter. Sen (2008) summarizes his critics against the HA by emphasizing that the utilitarian calculus-based happiness can be unfair to those who are deprived. This is because they adjust their desires to what they see as feasible to them. Furthermore, Sen affirms that 'sum-ranking', the procedure of aggregation, is a strong limitation, as after the aggregation we can not differentiate between two distributions of the same total utility level (as for example 98+2 = 50+50). He argues that HA is a limiting approach as people are not only interested in utility/happiness, but also in other factors, for instance freedom. On the contrary, recent surveys carried out in the transition Central and Eastern European region contradict this statement (Pew Global Attitudes Project, 2009) and represent that people in transition countries would give up their freedom to win back their former material security. Sen argues that happiness is only one important functioning, and the CA is a wider approach of individual well-being. Sen is skeptical about the cardinality and interpersonal comparability of subjective well-being. Frey (2010, p. 25.) underlines that "this skepticism coexists with well-established propositions in the literature on income

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inequality and poverty, taxation, and risk that accept implicit cardinal utility measurement and interpersonal comparability."

Other criticisms usually refer to the self-centered feature, the self regarding metrics of subjective well-being, which does not include public good. Yet, several recent studies (see Bolton and Ockenfels, 2006; Fehr and Schmidt, 1999) confirmed that individuals' well being and decision making includes social norms and fairness.

Due to the stream of criticism a number of recent several studies attempted to test the subjective well-being data. The unreliability argument was replied in some studies by applying objective indices of well-being like suicides (Helliwell, 2003) or hypertension (Blanchflower and Oswald, 2007). Despite theoretical critics both studies found that self-reported well-being data are reliable. Blanchflower and Oswald tested the subjective well-being data in EU15 countries based on a survey acquiring more than 15000 answers. Based on previous studies they decided to use self-reported blood pressure problems as a testing variable. Their most important assumptions were the followings:

- Mental difficulties and stress end up in higher number of hypertension cases in the population;
- People have no interest in rendering false answers;
- Hypertension can be easily discovered by doctors and people know whether they have problem with their blood pressure or not (thus it is no more a subjective question even though the survey collected self-reported answers).

The study concluded that there was a strong correlation between self-reported well-being data and reported subjective well-being data.

Kahneman (1999) has shown that individuals' memories of past events form a biased basis for decision making; furthermore, other factors may also bias individuals' evaluation and choices. Yet, Kesebir and Diener (2008), Graham (2008) counter-argued that emotions and happiness may contribute to efficient decision making.

Diener and Suh (1997) studied the response biases of subjective well-being surveys and concluded that biases are not significant as criticism claimed. Schwarz and Strack (1999) examined how contextual factors can influence the individual responses in international surveys. Surprisingly, they found that self-reported well-

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being data possess adequate validity and reliability. Frey and Stutzer (2002) found that subjective well-being correlates with behavioral observations. They examined the self-reported well-being data and the number of committed suicides in the following 5 years after the well-being reporting.

Many studies criticized the applications of self-reported well-being data. Even if these points may be true, tests showed that objective indices give the same or very similar results. However objective indices can also be criticized, thus the main methodology argument is questionable. Prevalent economics find economic and social indicators as reliable ones, but the best models or indicators are useful only if they can be an effective tool in service of human well-being (Oswald, 1997). Economic indicators, like the per capita GDP, have the same aggregation problems as shown above drawn in the first paragraph of this section. GDP is not only a wrong indicator for economic well-being, but particularly for individual well-being. If we accept the findings of HA, than we should take into account that for developed countries money doesn't matter for happiness (see Easterlin, 1974; Frey and Stutzer, 2002; Blanchflower and Oswald, 2004). If we do not accept the results of the HA, we should consider diminishing marginal utility theory. This would also suggest that increasing income for wealthy people is less considerable. The empirical evidence for diminishing marginal utility of income is studied by Frey and Stutzer (2002) and by Helliwell (2003). In line with this, if we try to use the subjective data in a larger scale, we can determine that the distribution of the average national well-being levels increases as medium income and poor countries are also studied. Marmot (2004) estimated that the per capita GDP threshold for well-being is around 18000 USD/year.

Social indicators are also often used in well-being analysis, because of their objectivity and their relatively easy measurability in most of the cases. However some social indices deceptive, because of the underreporting (for instance: rape), which may make the measurement problematic. Yet subjective judgments may affect the evaluation process by selection and interpretation. The most relevant question about social indicators: what are the desirable numbers? For instance: can we suggest a golden rate of relative poverty? If we can, what criteria should the ideal rate be? Except the cases with some indicators, generally subjective well-being and social indicators correlate weakly. Despite the above limitations, social indicators

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are widely used by decision makers, but an important notice should be taken: the evaluation of all objective statistics turns subjective by using them for decision making, analysis or components of complex indices (due to weighting).

Subjective well-being can be widely criticized, but all critics have to accept that self-reported data are not just the expression of hedonism. Individuals are most likely to experience high level well-being while making progress towards personal goals (Kesebir and Diener, 2008). Because self-reported well-being and individual decisions include fairness and other norms (as explained earlier), subjective well-being is not only about goals and their fulfillment, but also about feeling good for the right reason. Subjective well-being can bring us forward the understand adaptation, which is absolutely missing from the concept of prevalent utilitarianism. Standard economics assumes that there are no deviation from the utility predicted before consumption and the utility experienced after the consumption. First Scitovsky (1976, p.4.) criticized this assumption by calling it "unscientific" due to the rejection of mistakes in decision making. Since his revolutionary book, many experiments and surveys studied this estimation failure coming from the adaptation.

Subjective well-being may be important because it represents human feelings of happiness or the general mood of life-satisfaction. Even if most indicators are representing good performance, we can not call a society 'good' in which citizens are unhappy/not satisfied with their life. Moreover, a given high level of reported happiness or satisfaction with life is not sufficient for a good a society.

Criticism also calls happiness an unscientific concept because of its validity problems. Despite the fact that validity critics were widely answered, furthermore journal articles and studies about happiness have streamed since the early 90s, we have to admit that measures of happiness are unavoidably imperfect. On the other hand it is not a sufficient argument to ignore the concept and the HA.

DOI: 10.14267/phd.2014001

3.4. Schools and approaches

The HA is a relatively new study within social sciences. However, many economists, psychologists, sociologists belong to the HA and studies subjective well-being. Daniel Kahneman's Nobel Prize in economics gave pace to studying the HA. Kahneman studies experienced emotions and promoted utility experiments that contradicted the relevance of the revealed preference approach. The result is that happiness studies are now scientifically accepted and several type of approaches emerged in the past two decades. This section is trying to give a short summary about the 'happiness economics schools'.

As the number of scholars increased more distinct groups emerged. Their assumptions about subjective well-being, their methodology, their tools, furthermore their goals and questions can divide these scientists into four major schools.

The first group can be called as the Empirical Subjective Well-being School. Numerous researchers can be named within this school, for instance Diener, Frey, Stutzer. Their common feature is that they do empirical research based on survey data (usually global surveys). They use econometrics (mostly regressions) as tools for their analyses. Their basic assumption is that happiness or subjective well-being is one of the most important goals of human life. Thus people have to concentrate on maximizing their own happiness level. To make it easier the Empirical SWB School aims at understanding subjective well-being and try to find all effects that may explain or affect the different levels of reported well-being. In regressions they usually use objective indicators as independent variables. Their general goal is to divert the general way of thinking to focus more on subjective well-being instead of GDP. The Empirical SWB School is very popular as numerous scholars use these assumptions and tools.[25] They published many results and were very successful in studying different factors of the subjective well-being.

Secondly, the Leyden School[26] is also a specifiable group in studying subjective well-being. Their most important assumptions are that reported happiness is cardinal and interpersonally comparable. Scientist of the Leyden School (Van Praag, Frijters) not only assumed these features, but also gave a logical explanation

[25] Some of the most popular scholars are Veenhoven, Diener, Seligman
[26] They are also called New Cardinalists.

DOI: 10.14267/phd.2014001

for using these assumptions. They tested individuals and found that a large number of respondents understand the numeric utility scale very similarly. Furthermore, according to Van Praag (2007) respondents understand the same meaning under the same adjectives or terminology in well-being surveys. The general goal of the Leyden School is to create an ideal social well-being function, which may help maximizing social happiness and make decision making easier.[27] They use own surveys and focus on the utility of income by creating the IEQ (Income Evaluation Questionnaire).

The third group is Economic Psychology School. Daniel Kahneman brought the school's name into repute. Kahneman and his followers study utility and they found extremely important correlations for understanding utility. In chapter 5 we will discuss some of his findings in details, but we will only focus on his experiments related to different types of utilities. The Economic Psychology School separated the utility concept to experienced and decision utilities. Previously Bentham's approach was based on experienced utility (as it was tied to consumption); later the revealed preferences used decision utility. Kahneman and Tversky (2000) not only returned to the principle of experienced utility, but also found that experienced utility and decision utility can differ even if the life event is the same. These findings were acknowledged by the Nobel Prize in Economics.

Table 2

The major schools of the Happiness Approach

	Empirical Subjective Well-being School	Leyden School	Economic-Psychology School	Buddhist Economics School
Well-known scholars	Diener, Frey, Stutzer	Van Praag, Frijters	Kahneman, Tversky	Zsolnai, Payutto, Puntansen
Goal	Explaining factors of happiness	Helping decision making and maximizing happiness	Understanding utilities and the difference in experienced and decision utility	Sustainable consumption; human development, learning
Measuring	Global SWB surveys	Special surveys	Surveys, experiments, DRM	Surveys
Happiness/utility concept	SWB	SWB used as cardinal utility	Happiness, mood, utility	SWB without a general utility concept

Source: own table

[27] Some of the most popular scholars are Van Praag, Frijters

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The fourth school is the so called Buddhist Economics School (BES). It emerged as a mix of happiness economics, ecological studies and Buddhist principles and philosophies. Their goal is to show the unsustainability of the growth oriented present economic norms and to moderate the consumption worldwide. BES focuses on human development and argues that individuals ought to learn and do good work in order to ensure their own inner improvement. The term „Buddhist Economics" was coined by Schumacher. His essay "Buddhist Economics" was first published in 1966 in "Asia: A Handbook", and later republished in his collection titled Small Is Beautiful (1973).

DOI: 10.14267/phd.2014001

4. The findings of happiness research

Section three summarizes the most relevant findings of happiness economics. Several points will support assumptions of the standard economics, but many results will contradict to basic principles and theories of mainstream economics. First we comprise the effect of income on individual happiness and on national subjective well-being, which might be the most important for economists. Secondly, we introduce adaptation (or treadmill), rivalry and their possible relevance for the utility function. These results should be considered in every aspect of economics, but they are entirely needed for understanding the most important socio-economic problems in the CEE region after the transition. Finally we introduce other studies, which found other factors that are important for subjective well-being.

4.1 Happiness and income

The most exciting factor in understanding well-being for an economist is the relevance of income. The previous four decades collected several results and details about the importance of income on subjective well-being. Several findings contradict, but in the last two decades debates about the effects of income on happiness became silent and theorists agreed in the frameworks.

The first well-known finding in the topic can be attributed to Richard A. Easterlin. His 1974 paper (later updated in 1995) set the so called Easterlin paradox. The Easterlin paradox was studied by researchers for more decades to get a clearer insight into the details and the causes of the theory. The Easterlin paradox is based on the finding that the remarkable real income growth in the Western economies during the postwar era did not transform into increasing subjective well-being. Other scholars in the field of the happiness approach showed the same conclusion: income growth does not matter for happiness in developed countries (see Frey and Stutzer, 2002; Blanchflower and Oswald, 2004).

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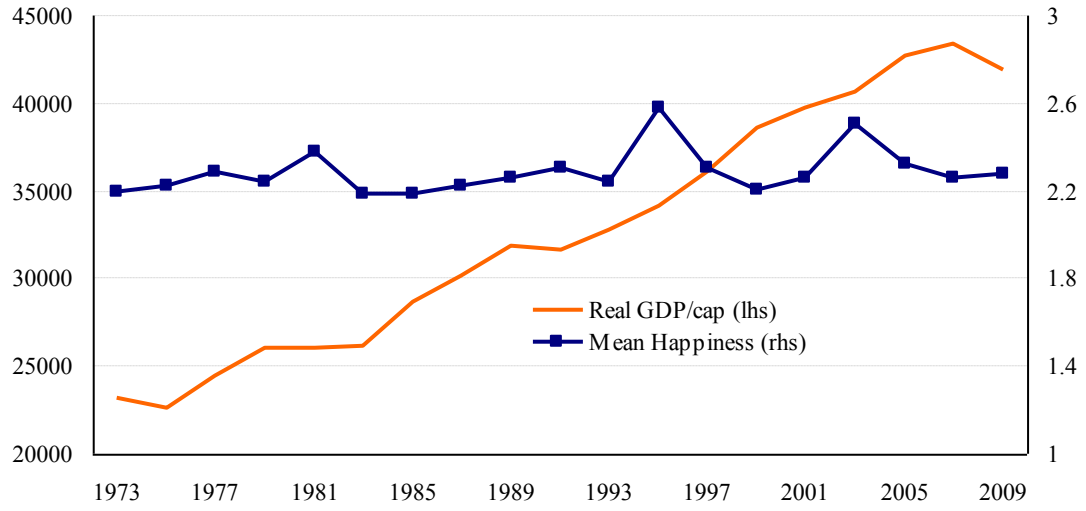
Figure 1.

GDP per capita (left hand scale) and reported happiness (right hand scale) in the United States of America (1973-2009)



Source: World Happiness Database, USDA

Other researchers argued that the Easterlin paradox is only true for countries with high income due to the diminishing marginal utility. In very rich countries the effect of income on happiness is not too significant, the most relevant sources of well-being are different like love, health, friends or family (see, for example Frey 2010). Above a certain level of per capita income in a country the same constant level extra income has less effect on happiness of the given society. Accordingly, other studies suggest that increasing income for wealthy people is less considerable. The empirical evidence for diminishing marginal utility of income is studied by Frey and Stutzer (2002) and by Helliwell (2003).

People with higher income can choose from more alternatives and can consume more goods and services. Often their status in the social hierarchy is higher (see rivalry in 3.3). Generally studies suggest that richer people, on average, report higher level of subjective well-being. As these econometric regression results are statistically significant, we should enounce: income increases happiness. However, the trends in graphs and some empirical evidence may be somewhat misleading and the income level of a country is an important feature in understanding the Easterlin paradox.

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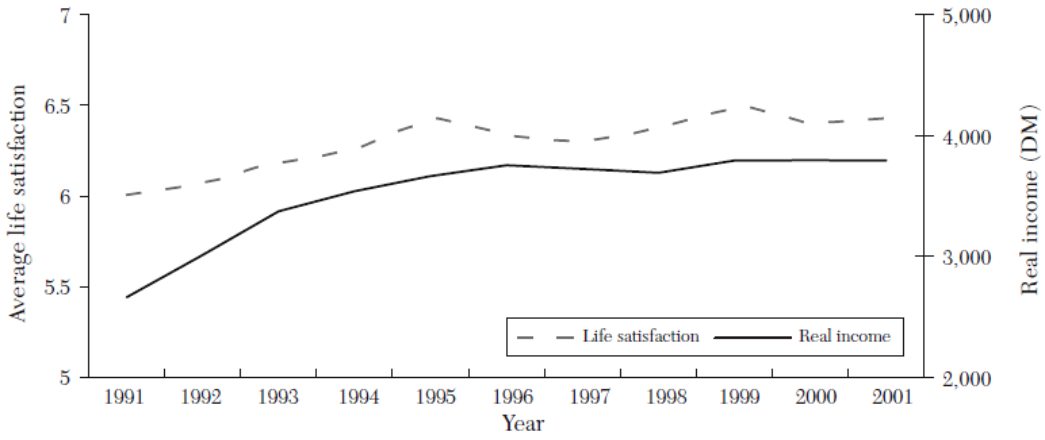
These findings about the correlation are based on surveys mostly focusing on the developed industrial countries. We can argue that the relationship between income and happiness within a society is positive and robust. Yet this relationship is not as strong as one would imagine. Easterlin (2001) tested the relationship and his econometric tests represented that the correlation is approximately 0.2. This means that income has a role on happiness but other factors like unemployment, health, family or personality even have a strong influence on reported well-being.

In contrast, Frijters, Haisken-DeNew and Shields (2004) analyzed East Germany after the reunification and found that income has a greater role in explaining subjective well-being. According to their regressions approximately 40 percent of the increase in self reported life satisfaction in East Germany is attributed to rapidly increasing real income after the German reunification. (See figure 2.)

Figure 2.

Life Satisfaction and Income in East Germany (1991-2002)



Source: *Clark, Frijters and Shields, 2008, p. 98. Data are won from the German Socio-Economic Panel Study.*

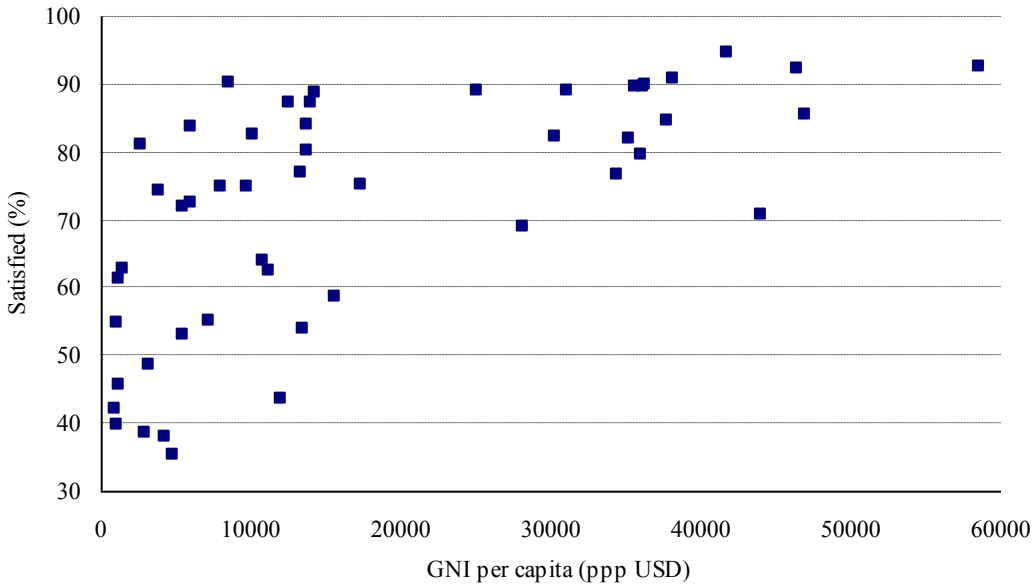
On the country level analysis if we try to use the subjective data in a larger scale, we can determine that the distribution of the average national well-being levels increases as medium income and poor countries are also studied. Various articles studied the averages of subjective well-being by a larger scale of nations. Inglehart and Klingemann (2000) and Graham (2005) found that on average people living in medium income or in developing countries report lower level of subjective

DOI: 10.14267/phd.2014001

well-being than those living in developed countries. For long decades happiness studies relied on the Easterlin-paradox first published by Easterlin (1974) that says money does buy happiness within a country, but it is insignificant in an international comparison.

Figure 3

Satisfied with life (% of total population) and per capita GNI[28] in 2008



Source: World Development Report (2010) 378-379., World Values Survey

Further research found that it is important to expand the number of countries to find out the relevance of absolute income. On the other hand Easterlin's international argument was not totally wrong. Increasing the per capita GDP results in decreasing variance of the national average level of well-being. After a given level of income the further increase will not affect the national average of subjective well-being. Marmot (2004) estimated that the per capita GDP threshold for well-being is around 18000 USD/year. Above this per capita GDP level income can not significantly explain subjective well-being country averages. Guriev and Zhuravskaya (2009) examined the relationship between increasing income, rising standard of living and subjective well-being in transition economies in CEE. They found that enormous jump in the average standard of living did not affect the

[28] Satisfied with life of the total population: people replied with 6,7,8,9 or 10 to the WVS satisfaction with life question (10-level scale).

DOI: 10.14267/phd.2014001

subjective well-being positively in most cases. GDP concerns only quantity and not quality, which means it can not differentiate between desirable and undesirable economic activities. However, positive activities like childcare and care of elderly are also included, but at the same time negative events like earthquakes or hurricanes are also accounted, thus reconstructions following those negative events are also welcome, if we take a look only at the GDP (Kesebir and Diener, 2008).

However, there are scholars like Diener and Seligman (2004) who noted that other factors like health conditions, the quality of the government or human rights also correlates with income. Furthermore, they found that filtering the effects of these factors induced that the relationship between income and subjective well-being became insignificant.

According to Clark, Fléche and Senik (2012) found positive income growth over longer run decreased the within-country happiness inequality. This is an important addition to the Easterlin-paradox, as declining spread means that not only the number of very happy fell, but also the number of not at all happy people. Thus, income growth did not increased average happiness level over time, but the overall happiness distribution developed, especially for risk-averse individuals.

Recent econometric studies on subjective well-being also underpin the positive effect of income on happiness. Fixed effect models that control for unobserved effects (for instance culture) also found that income has a statistically significant effect on happiness (see for example Senik 2004, Frijters, DeNew and Shields 2004). Other large sample researches using country fixed effects proved that subjective well-being co-moves with some macroeconomic indicators like real GDP growth or inflation (DiTella, MacCulloch and Oswald 2003).

To sum up, these studies support the argument that country-level income correlates positively with subjective well-being average of a country. On the other hand the income level of a given country is very important in the strength of the correlation between income and individual happiness average of the country.

However one could state that we can not be true about the causality. What if not higher income makes people happier, but more positive and satisfied people earn more money? They may work harder or they are less risk averse what make them more successful in their career. Gardner and Oswald (2006) studied individual behavior and mood after winning on lottery in Britain. Lottery winners reported

DOI: 10.14267/phd.2014001

higher subjective well-being in the following year. This supports the causality we made: higher income leads to higher subjective well-being.

In this chapter we summarized the findings about absolute income and the reported subjective well-being of a country. A study about lottery winners suggested that income does buy happiness and not inversely. Yet after the first year winners' subjective well-being tends to their level before winning the prize. This result will raise the question of adaptation to the new income level or standard of living.

DOI: 10.14267/phd.2014001

4.2 Adaptation or hedonic treadmill

Most papers about empirical happiness research found that human happiness did not correlate with increasing income in the western world or in Japan over time since the Second World War. This finding contradicts the assumptions of standard economics. How is it possible that people earn more money, can buy more or even much better quality goods and have more comfortable lifestyle and they are not happier than predecessors?

If people bought a new car, they would become excited, but later they get used to it and their mood tends to a "set-point" (see Layard (2005a) or Easterlin (2005)). Psychology uses the term adaptation to introduce this phenomenon, while economists usually call it 'hedonic treadmill' or habit.

Living standards are to some extent like alcohol or drugs as people can get used to them. The same quality means worse after experiencing a better. To sustain a given happiness-level individuals need to keep on having more after a certain new experience. Gardner and Oswald (2006), furthermore Brickman, Coates and Janoff-Bulman (1978) found that a significant increase in happiness can be realized immediately after winning a lot of money, but later they were not happier than before the winning. In most cases after a few months they did not feel better than others (control group). Gossen's First Law suggests the same idea, but we can go further. Kahneman (2000) explains this effect by the change of the aspiration level. After the individual's life circumstances change, their future goals and expectations modify. Surveys were carried out to study how the reported 'sufficient income' is modified by the actual income. Frank (1999) emphasizes that 1 USD rise in actual income causes a rise of at least 40 cents in sufficient income. Van Praag and Frijters (1999) got a similar result: the required income varies strongly with the actual income of the individual. A 10 percent rise in actual income generates a 5 percent rise in required income. Chart 3 represents the results of the US General Social Survey data. Responses show that the required real income is determined strongly by the actual real income. The correlation between the two time series was 0.952 from the surveyed 1952-1987 period.

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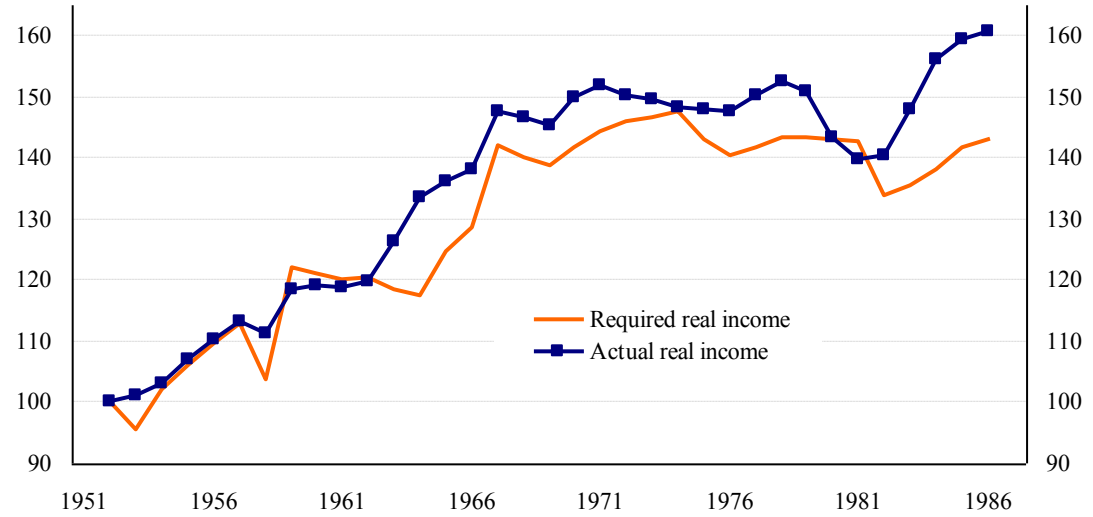
Figure 4

Actual income and reported sufficient income



Source: Layard, 2010, p. 148.

Adaptation to a certain level of income or standard of living is also called treadmill (or hedonic treadmill). Binswanger (2006) marked off four types of treadmill-effects. He uses the term positional treadmill to express the phenomena that despite the higher income we are not happier, because other people also earn more money, thus our relative income has not changed over time. To reflect the adaptation to new goods or new life circumstances he uses the term hedonic treadmill. Hedonic treadmill practically means that the joy we experience due to a new life event or due to the consumption of a product is interim and does not have a lasting effect. Wealth gives people freedom and more choices. We can decide from much more alternatives what to do in our free-time or what to buy. More options generate the multioptional treadmill. Previously it was easier to choose the best from less alternatives. Multioptional treadmill is not only caused by the higher transaction cost, but also about the mistakes (not the best option is chosen) we make and by uncertainty (we are not sure we did the right decision and the sunk cost of other goods can frustrate us). The final effect is called the time-saving treadmill, which shows that in our modern lifestyle we use many technical achievements to save time, but despite the technical findings it is not obvious that we save time. However, transportation is much more developed than it was 50 years ago; we travel further to our working place.

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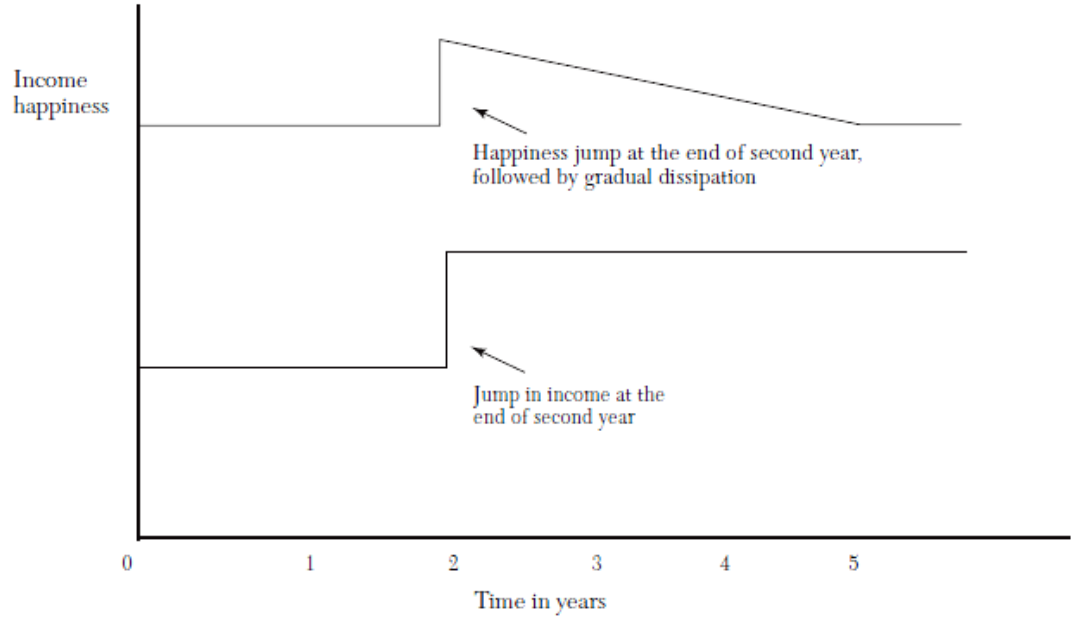
Loewenstein and Schkade (1999) found that people underestimate the speed of adaptation to new goods or experiences. The underestimation of adaptation results in systematic errors in human decision making. Easterlin (2005) summarizes the psychological findings about adaptation to different life events and interprets the most significant economic conclusions of the set-point theory. He argues that adaptation is not perfect in every life event; especially people adapt less to dire life conditions and events like disability, widowhood or divorce and marriage. Lucas et al (2004) found the same conclusion that adaptation is not always quick or perfect. The reported level of subjective well-being did not recover because of finding a job after unemployment. According to Layard (2005a) subjective well-being has a strong negative correlation with unemployment. Layard (2005a, p. 67) adds that "it hurts as much after one or two years of unemployment as it does at the beginning". This practically means people can not adapt to unemployment.

Figure 5

Change in happiness due to an income shock



Source: Clark et al. 2008, 105.

Clark et al (2008) argues that due to adaptation the only way to achieve permanently greater subjective well-being is to have continually rising income. Income adaptation individuals get used to their circumstances, so adaptation is like a

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continuous internal backward-looking reference point, where the references are the past incomes. Figure 5 illustrates adaptation with an income shock after the second year. In this case the individual compares his income at all periods to his income over the previous years.[29] The lower line illustrates the income shock in the end of the second year. After the shock income remain constant over the following three years. Meanwhile, the top line denotes the effect of the income shock on happiness. At the end of the second year happiness jumps in line with the rising income. Due to adaptation the level of happiness declines after the income shock and after three years returns to the initial level, the level before the income shock. With these assumptions individuals can only achieve permanently greater happiness by continually increasing their income.

[29] Clark et al. (2008) assumes that the individual compares his present income to the geometric average of his earnings over the past three years.

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4.3 Rivalry and relative income

Section 3.1 examined the country level statistical correlation between income and subjective well-being, while part 3.2 summarized the literature on adaptation. According to several recent findings we have to add rivalry to our framework. This understanding of relative income means that an individual compares his income to that of others in his environment. Rivalry is a method to understand the income differences within a country.

According to HA scholars, human beings are rivalrious. Mainstream economics incorporated this key fact of human nature mostly only in some game theory application, but key models and the utility function did not cover this phenomenon. People are pursuing happiness by working more and buying more or better products to represent a high social status. In capitalist market economies money is the central measuring tool and the social status is determined mostly by wealth. Thus, as inter alia Veblen (1934) explained the consumption of conspicuous goods (status symbols) represents status. Individuals compete not only in getting higher social position, but also in the consumption of status symbols. This is called 'rat race' in the literature. Fighting for status is seemed to be a zero sum game as Frank (1985) described: one can gain only with the other's loss. Additionally, rivalry can be a negative sum game. Some individuals compete for high status, while others do not want to compete, but suffer from results of the rat race. Individuals, who compete, work more to earn more and therefore to acquire status symbols. Among competitors there are some winners, whose happiness will increase, while unsuccessful competitors' happiness will decrease as their relative position worsened while they worked more. Neutral individuals will also suffer as their relative position also worsened. As a result the majority of the whole society suffered because of the rivalry and only the successful minority became happier. Competitors worked significantly more, thus non-competing neutral individuals' relative income also decreased.

Easterlin (2004) referred to Norval Glenn's survey, which proved that individuals would rather choose a well-paying job even if they were more hours away from their family instead of their current job. None of the 1200 answers said it

DOI: 10.14267/phd.2014001

is very likely to reject the job opportunity. More experiments studied the effect of income comparison and found that not only absolute but also relative income is important. Clark and Oswald (1996) found that among British employees self reported job satisfaction correlated more with relative than absolute income. Employees compare their wages to other employee's wages at the working place. In this sense the reference group is the most relevant question. Solnick and Hemenway (1998) came to the same result by asking Harvard students to choose from two different situations. The majority chose the situation 'A', which gave them less absolute income, but this lower income was twice as much as the average income[30]. Blanchflower and Oswald (2004) argued that if everyone else earns another 1%, the individual's happiness falls by third as much as it would rise if only the individual earned an extra 1%. Layard (2005a) noticed that women's standard of living increased remarkably since the Second World War, their job opportunities improved and their wage rose, but their relative happiness did not improve relative to men. These results contradict the Pareto principle and suggest rethinking many standard models. The above arguments result in less free-time and more working hours than needed, because of human mistakes in optimization. Furthermore, they suggest rethinking our ideas about human motivation.

To study rivalry in details, we should take one country and its citizens as a subject of our analysis. If we look at Table 4 we can realize that relative income has an effect on subjective well-being. Undoubtedly, this effect is much less than we would expect. For people in the lowest decile of income, the mean happiness level is 1.94, for the fifth decile the level is 2.19, while for the highest decile the mean level is 2.36.[31]

The relationship between income and subjective well-being is not linear. Higher income leads to higher level of subjective well-being, but as absolute income increases the extra well-being declines, which practically means that the diminishing marginal utility is true for income. According to Table 4 moving one decile upwards on the income ladder increases reported well-being by 0.05 points on average for the five low deciles, but only gains that of 0.03 points for the high five deciles.

[30] Situation 'A': an annual 50.000 USD income, while the national average is 25.000 USD; Situation 'B': an annual 100.000 USD income, while the national average is 250.000 USD

[31] 1 to 3 scale. 1='not too happy", 2="pretty happy", 3="very happy".

DOI: 10.14267/phd.2014001

Table 4

Income and happiness in the United States of America (1994-1996)

	Mean happiness rating	Mean equivalence income
Income decile 1	1.94	2586
Income decile 2	2.03	5867
Income decile 3	2.07	8634
Income decile 4	2.15	115533
Income decile 5	2.19	14763
Income decile 6	2.29	17666
Income decile 7	2.20	21128
Income decile 8	2.20	25745
Income decile 9	2.30	34688
Income decile 10	2.36	61836
Full sample	2.17	20767

Source: Frey and Stutzer, 2010, p. 28.

Studies that focused on European data found a similar result. Di Tella, MacCulloch and Oswald (2003) examined the Euro-Barometer surveys. They found that 88 percent of people were in the upper quartile of the income survey, who rated themselves “fairly satisfied” or “very satisfied”. This is also a very strong argument to prove the importance of income in subjective well-being.

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4.4 Further findings of the happiness studies

In the last 15 years there was a subjective well-being based revolution in the literature. The number of journal articles jumped exponentially and economists and social scientist used subjective data for more and more goal. These studies found several other interesting correlations among socioeconomic variables and subjective well-being. Without the desire of the intellectual completeness we summarized some findings we appreciate.[32]

Molnár and Kapitány (2006) based on Hungarian panel data found that income mobility is very important for subjective well-being as people assess their subjective well-being depended on their relative situation. The realized remarkable increase in the income of households did not translate to a rising life satisfaction. The authors argued that this paradox can be attributed mostly to the uncertainty of objective variables as individuals did not expect the continuation of the increase in their income. Furthermore, negative labor market expectations also decrease satisfaction with life.

Di Tella, De New and MacCulloch (2010) studied adaptation to income and status on a German individual panel data covering the period from 1984 to 2000. They found that adaptation exists for income, but individuals adopt to status much less. According to their results 65 percent of the current year's effect of income on subjective well-being is lost during the following four years, but the same effect of status remains unchanged. They also found that adaptation is different in some sub-groups, for instance left-wingers adapt to income, but they do not adapt to status, while right wingers adapt to status, but not to income.

Bjornskov, Gupta and Pedersen (2005) found that accelerating growth in both per capita GDP and life expectancy trend positively with life satisfaction. The finding means that "people get happier as their aspirations are more than met". They also found that relative unemployment growth has a significant effect on life satisfaction if it is interacted with a measure of political ideology.

Hayo (2006) argued that based on the examined pooled data set from seven Eastern European countries, socioeconomic variables that are relevant in the US and

[32] Dolan, Peasgood and White (2008) provides a very detailed review of findings about subjective well-being categorized in topics.

DOI: 10.14267/phd.2014001

in Western European countries have a similar effect on happiness in Eastern Europe under the dramatic changes of the transition. According to his article, cross country differences in happiness can be attributed to variations in the unemployment rates, the degree of political freedom and HDI.

Blachflower and Oswald (2004) examined the relationship between an additional level of education and subjective well-being, and found a positive relationship. Yet, Stutzer (2004) argued that middle-level education leads to the highest level of life satisfaction.

Furthermore Blachflower and Oswald (2004b) found that age and subjective wellbeing form a U-shaped function, thus at younger and older age points people report higher subjective well-being levels, and while at middle age the level is the lowest.

Many studies focus on the effect of unemployment on subjective well-being. Di Tella et al (2001), Frey and Stutzer (2002), Helliwell (2003) all found that unemployed people report a significantly lower level of subjective well-being. Pedersen and Schmidt (2011) found a strong impact from changes in labour force status. They suggested that unemployment has a strong negative effect on satisfaction and those who are outside the labour force also report somewhat lower satisfaction. Some other studies focused on not only the effect of unemployment on subjective well-being, but also its effect together with that of inflation. (We will discuss further details about the most important finding on preferences between unemployment and inflation in section 5.6.) Yet, Alessina, Di Tella and MacCulloch (2004) argue based on European data that unemployment rate do not have a significant effect on subjective well-being.

Helliwell (2003) examined on World Values Survey data that people who believe in God reported higher level of life satisfaction. Lelkes (2002) found that economic transition lowered happiness on average, but the religious were less affected by the changes.

Furthermore, Helliwell (2003) also found that married people tend to report higher level of life satisfaction. Besides being separated is associated with the lowest level of life satisfaction, lower than those who are divorced or separated.

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Senik (2006) showed that a raise in average income in one's professional group decreased individual subjective well-being negatively in former EU member states, while in post transition economies the correlation was positive.

In section three we presented the main economic findings of happiness research. To conclude the relevant results for our topic we summarize the following points:

- For one person money buys a significant amount of happiness. Getting higher on the income ladder the extra amount of happiness derived from higher income declines.
- For a nation the effect of income is different. Among developed (Western) economies the role of income is almost insignificant.
- The most relevant negative life events regarding happiness are divorce, widowhood and unemployment.
- Adaptation is important in human life. Getting used to negative and positive life events can be proved.
- Relative income and human comparison is a great deal for people.

Chapter five will not only explain more details about the relationship of utility and subjective well-being, but also show the recent experimental findings about utility.

DOI: 10.14267/phd.2014001

5. Utility and subjective well-being

In chapter five we will show why the utility based economics could get far from the understanding of well-being or even utility maximization. Utility function and its model consequences are very important, because models based on the usual utility function can't derive the process experienced in real life or in transition economies. If the mainstream models were right, all CEE societies would have reported a greater subjective well-being due to the remarkably increasing standard of living. As discussed previously, several CEE societies felt their situation was worse than before the transition, which means greater consumption and more products could not have gained their well-being. In chapter 5 we will introduce the major consequences of happiness findings on utility functions to introduce those findings that might support mainstream models to solve those paradoxes that cannot be solved at the moment. We try to explain why utility based on revealed preferences is not appropriate and effective in explaining human well-being and human feelings. We will mention some of the most impressive recent findings about utility and try to explain why mathematical summing of utility over time is not appropriate. We also tried to get proof from the literature to answer the basic question: is happiness tied to utility?

DOI: 10.14267/phd.2014001

5.1 Utility concept of the Easterlin paradox

In the previous chapter we summarized the findings related the Easterlin paradox and its revised changes. Empirical evidence may be translated to theoretical field as well. For this we have to assume that happiness scores or subjective well-being answers can be used as information about individual utility. From now the dissertation will use this assumption in line with most of the empirical studies.

To understand the Easterlin paradox we have to formulate a basic social utility function, which contains information about the aggregate level and the individual level as well. The general Easterlin paradox deals with the country level differences in happiness and per capita income. On the other hand studied panel data suggested that the income comparison among people also had a significant effect on happiness. Furthermore, an individual also compares his current consumption to his past consumption level. Thus, an extended version of such an individual utility function will have the following form (based on Clark, Frijters and Shields, 2008, 99.):

$$U_t = U\left[u_1(Y_t), u_2(Y_t \mid Y_t^*), u_3(T - l_t, Z_{1t})\right],$$

where $U[u_1, u_2, u_3]$ is a function of individuals with representing and combining all the subutilities u_1, u_2 and u_3 together. U_t is the aggregated utility function of a given individual and t refers to time. The three different subutilities represent different types of utilities based on the main findings of happiness research. First, u_1 is a basic utility function, where Y_t refers to incomes from time t = 0 to t, while u_1 represents the utility from consumption. This function increases at a decreasing rate, thus showing diminishing marginal utility of consumption. Secondly, u_2 utility models relative income. Based on our decision it may represent social comparison (reference group approach) or habituation (comparison income approach). The concept depends on the meaning of Y_t^* as it may represent the 'reference group' or the 'comparison income'. In the first case we choose a reference group and compare our income to their income. Reference group can be our micro environment (friends,

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colleagues), a demographic group. Such a comparison may hold for international income differences as well (see later), like the per capita GDP comparison among CEE countries is a relatively usual phenomenon. On the other case we may choose our own past income as a comparison income or even an expected future income. The u_3 subutility function explains the effect of leisure on utility. $T - l_t$ shows the total hours of leisure (lt refers to the number of working hours) and Z_{1t} is a vector of other socio-economic variables.

For explaining the Easterlin paradox we can use this basic utility function with rethinking the comparisons to others (external reference points) and comparisons to the individual's past income level (internal reference points). To do so Clark, Frijters and Shields (2008) formulated a simplifying model to catch the empirical based findings. As a first step they assumed that income is the only relevant difference among countries, thus u_3 can be ignored as it is the same for all countries. Secondly, they presume that reference income within a country is average income. In this case the utility function takes the following form:

$$U_i = ß_1 \, y_i / (y_i + A) + ß_2 \ln(y_i / \tilde{y}_i) ,$$

where $\tilde{y}_i$ denotes the average income in a given country, i represents individual i and A is a positive constant. In this context the first subutility part ($y_i / (y_i + A)$) should be imagined as figure Y shows. The idea is to formulate diminishing marginal utility of income.

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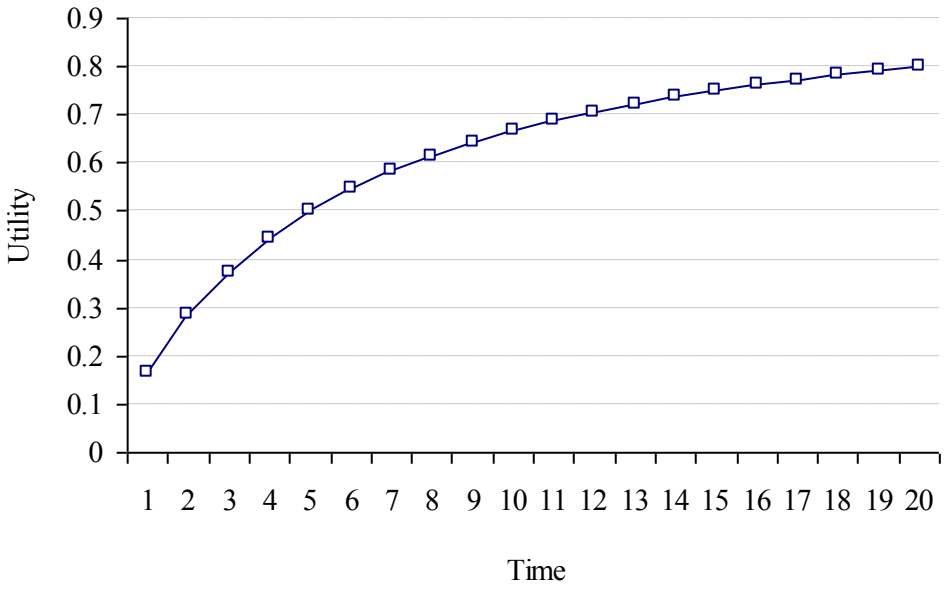
Figure 6.

The relationship between income and utility as income increases.



Source: Own table

Figure 5 shows that the rise in the income of a country increases utility, but the higher income level we examine the lower the proportional effect on utility is. Besides, a general rise in the average income of the country maintains the second subutility term unchanged. This model suggests that the slope between income and subjective well-being (or utility) is steeper within a country at a given point in time, than over time by country (Clark et al, 2008, p. 100). Increasing income has a positive effect on the individual's utility due to relative income. Assuming that rivalry is zero some, this income increase has no impact on the country level subjective well-being.

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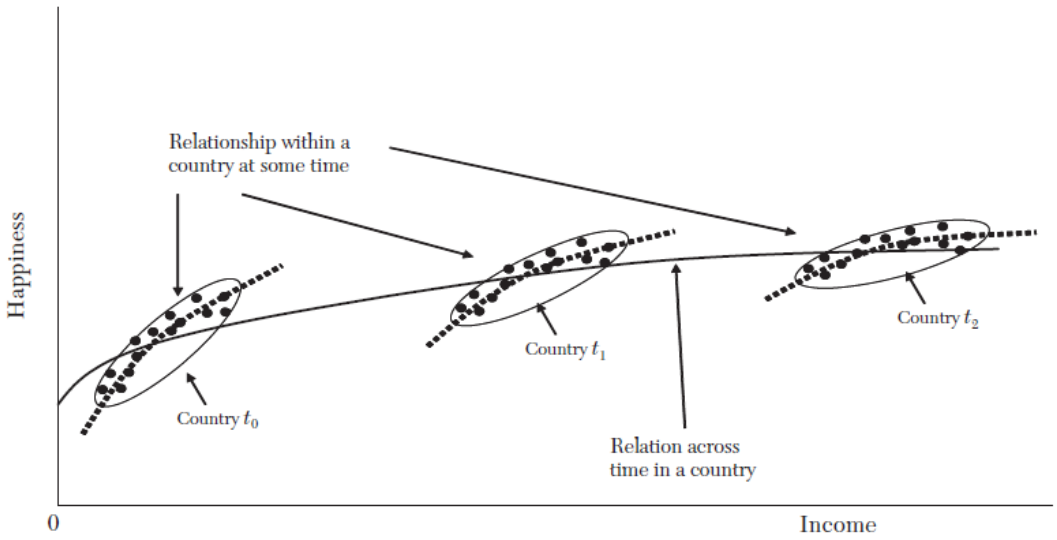
Figure 7.

The relationship between income and happiness (or subjective well-being) on the individual and at aggregate (country) level.



Source: Clark, Frijters, Shields 2008, p. 101.

Figure 6 represents a country, which develops or at least increases its total income over time. The dotted line explains the relationship between individual happiness and individual income at a given period, while the thick line shows the aggregate level happiness and income correlation. The average subjective well-being changes only very little in time and due to diminishing marginal utility the extra benefits of the additional income decline. This is the most important conclusion from the empirical studies we summarized in chapter 4. On the other hand individual's happiness may change relatively remarkably due to an increase in income at t_0. At t_1 the country has become richer, but the general average happiness of the society increased only a little. Besides, the functional connection between individual income and individual happiness is less steep than at t_0. At the third period not only the average happiness of the country is almost unchanged, but also the relationship between income and happiness is nearly flat. The general message of the model is that the marginal utility from additional income approaches zero as a country increases its income, while the marginal utility of higher status never approaches zero the income of the reference group increases with the individual income. (Clark, Frijters and Shields, 2008, p. 101).

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As a final step several countries can be added into the model. The empirical finding that over decades real GDP growth and happiness are uncorrelated, can be built in the formula. In this case we will have two different comparisons. First a comparison with the closer (micro) environment for instance and a second one with other countries average for instance. In a framework like that the utility function has to be shaped as the follows:

$$U_{ijt} = ß_1 \ln (y_{ijt}) + ß_2 \ln(y_{ijt}/\tilde{y}_{jt}) + ß_3 \ln(\tilde{y}_{jt}/\tilde{y}_t) + Z'_{ijt} \gamma.$$

In this utility function U_{ijt} represents the utility of individual i in country j at time t, while y_{ijt} is the income of individual i in country j at time t. The relative incomes are given by $\tilde{y}_{jt}$, which denotes the average income of the country j at time t (for instance Hungary's), and $\tilde{y}_t$ represents the average income of all the examined countries (for instance the EU27's). If the output of a country grows at a larger pace than that of all the examined countries ($\tilde{y}_{jt}/\tilde{y}_t$ changes), then country with a higher growth rate will reach a higher subjective well-being level. As the other comparison means that an individual increases his income compared to others within the same country ($y_{ijt}/\tilde{y}_{jt}$ grows), this will not lead to a general macro level increase in subjective well-being, as the given individual will increase his subjective well-being, while others will realize a subjective well-being loss due to the relative changes in their income. At macro level the best way to increase the subjective well-being average of a country is to raise the country's income relative to the other examined countries (neighbors for instance). However, from a global perspective this country vs country comparison of the incomes is also a zero-sum game, thus such a race for growth may only have a relevant meaning to subjective well-being in a region (Clark, Frijters and Shields, 2008).

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5.2 Further consequences on the utility function

In the previous subchapters we studied interesting findings that differ from the assumptions and results of standard economics. As a very first consequence we should try to rethink the utility function by reshaping it with those findings.

As Layard (2005b) formed the effect of rivalry may result the following (Cobb-Douglas type) utility function:

$$U_i = (c_i - \beta c)^{\alpha}(1 - h_i)^{1-\alpha} = c_i{}^{\alpha}\left(1 - \beta\frac{c}{c_i}\right)^{\alpha}(1 - h_i)^{1-\alpha}$$

Where c_i is own consumption, c is average consumption (of the society) and h_i is the fraction of time worked. Consumption is not only valued for its own sake, but also in relation to the consumption level of the society. Assuming that $c_i = h_i$ Layard (2005b) found that in the optimum the individual works longer (by nearly 20 percent) than is optimal due to rivalry. This is an externality problem as here the optimization is not only intrinsic, but also about competing with the consumption of others. The consequence of an extra hour worked is a one unit increase in the consumption, which also affects the average level of consumption. This reduces the utility of every other individual. To prevent this loss Layard suggests imposing a tax, which forces individuals to choose their hours worked on the basis of absolute value of consumption.

Overwork is not only induced by rivalry, but also by adaptation (or habit). As people adapt to higher standard of living, they lose the option to return to a previous lower level of living standard. The distortion arises if the habituation effect is not foreseen. To obtain a given amount of utility individuals have to consume more, thus work more hours. Assume that utility in period t is given as follows:

$$U_t = f(c_t - \gamma c_{t-1})v(1 - h_t)$$

Then we have to maximize $\sum D_t U_t$ (where D is the discount factor). If real wage is equal to one unit consumption, the budget constraint is $\sum R_t(h_t - c_t) = 0$. As Layard (2005b) derived a myopic and a foreseeing person chooses different number of

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hours worked and the consumption of the myopic person is 20 percent higher than the others.

Finally, we can also formalize the effect of conspicuous consumption. In this approach we have to differentiate goods into two sets. Some goods, like cars or houses are more visible than others. Usually these goods can become status symbols. We call them conspicuous goods. We assume that people compete with each other in consuming these goods, but do not compete in consuming merit goods[33]. In the model we assume that merit goods (g_i) can be acquired by extra work or by reduced conspicuous consumption (c_i). This could be represented in the following form:

$$U_i = (c_i - \beta c)^{\alpha} g_i^{\delta} (1 - h_i)^{1-\alpha-\delta}$$

A collective decision on the inconspicuous good was collective, everyone would work (α + δ) units and spend δ units of income on merit goods and α on proper consumption. But the individual decision would be different and he would work

$$h = \frac{\alpha + \delta(1-\beta)}{1-\beta(1-\alpha)} > \alpha + \delta$$

Which also generate that he would overwork, overconsume and spend less income on merit goods.

Constantinides (1990) formulated a different type of utility function to deal with hedonic adaptation (or habit formation). According to the popular Constantinides utility formula lifetime utility may be represented as:

$$v_t = E_t \sum_{j=0}^{\infty} \beta^j U(C_{t+j} - \Theta H_{t+j})$$

where v_t stands for lifetime utility, ß is a discount factor of flow utility (U), C_{t+j} represents the current consumption, Θ is a parameter showing the strength of adaptation, H_{t+j} characterizes current "habit" (a weighted average of past consumption levels). The formula would express perfect adaptation if Θ is equal to

[33] For instance job security, insurance or health services

DOI: 10.14267/phd.2014001

1. This practically would mean that people adapt to their previous consumption level in every new period and therefore utility may increase over time only if consumption level increases every period.

Although, we do not believe in utility summing over time, the Constantinides (1990) and the Layard (2005b) formula make it easier to understand adaptation. Yet these formulas are misleading. We must mention a capital doubtfulness of these formulas. On the one hand utility means expected utility in both concepts that should mean decision utility as utility is estimated before consumption. On the other hand utility in the formula also stands as experienced utility, because this utility is perceived after consumption (or in a following period). We believe the two different understandings of utility should be separated. As this combination of definitions is one of the major simplifications that leads to wrong consequences.

We used the formulas of Layard (2005b)[34], Constantinides (1990) and Kimball and Willis (2006) to show that individual behavior is more complex and people are not always acting rationally. As we are emotional creatures and our decision making may be called limited rationality, we make significant mistakes in our utility 'optimization'. To understand utilities, adaptation, individual motives, we have to study self-reported data to get more information about human estimation or expectation. These adjustments of the utility function can be used to rethink the subjective well-being difficulties in the CEE region. If consumption was the key factor to determine well-being, the CEE societies would have been a success story. As the reported SWB data disproves this statement, we should find different concepts to explain the survey results.

[34] For the detailed derivation see the appendix of Layard (2005b)

DOI: 10.14267/phd.2014001

5.3 Utility maximization

Do people always maximize their utility? This is a very standard question in economics. Most economists believe that individuals are always maximizing their utility as they are rational decision makers. Unfortunately, such an idea can be criticized. Individuals' behavior is not always motivated by utility maximization. We could easily mention two examples: taking care of children (Layard, 2005) and fairness (Fehr and Schmidt, 1999). Furthermore, Hámori (2003) summarized many findings about the limits of rationality and the presence of trust and cheating in economic decisions.

According too Fehr and Schmidt (1999) even if there is strong evidence that people exploit their bargaining power in competitive markets, it is not evident for bilateral bargaining. They studied situation where people had the chance to exploit free-riding and other cases when there was an opportunity to punish free-riders. They found that "in simple experiments like the ultimatum game, the public good game with punishments, or the gift exchange game, the vast majority of the subjects behave in a 'fair' and 'cooperative' manner although the self-interest model predicts very 'unfair' and 'non-cooperative' behavior" (Fehr and Schmidt (1999) p. 855).

Mainstream economic theory assumes no remarkable difference between the predicted utility when choosing among alternatives and the experienced utility when consuming has already happened. Scitovsky (1976, p. 4.) called this concept "unscientific" due to "ruling out any conflict between what man choose to get and what will best satisfy him". Since the publication of Scitovsky's successful book several surveys and experiments were carried out to study how appreciate people are in forecasting utility. Kimball and Willis (2006) argues that lifetime utility in standard economic analysis is a concept showing people's choices, which means that they value traded goods, non-traded goods and partially-traded goods[35]. We can partly agree with this concept. This would assume that people have all the information for the right decisions and that they are able to decide without concerns. We believe this is not true for real life events. Furthermore, people's situation

[35] „Traded goods" are goods trade din the market. „Non-traded goods" means goods not trade din the market (freedom, clean air, community, family). „Partially-traded goods" stands for goods that are not exactly traded, but tied to the market (for instance: time allocation as people are paid for work; health as people pay for health care, but they can not buy health directly).

DOI: 10.14267/phd.2014001

changes during their life and life events may happen that they did not expect previously. For example an illness may occur later that would have changed their previous decisions and behavior. Secondly they may not think about the stress that can be attributed to their hard work. Several other factors may appear that will lead to imperfect decisions. Thus, we argue that the decision (ex ante) and the experienced (ex post) utility may differ significantly.

Loewenstein and Schkade (1999) found that people make significant mistakes during anticipating future utility. The major mistake is the underestimation of adaptation speed to new experiences. Estimation mistakes lead to systematic errors in decision making. These mistakes are usually related to extrinsic attributes and intrinsic attributes that bias human decision making process. The result is usually the overestimation of extrinsic goods or values in contrast to intrinsic ones. Practically this means that individuals put too much effort in earning more money or obtaining a better social position, instead of spending more time with their family or friends. Various studies gave attempt to solve the problem of ex ante and ex post utility. Finally Daniel Kahneman found a solution for the problem.

Kahneman and Tversky (2000) did experiments to study the two different types of utility. He found that decision utility and experienced utility are different and the most important assumption of economics, the principle of dominance is not true for human preference-ordering. The experiment was based on experienced 'utility' during a negative event, a colonoscopy examination. Participants were asked to note their pain level every minute during the examination on a 0-10 level scale, which gave immediate information about their experienced utility. Patients came through two types of examinations. The first type was about 8 minutes long, while the second was about 25 minutes.

Figure 7 shows the results of the reported pain levels. If we use the assumptions of standard economic theory we can easily calculate the total utility (in this example the total pain) level by integrating the pain function. The grey area gives the final sum of utility[36]. As the second examination was much longer in time and the highest level of pain was very similar to the first type we can decide without long calculations that the first type results in less pain in absolute terms. Despite the logical derivation and the exact calculations of Kahneman and Tversky participants

[36] Disutility in this experiment.

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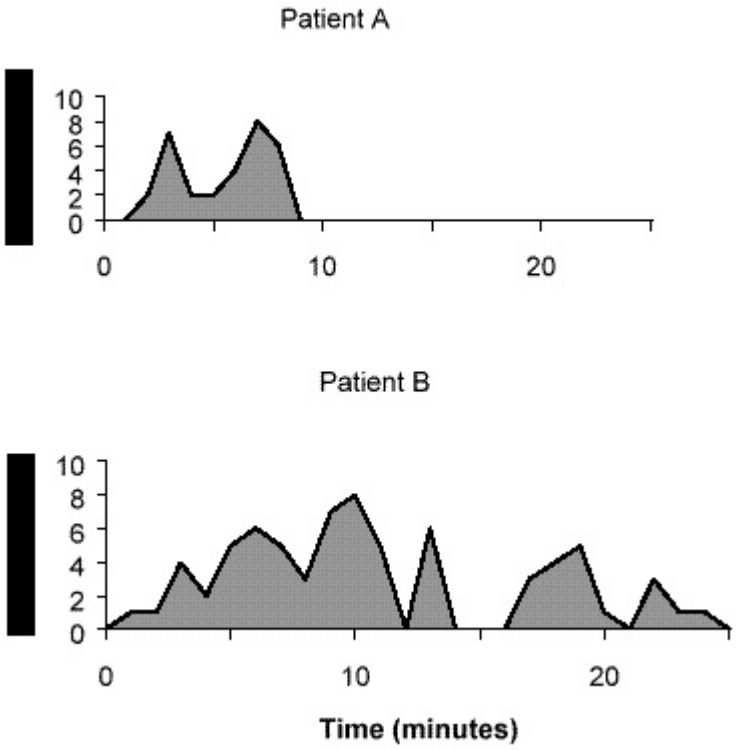
chose the second type of examination, when they were asked which type they would prefer if one more examination was needed.

Figure 8

Experienced pain during colonoscopy examination on a 10-level scale over time



Source: Kahneman and Tversky, 2000, p. 674.

The result is entirely contradicting to standard economic assumptions. This not only means that decision utility and experienced utility differs, but also that individuals can not optimize their utility the way economics and its preference-ordering rules[37] assumed. After many tests Kahneman and Tversky found that experienced utility correlates only with the strongest pain level and the pain experienced during the last three minutes of the examination. They found these two rules were the key in the decision making. In other words the principle of dominance can not be proved in human perception regarding experienced utility and thus ex post decision making.

[37] Transitivity, reflexivity, completeness and the principle of dominance

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Kahneman et al. (1993) tested preferences in another experiment, in which participants were asked to immerse their hands in cold water. Both hands were immersed in cold (14.1°C) water for 60 seconds. After 60 second they had to remove one hand, but they had to hold the other hand in the water. Meanwhile the water was warmed up somewhat, but the temperature was still very uncomfortable (15.2°C). The total pain, meaning the sum of immediate pain multiplied by duration, was expected to be greater for the second hand. Despite the assumptions, 70 percent of the respondents told that they would prefer the longer case compared to the shorter one. This experiment is another practical empirical proof that suggests our concerns about the temporal monotonicity. Furthermore the test is an additional disproof of the fact that decision utility and experienced utility are different.

The tests not only disproved 'the more the better' principle, but also showed that summing the utility over time is useless. Human brain is working differently as it was mathematically modeled and assumed in microeconomics. Therefore no model can come near the human perception or the experienced utilities. Models aiming at utility maximization over time or utility maximization by increasing consumption are misleading in terms of the experienced utility. Thus these utility model results are contradicting experiments even though they may be true for ex ante utility estimations. To understand additional details of human decision and perception process to get information on how the brain miscalculates an event in time further research is needed. One thing we can state for sure: human perception of events makes mistakes what economists can call as mathematical mistakes. Various scholars have been studying these mistakes or utility biases.

Non-objectivist examination of utility made it possible to understand several new details of utility biases. Referring to some examples: intrinsic motivation (Frey, 2000, 2004), cooperation and fairness (Fehr and Schmidt, 1999), status (Frank, 1999), emotions (Elster, 1998). Furthermore, Thaler (1992) and Frey and Eichenberger (1994) disaffirmed that utility can be derived from choices made. Kahneman and Thaler (2006) proved that individuals fail to maximize experienced utility in contrast to decision utility.

Subjective approaches could also support experiments aim at finding details about mistakes people make during decision making. As Frey (2010, p. 127.)

DOI: 10.14267/phd.2014001

summarized: “individuals systematically underestimate the utility of consumption aspects that care for intrinsic needs”, like time spent with family and friends and on hobbies. Meanwhile extrinsic desires (income or status) are overvalued. As a result, people underconsume goods with intrinsic attributes and overconsume those with extrinsic attributes. According to Frey and Stutzer (2007), this error decreases individual utility compared to the utility level without such mistakes.

The Cognitive Revolution criticized and changed our knowledge about utility concept remarkably. Since the revolution of revealed preferences economic scholars strongly believed that observing the choices made by individuals can simply explain their preferences perfectly. Based on this concept utility is the result of behavior (revealed preferences). The approach of revealed preferences has a very strong initial assumption: people have all the information to estimate the utilities of their choices and they can do this estimation and make a definite decision in every situation. Scholars of the happiness approach argue that individuals make mistakes during decision making and consumption. Economists have not used the findings of psychologists yet, but at least started the research with numerous experiments. Experiments showed that many assumptions of the standard economic theories are not true.

Table 5

The different understanding and using of utility

	Standard Economics	Happiness Approach
Utility concept	The effect of an actual life event	The life satisfaction or subjective well-being of an individual
Object of the utility concept	Consumption utility	General happiness or satisfaction level
Utility scale	Ordinal	Cardinal
Measurement is based on	The individual's decisions (revealed preferences)	The individual's subjective experience and feelings
Goal of utility	Modeling individual decision making and optimization	Studying mistakes in decision making and subjective well-being

Source: own table

DOI: 10.14267/phd.2014001

5.4 The relationship between utility and SWB

None of the scholars have been able to find a formula to represent the direct relationship between utility and any types of subjective well-being. This may be attributed to the difference between the definitions and the concepts. However, Kimbal and Willis (2005) formulated the relationship using many assumptions[38]. However, their assumptions were very strong and contradicted many findings related subjective well-being.

Clark, Frijters, and Shields (2008) also tried to explain the link between subjective well-being and utility. Despite the fact that they found some evidence about linkages between the two variables, they remained cautious. They argue that it might be assumed that happiness is not the same as utility, because happiness is an evaluation of what has occurred while utility (as generally used) is what people expected to happen. They refer to Rabin, who found that the most significant factor that leads to misprediction of the expected utility is the underestimation of how quickly and how fully we adjust to changes. Secondly, they argue that there may be errors in anticipating the reference group. According to Frijters, Haisken-DeNew, Shields (2002) East German respondents overestimated their future satisfaction with life due to the euphoria during the reunification as they failed to realize that their reference group change towards West Germany, which results in a significant worsening of their relative financial situation. Thirdly, Clark, Frijters, and Shields (2008) emphasize that happiness data can not be used as a measurement of utility, because happiness is not covering every aspect of life. Although we can understand this argument, we believe the same is true for utility as well, thus it is not the right point. Finally, they mention their mistrust in the measurement of happiness as a reason to be cautious. Yet we believe that the widely used surveys are totally neutral, it may happen that survey answers are manipulated by reminding respondents to positive or negative events.

Happiness is a different concept than utility. Connecting it to decision utility is very complicated. We only find reason in assuming relationship between experienced utility and subjective well-being. Yet it has no real meaning to standard

[38] For further details see appendix 1.

DOI: 10.14267/phd.2014001

economics, because economists still understands utility as decision utility and their modeling is based on consumption.

DOI: 10.14267/phd.2014001

6. Model estimations

This chapter focuses on econometric model estimations. The literature rarely used the Eurobarometer and the Eurostat data bases to regress subjective wellbeing in the European Union. As focusing on well-being and life quality is a crucial feature of the European Union, we think results might be interesting not only for researchers but also for decision makers.

Due to several methodological difficulties we used different type of models. We believe that the usage of fixed (country) effect panel models is reasonable due to the unobservable country features we cannot explain with socioeconomic variables. On the other hand fixed effect panel models cannot deal with the starting level differences among countries (as the estimated country specific constant also contains that information), thus we also used cross section regressions. Due to the relatively large number of model specifications we put several model estimation results in the appendix and hold only the most important results in the main text.

As argued in chapter five, individuals make mistakes during their decisions. We used Eurobarometer 69 survey to check how certain nations think about the values that are important for their happiness. We used the four most important values from all countries and estimated a "suggested" life satisfaction based on those value weights and value specific statistical data. We found that most EU member states are "bright". This means most countries report a higher level of life satisfaction to Eurobarometer, than the level which is reasonable based on their national value weights and also on European constant weights.

Furthermore, as monetary policy is strictly rule based, we gave an attempt to estimate the life satisfaction effects of employment[39] and inflation using the Eurobarometer for the euro area, the former EU member states (EU15) and the new member states (EU12).

[39] We prefer using emplyoment instead of unemployment as the variation among EU member states is largerand we believe that differences in the national rules of unemplyoment result in larger estimation mistakes.

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6.1 Data used for model estimation

In this part we go through all the variables we used for econometric estimations. Dependent variables used were the life satisfaction data of the standard Eurobarometer surveys. Except HDI, Eurostat is the source of the data we used as independent variables. As a result we collected a relatively large dataset form the 27 EU member states (cross sections) and 24 annual statistical data from 1988 till 2011 (periods) including many socioeconomic variables that may be important for regressing life satisfaction.

6.1.1 Dependent variables

For dependent variables of our model estimations used three types of data from the Eurobarometer life satisfaction surveys. These surveys are carried out with the same statistical method; national surveys are representative in each country. Each wave is independent, meaning that the same individuals are not surveyed more than once. Therefore the data is not a panel at the micro level, but a panel at the macro level, with measurement error (as different people are asked in each survey waves). Standard Eurobarometer surveys measure life satisfaction on a four-level scale. The four levels are the following:

1) Not at all satisfied.
2) Not very satisfied
3) Fairly satisfied
4) Very satisfied.

From this scale we used the proportion of very satisfied and the proportion of not at all satisfied answers without any changes. The extreme levels can be useful to interpret some relevant socioeconomic changes for different segments of the European society.

For estimating correlations and regressions, we generally used life satisfaction statistics (Eurobarometer) by establishing the proportion of those who

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are generally satisfied with their life. We assumed that people who were generally satisfied with their life had replied with the two positive answers: they were fairly satisfied or very satisfied with their life (level three and four on the scale). Therefore, LS denotes the proportion of people who answered with the two better answers[40]. Yet, we also regressed the extreme answers. In this case we estimate the probability of the answers 'very satisfied' (VS) and 'not at all satisfied' (NAAS).[41]

Table 6

The dependent variables of the model estimations

LS	Satisfied with life.
VS	Very satisfied with life
NAAS	Not at all satisfied with life.

Source: own table

The descriptive statistics and trends of the dependent variables show several interesting features of LS during the examined period. First, the mean of LS values is 0.744, which means that over the period 1988-2011 on the average 74.4 percent of EU citizens were satisfied with their life. Secondly, the most frequent annual country averages of life satisfaction values were between 0.75 and 0.8 (see figure 8). Besides, the minimum value of life satisfaction country average was 0.497, while the highest level was 0.92. The negative skewness means that the left tail of the density function is longer than the right tail of it.

[40] LS = (number of fairly satisfied with life answers + number of very satisfied with life answers) / (number of all answers)
[41] Part 5.1.2 explaines why these answers should be understood as probabilities and what is a linear probability model.

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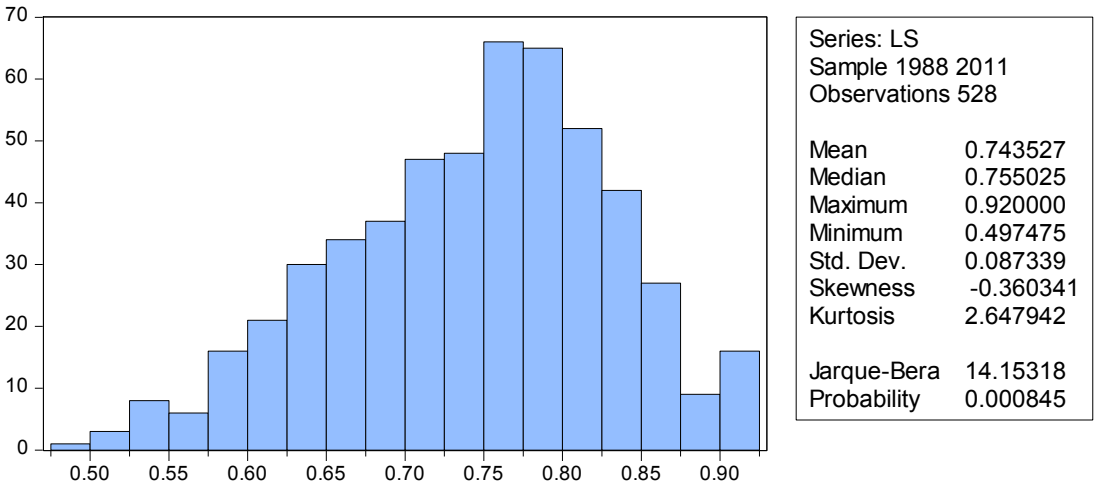
Figure 9

Descriptive statistics of LS in the whole dataset



Source: Eurobarometer (Eviews figure)

The one-way tabulation of the values of the dependent variable satisfied with life shows that there was only one data below 0.5. It was Bulgaria in 2001. It is generally true that the subjective well-being in new member states is usually lower than in the EU15 countries. At this point it is important to add that the data set is unbalanced as we only have annual Eurobarometer data in the CEE region from 1998, while for EU15 countries we have data from 1988. Thus the descriptive statistics of our data are somewhat more positive than what reality would have showed with data from the most difficult period of the transition in CEE countries[42].

Further statistics show that cumulatively only 6.8 percent of all annual subjective well-being averages were lower than 0.6. In this group we can find two countries from the EU15, which were hit strongly by the crisis. Portugal and Greece also reported low life satisfaction since 2010. In these countries very strict fiscal programmes were implemented, which were in line with the macroeconomic goals of the IMF stand by agreements. These macroeconomic adjustment programmes affected subjective well-being through several socioeconomic dimensions. In the medium run unemployment increased, pensions and public sector wages were cut significantly and real GDP shrank. Spain, which also suffered from the effects of the

[42] After 1990 transition countries in the CEE suffered a large output loss and employment declined significantly. This period is often called a transformational depression.

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global financial crises, did not realize such a strong decline in subjective wellbeing until 2011. However, its subjective well-being level was relatively high compared to the other crisis-hit countries. Other countries with relatively low life satisfaction rates (below 0.6) were transition CEE countries: Bulgaria, Hungary and Romania.

In most of the countries life satisfaction averages were between 0.6 and 0.8. The positive extremes were Luxemburg, Sweden and the Neatherland, which reported the highest values. Life satisfaction was above 0.8 during the whole period in these countries. People in Denmark seem to be the most satisfied with their life as from the 24 periods in 16 periods at least 90 percent of Danish people were satisfied with their life.

The variation of the dependent variable LS is relatively low over time and relatively large among countries. Figure 9 illustrates the variation in the level of life satisfaction in the whole data set. Different clouds represent different countries (numbers from 1 to 27 on axis X). According to the figure the LS values differ among countries, but the values depend strongly on the previous data of the same country. This is relatively difficult methodological problem. It may represent strong socioeconomic, historical or cultural differences among the 27 countries. However, if we control for the differences among countries we lose very important information. To fight this challenge we used different type of models. Figure 9 also tells us that there is no common trend, but there are some country specific trends. This makes model estimations more complicated.

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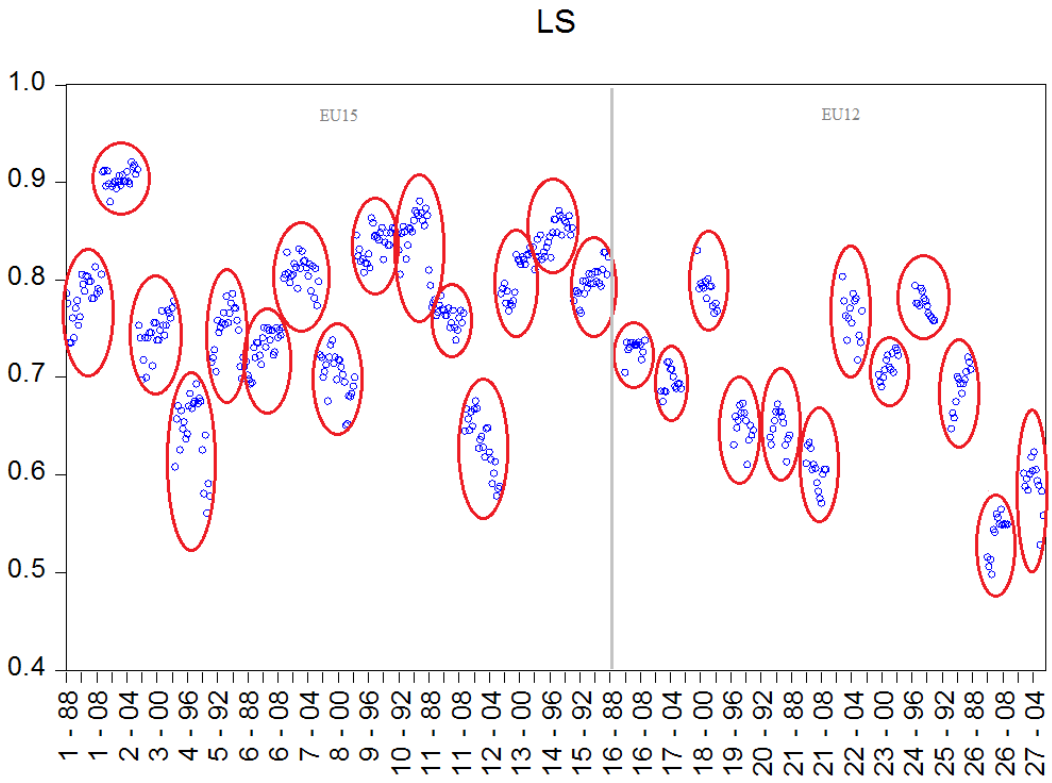
Figure 10

The value cloud of the dependent variable LS for the whole data set. Clouds show different country averages ranked in time form 1988-2011 starting with the EU15 in the left corner and showing new member states from number 16.



Source: Eurobarometer (Eviews figure)

The ANOVA table is more informative about the source of variance. It also supports that the variation between countries is larger than within countries. Approximately 94.9 percent of the variation in LS is between countries (cross sections), and only 5.1 percent of the variation is within countries.[43] This suggests two messages. First, in models we have to deal with the country specific differences. Secondly, if we use country fixed effects in a model, its R^2 will be very large.

[43] The results are calculated from the source of variation: 3.815314/4.020022=0.9490779.

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Table 7

Variation analysis of dependent variable LS

Method	df	Value	Probability
Anova F-test	(26, 501)	359.1374	0.0000
Welch F-test*	(26, 165.539)	501.4559	0.0000

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	26	3.815314	0.146743
Within	501	0.204708	0.000409
Total	527	4.020022	0.007628

Source: own table based on Eviews

There are large economic and social differences between countries in the EU15 region and countries in the EU12 region that might be showed by life satisfaction trends. To interpret these differences and changes over time we show the LS trends in Germany and in Hungary. We believe this comparison may interpret several important historical and socioeconomic events that might be useful hints for model estimations. After the reunification East Germany also experienced a transition like Hungary, but the economic support of West Germany and other factors may show some differences between the two as well. In Hungary from 2000 the average life satisfaction decreased and bottomed out in 2008, when the crisis hit the country (see figure 10). This may be interesting as in 2004 Hungary accessed the European Union and a general increase in life satisfaction due to this event would be a trivial hypothesis. Furthermore real GDP contracted by 6.8 percentages in 2009 when the greatest positive jump in life satisfaction was realized.

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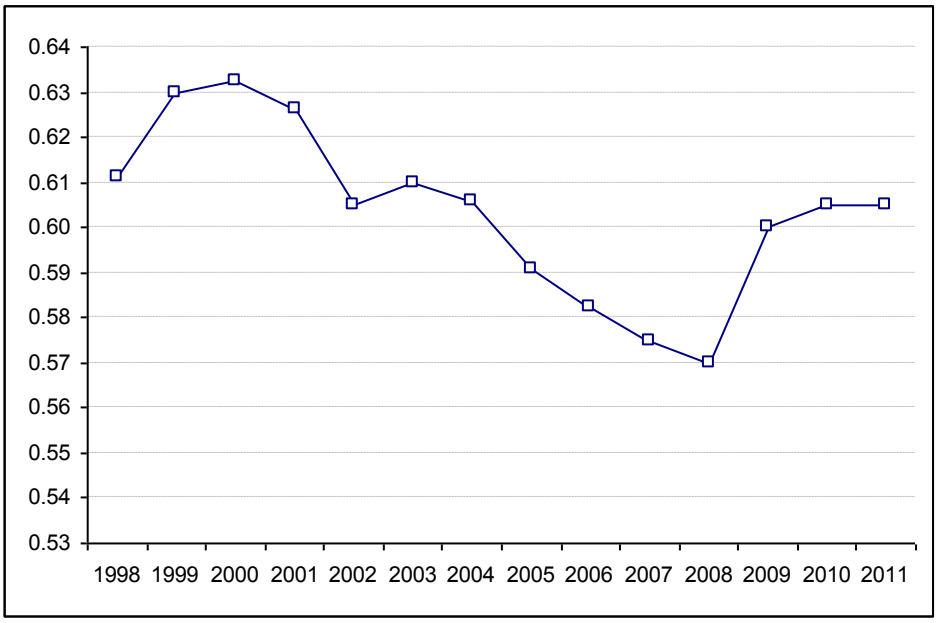
Figure 11

The trend of life satisfied with life (LS) in Hungary



Source: Eurobarometer

Meanwhile in Germany life satisfaction answers showed an increasing trend over time. Directly after the transition less people reported that they were satisfied with their life, and since 1990 the trend is increasing. Unlike the new member states, life satisfaction in Germany did not drop or bottomed out during the global crises (see figure 11). Looking at the figure it may be also a good hint to assume that after the establishment of the euro area (2001) general life satisfaction increased in Germany. The mild positive German trend may be attributed to the independent variables like the increasing life satisfaction or the positive real GDP growth. Besides it may be explained by the positive effects of the reunification, which we cannot observe as we use national averages of data and not regional statistics.

(For all other life satisfaction trend line figures see appendix 2.)

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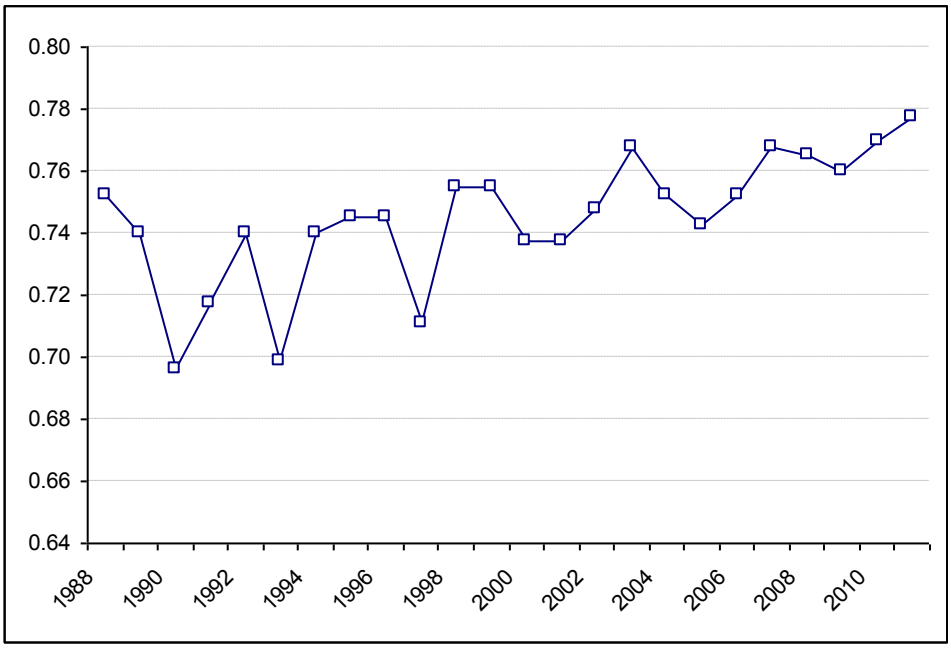
Figure 12

The trend of life satisfied with life (LS) in Germany



Source: Eurobarometer

The descriptive statistics of the 'not at all satisfied with life' (NAAS) dependent variable shows a different picture. Answers covered the 0 - 0.3 interval. The proportion of 'not at all satisfied' answers is concentrated around 2-3 percent levels, meaning that only 2 or 3 percent of the whole society answered in the given year that they were not at all satisfied with their life. Almost 88 percent of the total not at all satisfied answers were below the 0.1 level. This means that in 88 percent of all the not at all satisfied country averages covered less than 10 percent of the society. In average 4.6% of people in the whole EU27 answered they were 'not at all satisfied' with their life during the analyzed period. Somewhat more than 9 percent of the annual country averages were between 0.1 and 0.2. This is in line with the positive and relatively large skewness indicator, which represents the concentration of the data on the left hand side of the density function.

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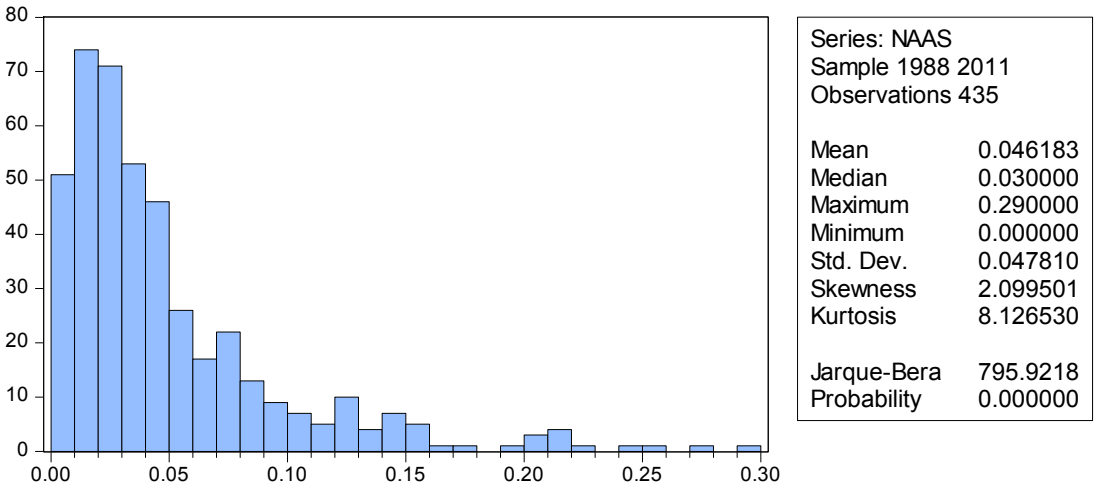
Figure 13

Descriptive statistics of NAAS in the whole dataset



Source: own figure based on Eurobarometer (Eviews)

Table 8

Variation analysis of dependent variable NAAS

Method	df	Value	Probability
Anova F-test	(26, 408)	106.0773	0.0000
Welch F-test*	(26, 104.707)	75.30454	0.0000

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	26	0.864206	0.033239
Within	408	0.127844	0.000313
Total	434	0.992050	0.002286

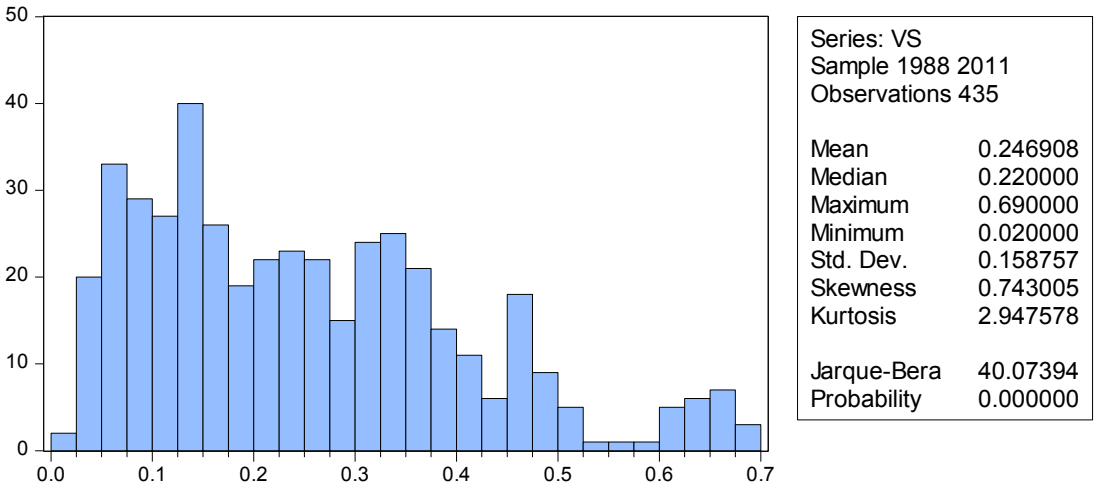
Source: own table based on Eviews

DOI: 10.14267/phd.2014001

The descriptive statistics of the answers 'very satisfied with life' (VS) varies the most from the dependent variables. Anwers covered the 0.02-0.69 interval. The 'very satisfied' answers are not strongly concentrated at any levels. On average 24.7% of the EU27 citizens are very satisfied with their life. 45 percent of all the total very satisfied answers were below the 0.2 level. This means that in 45 percent of all the very satisfied country averages covered 20 percent of the society. Around 38 percent of the annual country averages were between 0.2 and 0.4. This can be found in the positive, but relatively low skewness indicator, which represents the concentration of the data on the left hand side of the density function.

Figure 14

Descriptive statistics of VS in the whole dataset



Source: own figure based on Eurobarometer (Eviews)

Table 9

Variation analysis of dependent variable VS

Method	df	Value	Probability
Anova F-test	(26, 408)	282.4744	0.0000
Welch F-test*	(26, 110.173)	464.1806	0.0000

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.

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Between	26	10.36274	0.398567
Within	408	0.575681	0.001411
Total	434	10.93842	0.025204

Source: own table based on Eurobarometer (Eviews table)

5.1.2 Independent variables

For the model estimations we used several economic and social indicators that are relevant based on the literature and our hints. Table 10 contains all the data (and their description) which was used in model estimations.

Table 10

The list and the most important details of independent variables used for econometric regressions

Price_lev	Annual average price level. 100 is equal to the average price level of January 2000. The source of data is Eurostat.
Log(Price_lev)	Logarithm of price levels. Shows the percentage change of price level. The source of data is Eurostat.
EMP	Employment rate. Due to the number of changes in unemployment rate and the variety of national definitions of unemployment and the differences in the length of unemployment we decided to use employment rate. *„The employment rate is calculated by dividing the number of persons aged 20 to 64 in employment by the total population of the same age group. The indicator is based on the EU Labour Force Survey. Employed population consists of those persons who during the reference week did any work for pay or profit*

DOI: 10.14267/phd.2014001

	for at least one hour, or were not working but had jobs from which they were temporarily absent."[44] The source of data is Eurostat.
EMP_c	The year on year change of the employment rate. The source of data is Eurostat.
Inf	Inflation rate. Year on year change of the price level. The source of the data is Eurostat.
rGDP	Real gross domestic product growth rate. „*The calculation of the annual growth rate of GDP volume is intended to allow comparisons of the dynamics of economic development both over time and between economies of different sizes. For measuring the growth rate of GDP in terms of volumes, the GDP at current prices are valued in the prices of the previous year and the thus computed volume changes are imposed on the level of a reference year; this is called a chain-linked series. Accordingly, price movements will not inflate the growth rate."*[45] The source of data is Eurostat.
ppsGDP	Per capita gross domestic product compared to the European Union average. „*The volume index of GDP per capita in Purchasing Power Standards (PPS) is expressed in relation to the European Union (EU-27) average set to equal 100. Basic figures are expressed in PPS, i.e. a common currency that eliminates the differences in price levels between countries allowing meaningful volume comparisons of GDP between countries. Please note that the index, calculated from PPS figures and expressed with respect to EU27 = 100, is intended for cross-country comparisons rather than for temporal comparisons."*[46] The source of data is Eurostat.
GERD	Gross expenditure on research and development in share of

[44] The official definition of the Eurostat.
[45] The official definition of the Eurostat.
[46] The official definition of the Eurostat.

DOI: 10.14267/phd.2014001

	GDP. The source of data is Eurostat.
HDI	Human Development Index. The HDI is a composite statistic of life expectancy, education, and income normalized indices.[47] The source of data is UNDP.
Healthy	Number of healthy life years. It represents the disability-free life expectancy (DFLE), and defined as the number of years that a person is expected to continue to live in a healthy condition. The source of data is Eurostat.
Life_ex	Life expectancy at the age of 65 years. The source of data is Eurostat.
Divorce	Crude divorce rate. It represents the ratio of the number of divorces during the year to the average population in that year. The value is expressed per 1000 inhabitants. The source of data is Eurostat.
Marriage	Crude marriage rate. The crude marriage rate is the annual number of marriages per 1,000 population. The source of data is Eurostat.
working_years	Total number of working years. The source of data is Eurostat.
one_week_holiday	Inability to afford paying for one week annual holiday away from home. The source of data is Eurostat.
agri_lab	Employment level in the agricutural sector. The 2000 end year data = 100. The source of data is Eurostat.
edu	Participation rates in education. Education participation rates for aged 15-24 years as percentage of corresponding age population. The source of data is Eurostat.
IMFdum	IMF dummy. 0 if a country did not have an IMF-EU financial support during the 2008 global financial crises. 1 if the country had an IMF financial support package (only for stand-by

[47] For details see the UNDP occasional paper about HDI (web address can found among internet references).

DOI: 10.14267/phd.2014001

	agreement type credit support, but not for flexible credit line (FLC), as FLC does not need a further fiscal consolidation).
EUR_dum	Euro dummy. 0 if a country did not use euro. 1 from the year since the country uses euro as currency.
EUAC_dum	EU accession dummy. 0 until the membership, 1 since the joining to the EU.
EU12_dum	New member state dummy. 0 for EU15 member states, 1 if the EU membership is from 2004 or 2007.
CRI_dum	Crises dummy. 0 until the crises break out. From 2009 the value of the dummy is 1.

DOI: 10.14267/phd.2014001

6.2 Pooled OLS

In the following chapters we summarized the most relevant model specifications of our econometric research. To understand why we chose the later showed models we would like to shortly summarize the most relevant econometrics related difficulties with the problem and the dataset.

As a start we estimated pooled OLS models. Due to methodological problems (detailed below) we estimated other type of models. First we decided to use fixed effect models with cross section (country) fixed effects to deal with the unobservable country specific variables such as culture. As LS variable trends differently among the 27 member states[48], we decided to regress first difference fixed effect models as well, to deal with the different trends. Unfortunately, as the level differences in the beginning are lost in these models, thus we also estimated cross section regressions to understand the importance of the level differences in the independent variables. Finally, we calculated estimated well-beings, based on the value weights of EU citizens about happiness and the related statistical data.

The pooled OLS methods are used as attempts of model estimations to find the most important statistical relationships among variables. Pooled OLS estimations may help finding the key variables that will be useful for other estimation methods. Unfortunately, its results are inconsistent, and biased. The statistical biases should be taken into account, thus results should be used only as benchmark for other model estimations.

The prerequisites of unbiasedness for pooled OLS models are relatively strong. Residuals have to be uncorrelated. Usually, while using pooled OLS models we have to control for heteroskedasticity. Residuals are strongly autocorrelated within the countries, thus results are biased and thus we cannot estimate standard errors with the usual methods. As a result we do not have perfect feedback about the consistency of these coefficients. The results and the interpretation of the pooled OLS models can be found in Appendix 4.

[48] For istance we showed the different trend sin Hungary and in Germany. In appendix 2 the Reader can check that there are different country specific trends, thus we decided to deal also with difference models to catch these trends.

DOI: 10.14267/phd.2014001

6.3 Panel models

In the previous chapter we summarized the problems of the pooled OLS estimations. As we noted these results are problematic as we do not have appropriate information about the significance due to the biased standard errors. Due to the problems with t and F statistics we tried to regress other type of models as well. In pooled OLS models the residuals were strongly autocorrelated. To deal with this problem we tried to estimate country fixed effect panel models. As the number of cross sections (27 member states) and periods (24 years) is relatively low and they are similar we used Eviews' standard robust errors to get better estimations on standard errors and significance levels[49].

6.3.1 Fixed effect panel models

All the methodological difficulties and the general problems with other types of models suggest that fixed effect panel models may be the best choice for model calculations. The general idea is that EU27 member states differ in country features and social values and this has a direct impact on the basic level of life satisfaction country averages. Plainly speaking these differences may cover cultural, historical, identical or value-based differences that cannot be observed by data. The advantage of fixed effect models is that these regressions can estimate an unobserved constant for all countries that can represent these country differences.

Above these ideas the panel model test also suggests that fixed effects are needed for the right regression in our models. According to the test result of the Hausman test (correlated random effects test) we have to reject using cross section random effects instead of fixed effects.[50] Thus, fixed cross section effects are needed.

[49] We used the White period coefficient covariance method of the Eviews panel options modul. It controls autocorrelation, but assumes that the included countries are independent (residuals are not correlated) and the number of countries tends to infinity. To meet the first assumption we used cross sectino fixed effects. The later assumption does not hold, but we do not see any better econometric model for the exact panel problem.

[50] See Appendix 5 for the result of the Hausman test.

DOI: 10.14267/phd.2014001

A general form of a fixed effect model is:

$$Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$$

where α_i is a random variable that captures unobserved heterogenity. In our case such unobserved variables might be cultural differences or general mood differences among EU member states. (See appendix 4 for the fixed effect model results in the whole EU27.)

Table 11

Fixed effect model estimations regressing LS in the EU12 (italic numbers below the coefficients are the p-values)

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
C	0.675998	0.736774	0.691012	0.753424	0.815573
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*
RGDP	0.001245	0.000923	0.001099	-	-
	0.0002	*0.0041*	*0.0004*	-	-
INF	-0.000325	-	-	-	-
	0.6652	-	-	-	-
EMP_C	0.000151	-	-	-	-
	0.8147	-	-	-	-
EDU	-	0.0514	-	-	-
	-	*0.137*	-	-	-
AGRI_LAB	-	-	0.030164	-	-
	-	-	*0.1097*	-	-
LIFE_EX	-	-	-0.00303	-0.00587	-0.00466
	-	-	*0.1437*	*0.0314*	*0.2187*
PPS_GDP	-	-	-	0.000213	-
	-	-	-	*0.4401*	-
WORKING_YEARS	-	-	-	-	-0.00207
	-	-	-	-	*0.2746*
EUAC_DUM	-	-	-	-	-0.000739
	-	-	-	-	*0.8542*
IMFDUM	-	-	-	-0.01378	
	-	-	-	*0.0367*	

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Fixed effect	Country	Country	Country	Country	Country
R-squared	0.9555	0.9611	0.9502	0.9590	0.9573
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
Total panel (unbalanced) observations:	165	161	159	144	132

Table 11 summarizes the fixed country effect panel model estimations from the dataset of the EU12. Due to the relatively low number of observations (for the new member states Eurobarometer conducted surveys from 1998) we couldn't include too much variables in our models. On the other hand the earlier 1990s would have been interesting for the analysis because of the transformational depression, but the big volatility of macroeconomic data during those years might have been troublous for estimations. According to model 1, an extra one percentage point increase in real GDP growth rate raises the probability of answering being satisfied with life by 0.125 percentage points. Inflation rate and employment growth rate were statistically insignificant. These variables would have less effect on life satisfaction. The coefficient of participation in education (among 15-24 year population) was not statistically significant at any standard significance levels. Its effect seems relatively large, but as it is a participation rate, the coefficient has to be divided by 100 to get the comparable effect on life satisfaction. Model 3 suggest that life expectancy at the age of 65 decreases life satisfaction. This contradicts our ideas. Even though the coefficient was not significant statistically in model 3, it was in model 4 and 5 and the sign of the coefficient did not change.

We find that pps per capita GDP has a positive effect on life satisfaction. A one percentage point increase in pps per capita GDP result in a 0.02 percentage points increase in the probability of replying being satisfied with life. Meanwhile, model 4 portrays the effect of a stand by agreement type IMF/EU bail-out programme. The estimation suggests that such a programme decreases the probability of answering being satisfied with life by 1.4 percentage points. We have to note that an economic adjustment yields in the longer run, thus it is possible that the positive effects of such a program may be realized on the longer run. Furthermore, we also have to be cautious with this result as we do not know the

DOI: 10.14267/phd.2014001

counterfactual effect: what would have happened with life satisfaction if a default had happened.

Model 5 has further findings. Firstly, the number working years seems to trend negatively with life satisfaction. This result contradicts some of the basic findings of the literature. For instance Scitovsky (1974) argued that boredom has a negative effect on subjective well-being. Our general assumption would be that working is less boring than being at home without work, thus this result is surprising. On the other hand it might be important that the labor market uncertainties are larger in the new member states, thus people would like to be pensioners as early as possible, in line with the finding of Molnár and Kapitány (2006). As the estimated coefficient is statistically not significant we can have concerns about the result. However, we believe that in this case insignificance is also a result. Just like the case of the EU accession dummy. The regression suggests that in new member states EU accession did not have a significant effect on life satisfaction. This also contradicts our hypothesis. By the way, we have to add that migration to EU15 countries from EU12 might be important, as the EU membership gave the opportunity to work abroad for more million citizens in CEE countries, who might became more satisfied with life, but their replies do not count to EU12 answers.

Table 12

Fixed effect model estimations regressing LS in the EU15 (italic numbers below the coefficients are the p-values)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
C	0.773047	0.883884	0.697444	0.899468	0.927508
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*
RGDP	0.001509	0.000242	0.00195	-	-
	0.0005	*0.6077*	*0.0000*	-	-
INF	-0.000132	-	-	-	-
	0.928	-	-	-	-
EMP_C	0.000945	0.002103	-	-	-
	0.3084	*0.0297*	-	-	-
EDU	-	-0.182485	-	-	-
	-	*0.0000*	-	-	-
AGRI_LAB	-	-	0.025682	-	-

DOI: 10.14267/phd.2014001

	-	-	*0.5963*	-	-
LIFE_EX	-	-	0.003077	-0.00681	-0.005506
	-	-	*0.0069*	*0.0008*	*0.1078*
PPS_GDP	-	-	-	-7.32E-05	-
	-	-	-	*0.806*	-
EURO_DUM	-	-	-	0.001232	-
	-	-	-	*0.842*	-
WORKING_YEARS	-	-	-	-	-1.69E-03
	-	-	-	-	*0.535*
IMFDUM	-	-	-	-	-0.048028
	-	-	-	-	*0.0132*
Fixed effect	**Country**	**Country**	**Country**	**Country**	**Country**
R-squared	0.9295	0.9621	0.9334	0.9540	0.9570
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
Total panel (unbalanced) observations:	303	192	297	180	165

We summarized similar model estimations (tried to use the same explanatory variables) for the EU15 countries in table 12. Exactly like in the case of the EU12, we got that real GDP growth has a relatively little positive impact on life satisfaction. We found that a one percentage point increase in real GDP growth would raise the probability of answering being satisfied with life by 0.15 percentage points (according to model 1). Besides, the coefficients of inflation rate and employment rate were not statistically significant and their estimated effect was little. Model 2 suggests that education decreases life satisfaction in old EU member states. We found that a one percentage point increase in education participation lowers the probability of answering being satisfied with life by 0.18 percentage points. This result might be strange. In some countries (for instance Luxembourg, Italy, France, Austria), where life satisfaction is relatively high the education participation is very low (even compared to new member states). Furthermore in this model the coefficient of employment growth rate was significant and had a positive impact on life satisfaction. The regression suggests that a one percentage point rise in employment growth increases the probability of being satisfied with life by 0.21 percentage points. It is important to add that in this model the coefficient of real GDP growth became statistically insignificant.

DOI: 10.14267/phd.2014001

Further regressions gave different results than the similar models in the EU12 countries. Model 3 suggests that life expectancy (at the age of 65) has a positive effect on life satisfaction (unlike in the EU12). An extra year increase in life expectancy raises the probability of answering being satisfied with life by 0.31 percentage points. On the other hand the positive impact of life expectancy on life satisfaction changed to a negative effect in the other regressions. The level of agricultural labour was not statistically significant. The last two models suggest that over time the pps per capita GDP level has no statistically significant effect on life satisfaction. This is in line with the findings of previous papers (see chapter 4), as above a certain threshold rising income do not affect life satisfaction. Besides we found that the euro adaptation had no significant effect on life satisfaction. However, the effect of IMF/EU stand-by agreements was statistically significant. Model estimation suggests that under an IMF/EU macroeconomic adjustment programme on average the probability of answering being satisfied with life declines by 4.8 percentage points. In this estimation 3 countries contributed in a bail-out programme: Greece, Ireland and Portugal. Again, an economic adjustment program may have positive effect in the longer run. Furthermore, counterfactual effect is unknown: we have no information about life satisfaction development in case of a default.

6.3.2 Estimation of being 'very satisfied' with life

In this section we regressed the probability of answering 'very satisfied' with life[51] using the same country fixed effect panel method. These models work exactly the same way as those we interpreted in the previous part, their explanation is also the same, and models are understood as linear probability models.

[51] Answering being very satisfied with life means the best reply from the four alternatives, the highest level on the four-scale survey.

DOI: 10.14267/phd.2014001

Table 13

Fixed effect model estimations regressing very satisfied with life in the EU27 (italic numbers below the coefficients are the p-values)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
C	0.169026	-0.041647	1.010391	1.013365	1.09098	1.019549
	0.0013	*0.5461*	*0*	*0*	*0*	*0*
PPS_GDP	0.000981	0.000942	0.00142	0.001445	0.001394	0.001395
	0.042	0.0429	0.0034	0.0029	0.0039	0.0048
DIVORCE	-0.01796	-0.016848	-	-0.010145	-	-
	0.0451	*0.0511*	-	*0.2741*	-	-
LIFE_EX	-	0.013164	0.015834	0.015429	0.013252	0.015831
	-	*0*	*0*	*0.0001*	*0.0012*	*0*
EDU	-	-	-4.060492	-4.001376	-4.206281	-4.08672
	-	-	*0*	*0*	*0*	*0*
EDU^2	-	-	3.432923	3.397052	3.550409	3.451934
	-	-	*0*	*0*	*0*	*0*
EURO_DUM	-	-	-	-	0.015582	-
	-	-	-	-	*0.0814*	-
EUAC_DUM	-	-	-	-	-	0.005011
	-	-	-	-	-	*0.7807*
Fixed effect	**Country**	**Country**	**Country**	**Country**	**Country**	**Country**
Total panel observations	273	273	248	248	248	248
R-squared	0.957978	0.961134	0.964947	0.965141	0.965437	0.964959

According to the results of the first regression per capita pps GDP level tends to increase the number of very satisfied answers. However its effect is not very large, one percentage point growth of the per capita GDP level increases the probability of being very satisfied with life by 0.098 percentage points on average. In other models presented in table 13 the effect of per capita GDP is larger. Furthermore, as expected, divorce rate trends negatively with the highest level of life satisfaction. If the crude divorce rate increases by one percentage point the probability of reporting being very satisfied with life declines by almost 1.8 percentage points.[52] Besides, the second regression suggests that one year increase of the life expectancy at 65 increases the probability of being very satisfied with life by 1.32 percentage points. We found that education participation decreases the level of being very satisfied with life. Calculating with an increase from a participation level of 60 percentages to 61 percentages the probability of very satisfied with life answers declines by 0.63 percentage points. Despite the fact that the euro dummy

[52] Crude divorce rate is calculated on 1000 people population that is why it may have such a large effect on the level of being very satisfied with life.

DOI: 10.14267/phd.2014001

was only significant at the 10 percent statistical significance level, its effect on being satisfied with life seems remarkable. The euro adaptation increased the probability of answering being very satisfied with life by 1.56 percentage points. Yet, the used EU accession dummy's coefficient was not significant, thus it had no statistically measurable effect on being very satisfied with life.

Table 13 does not contain some important socioeconomic variables we also tested. The effects of marriage, divorce rate, real GDP growth rate, employment growth rate and employment rate, inflation, price level were not statistically significant in any regressions.

6.3.3 Estimation of being 'not at all satisfied' with life

In this subchapter we summarize our estimations of testing being not at all satisfied with life. Again we used fixed country effect panel models, and similarly to previous ones, models are understood as linear probability models.

Table 14

Fixed effect model estimations regressing not at all satisfied with life in the EU27 (italic numbers below the coefficients are the p-values)

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
C	0.04544	0.04392	0.030935	0.133028	0.207913	0.221556
	0	*0*	*0*	*0*	*0*	*0*
RGDP	-0.001625	-0.001346	-0.001427	-0.001158	-0.000903	-0.000951
	0	*0*	*0*	*0.0002*	*0.0013*	*0.0007*
INF	0.002588	0.002488	0.002788	0.003297	0.003093	0.002748
	0.0008	*0.0012*	*0.0004*	*0*	*0.0001*	*0.0003*
Divorce			0.006351	0.008871	-	-
			0.0465	*0.0059*		
CRIDUM		0.004609	0.004893	0.004314	-	-
		0.0701	*0.0601*	*0.0921*		
EMP				-0.001659	-0.001927	-0.001962
				0.0003	*0.0001*	*0*
MARRIAGE					-0.007686	-0.007959
					0	*0*
EUAC_DUM						-0.024617
						0.0044
Fixed effect	**Country**	**Country**	**Country**	**Country**	**Country**	**Country**
Total panel observations	384	384	380	380	367	367

DOI: 10.14267/phd.2014001

R-squared	0.887667	0.888705	0.890142	0.894215	0.899118	0.901538

According to the panel model estimations showed in table 14 the probability of answering being not at all satisfied with life trends with real gdp growth and inflation as well. One percentage point increase in real GDP growth decreases the probability of being not at all satisfied with life by 0.163 percentage points. Meanwhile, if the inflation rate increases by a percentage point, the probability of being not at all satisfied with life increases by 0.259 percentage points. Further results indicate that the crisis had a remarkable impact on being not at all satisfied with life. The meaning of the crisis dummy coefficient is that the crisis increased the probability of being not at all satisfied with life by 0.461 percentage points. Furthermore, divorce rate also trends positively with unsatisfaction. One percentage point increase of the crude divorce rate raises the probability of being not at all satisfied with life by 0.635 percentage points. Besides, if employment rate increases by one percentage point the probability of replying not at all satisfied with life declines by 0.166 percentage points. Crude marriage rate decreases unsatisfaction with life. Model 5 and 6 suggests that one percentage point increase of the crude marriage rate lowers the probability of being not at all satisfied with life by around 0.77 to 0.8 percentage points. Besides, EU accession also decreased unsatisfaction. According to model 6, accessing the European Union reduced the probability of replying not at all satisfied by 2.46 percentage points.

We tested several other socioeconomic variables as well, but none of them were significant. These variables were life expectancy at the age of 65, the level of agricultural labour, education participation and euro adaptation.

DOI: 10.14267/phd.2014001

6.4 First difference panel method

First difference models can deal with the country specific trends instead of only estimating a country specific constant like fixed effect models. Although country specific trends are similar for most of the countries (stagnating or slightly positive), but other countries trend in a decreasing way. This chapter shows those model estimations that manage this difficulty.

6.4.1 Estimations regressing life satisfaction

As the source of variation in LS is mostly between countries which can be explained mostly by country (cross section) fixed effects, we have to focus also on the within variation of the dependent variable. Furthermore, as there is no common trend in the LS data, but country specific trends exist, first difference models with fixed effects may give better results. Using the first difference of the dependent variable results in a dataset with a larger within variance and a much lower between variance (Table 15).

Table 15

ANOVA table of dependent variable d(LS).

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	26	0.001727	6.64E-05
Within	474	0.153618	0.000324
Total	500	0.155344	0.000311

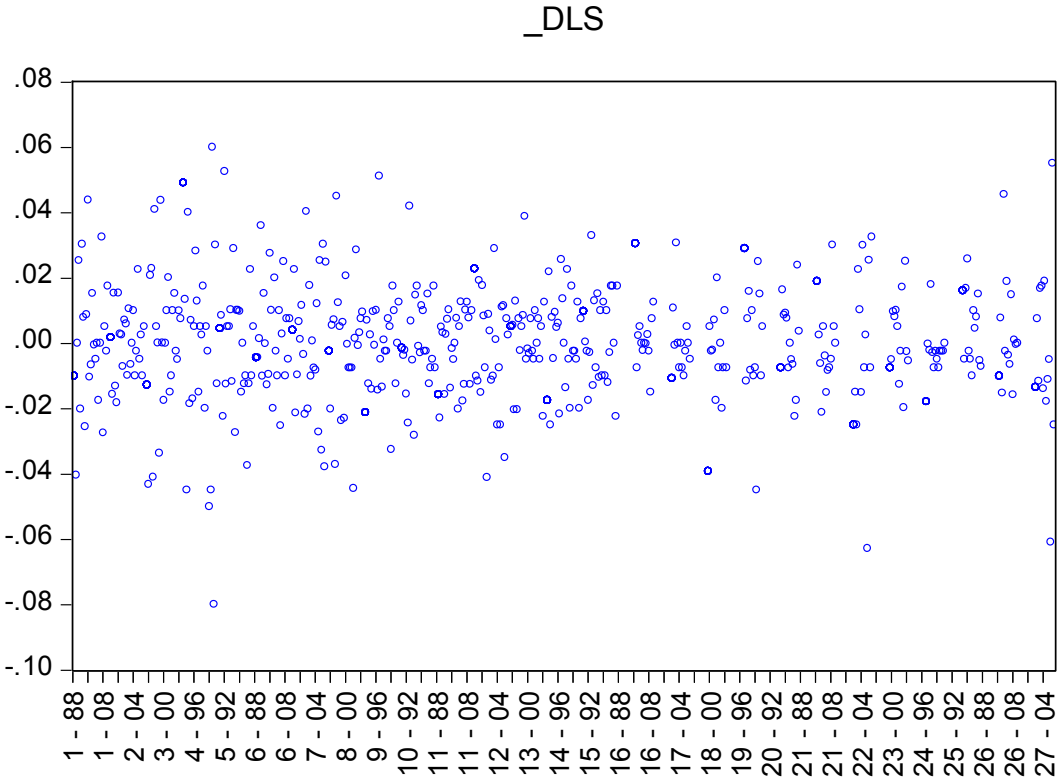
Source: own table (Eviews)

Using such method will improve our data. As a result of taking the first differences the country specific trends are removed from the series of the life satisfaction data. If we compare figure 14 with the clouds of figure 9, we can see the difference, because we are not able to draw the country clouds to the same graph as the country trends cannot be seen. This data is expected to give us more trustful results.

DOI: 10.14267/phd.2014001

Figure 15

The variation figure of dependent variable d(LS). The first number in the x-axis shows the code of the country, the second shows the year.



Source: own calculation (Eviews)

The first difference model will be useful as the country specific constants from the fixed effect will be lost, but the parameter of the country specific trends will remain. Thus we will use fixed effect models with cross section (country) and period (year) fixed effects and will take the difference of them to control for country specific unobserved variables and to deal with time specific common shocks. Table 16 summarizes the model estimations for the first difference of life satisfaction. To estimate standard errors we here also used the White period method (explained in 6.3). Models suggest that a one percentage point increase in emplyoment growth rate rises the probability of answering being satisfied with life by 0.13-0.14 percentage points. Furthermore a one percentage point change in divorce rate decreases the probability of answering being satisfied with life by 0.73 percentage points. Yet, if we change the divorce rate to crude marriage rate, its estimated coefficient is larger. According to model 2, if marriage rate increases by one percentage point, the probability of replying being satisfied with life rises by 1.59 percentage points.

DOI: 10.14267/phd.2014001

Model 3 suggests that real GDP growth rate doesn't have a significant effect on life satisfaction in Europe. Yet, inflation seems to have a significant effect on life satsifaction. Surprisingly its relative effect is very similar to that of emplyoment growth rate. Model 3 and model 4 showed that a one percentage point rise in inflation decreases the probability of being satisfied with life by 0.12-0.13 percentage points. For economic development and competitiveness and even for education gross expenditure on research and development (GERD) in share of GDP seems to be the best indicator. As not only GDP growth rate, but also education participation were not significant in regressions we believe that the interpretation of GERD is important. Model 5 and 6 suggested that an extra percentage point expenditure on research and development rises the probability of being satisfied with life by 2.14-2.21 percentage points.

Table 16

Fixed effect difference models regressing life satisfaction (d(LS)).

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
C	-0.00028	-0.01599	0.00329	0.001787	-0.00082	0.001384
	0.0986	*0.0122*	*0.0102*	*0.113*	*0.0023*	*0.2851*
EMP_C	0.001444	0.001352	0.001326	0.001395	0.001281	0.001406
	0.0176	*0.0123*	*0.0297*	*0.0196*	*0.0726*	*0.0516*
D(DIVORCE)	-0.00727					
	0.0614					
DMARRIAGE(-1)		0.01589				
		0.0133				
RGDP(-1)			-0.00035			
			0.2922			
INF			-0.00139	-0.00129		-0.001386
			0.0848	*0.0686*		*0.0948*
D(GERD)					0.022141	0.021379
					0.031	*0.0351*
Fixed effects	**CS, Per**	**CS, Per**	**CS, Per**	**CS, Per**	**CS, Per**	**CS, Per**
R-squared	0.229427	0.212543	0.240678	0.227549	0.26596	0.271729
Prob(F-statistic)	0.0000	0.000009	0.0000	0.0000	0.000001	0.000001
Total panel observations:	489	448	441	486	387	380

* For fixed effects CS stands for cross section (country) and per stands for period (years).

In contrast to previous findings and researches we did not find a significant statistical correlation between life satisfaction and a set of other objective variables.

DOI: 10.14267/phd.2014001

Surprisingly above the real GDP growth rate the per capita pps GDP level in share of the EU average was neither significant. Nor the change in the crime rate was. Despite the results of value surveys we did not find a significant correlation between life satisfaction and the change of life expectancy, and also did not find a statistical correlation bewteen life satisfaction and the chane in the number of health years. Finally we did not find a significant correlation between life satisfaction and IMF dummy.

6.4.2. Estimations for being very satisfied and not at all satisfied with life

We used the same type of econometric models to explain being very satisfied with life and being not at all satisfied with life. Using the same variation analysis after calculating the first differences affected these variables similarly like it did life satisfaction interpreted in the previous subchapter. The country specific trends disappeared, and countries cannot be recognized on the variation figure of dependent variable VS.

Furthermore table 17 shows that in contrast to the results of the ANOVA tables for VS in chapter 6.1.1. the within variation increased from that 5.27 percentages to 97.41 percentages. This means that almost all the variation is now within the countries.

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Figure 15

The variation figure of dependent variable d(VS). The first number in the x-axis shows the code of the country, the second shows the year.

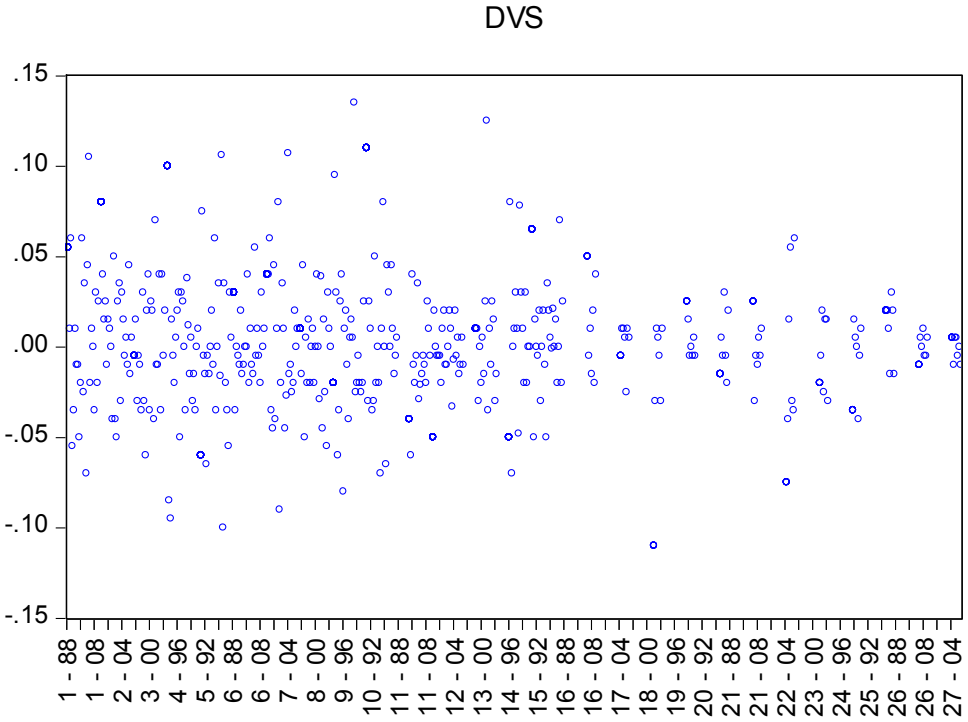

Table 17

ANOVA table of the first difference of dependent variable d(VS).

Method	df	Value	Probability
Anova F-test	(26, 381)	0.389991	0.9974
Welch F-test*	(26, 96.2225)	0.476938	0.9833

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	26	0.012230	0.000470
Within	381	0.459540	0.001206
Total	407	0.471770	0.001159

Table 18 summarizes the model estimation results of regressing being very satisfied with life. According to model 1, a one percentage point increase in the employment growth rate results in a 0.134 percentage points rise in the probability

DOI: 10.14267/phd.2014001

of being very satisfied with life (other models estimated a somewhat larger effect for the employment rate). This was the only model where we found a significant statistical correlation between being very satisfied life and real GDP growth rate (on a 10 percent significance level). However, the effect of real GDP growth rate was relatively little. An extra percentage point of real GDP growth rate increases the probability of answering being satisfied with life by only 0.098 percentage points. Inflation rate has no statistically significant effect on being very satisfied with life.

Table 18

Fixed effect difference models regressing being very satisfied with life d(VS).

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
C	-0.002123	-0.000454	0.001367	0.001719	0.002186
	0.093	*0.8927*	*0*	*0.0064*	*0.0026*
EMP_C	0.001343	0.001659	0.001911	0.00216	0.001734
	0.0494	*0.0346*	*0.0397*	*0.0625*	*0.0601*
PPS_GDP					0.000871
					0.09
DMARRIAGE			0.006312	0.007404	
			0.0396	*0.1128*	
RGDP	0.000981				
	0.0617				
INF		0.000163			
		0.9408			
D(WORKING_YEARS)				0.008548	
				0.0642	
D(EDU)					0.025256
					0.8534
Fixed effects	**CS., Per.**	**CS., Per.**	**CS., Per.**	**CS., Per.**	**CS., Per.**
R-squared	0.256866	0.232872	0.245944	0.37304	0.367306
Prob(F-statistic)	0.000016	0.000044	0.000032	0.000003	0.000003
Total panel observations:	369	396	372	218	220

* For fixed effects CS stands for cross section (country) and per stands for period (years).

However, the change in the crude marriage rate and the change in the number of working years had a significant effect on being very satisfied with life. One percentage point increase the crude marriage rate increases the probability of being

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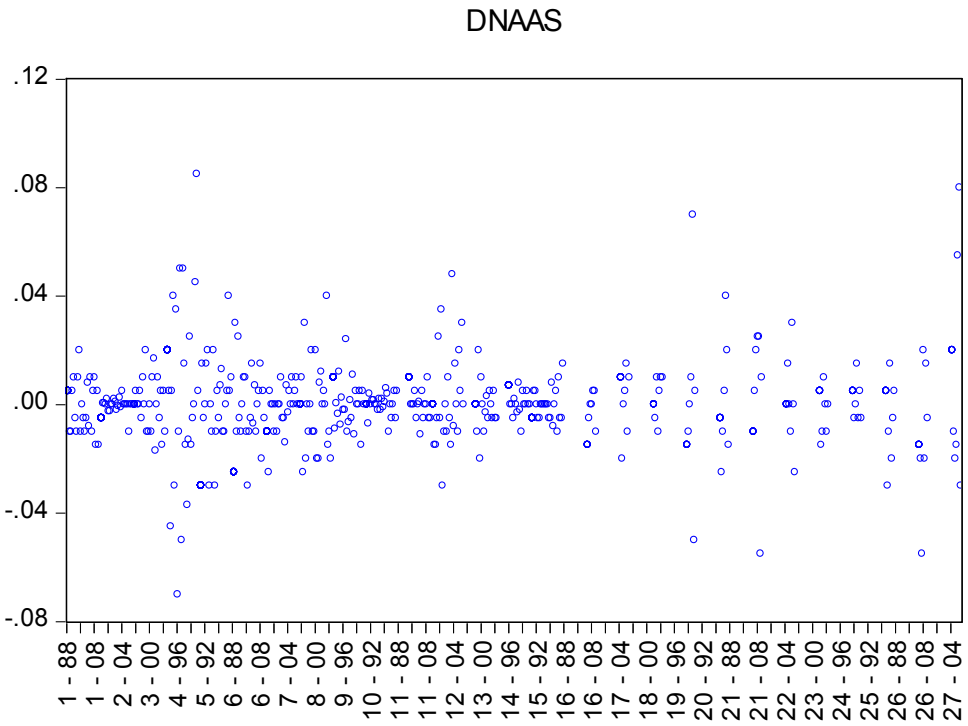
very satisfied with life by 0.63 percentage points. Including the (change in the) number of working years turns marriage insignificant. Models suggest that a one percentage point increase in the number of working years (approximately 4 months) increases the probability of being very satisfied with life by 0.85 percentage points. This result together with the effect of employment contradicts many assumptions of classic economics where work is an effort that decreases utility. Finally, model 6 suggests that a one percentage point increase in per capita pps GDP level compared to the EU average raises the probability of being very satisfied with life by 0.09 percentage points.

Figure 16

The variation figure of the first difference of dependent variable not at all satisfied with life d(NAAS). The first number in the x-axis shows the code of the country, the second shows the year.



Using the method for being not at all satisfied with life also improves our data. Taking the first difference of dependent variable being not at all satisfied with life will increase the within variation to 98.4 percentage.

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Table 19

ANOVA table of the first difference of dependent variable not at all satisfied with life d(NAAS).

Method	df	Value	Probability
Anova F-test	(26, 381)	0.430185	0.9942
Welch F-test*	(26, 91.9753)	0.270821	0.9998

*Test allows for unequal cell variances

Analysis of Variance

Source of Variation	df	Sum of Sq.	Mean Sq.
Between	26	0.003005	0.000116
Within	381	0.102367	0.000269
Total	407	0.105372	0.000259

According to model estimations (see table 20) we found that the change of the employment rate has a significant negative effect on being not at all satisfied with life. In other words a one percentage point decline in the employment growth rate increases the probability of being not at all satisfied with life by 0.15 percentage points. Real GDP growth rate also has a negative effect and its effect is somewhat larger.

A one percentage point increase in the real GDP growth rate decreases the probability of answering being not at all satisfied with life by 0.17-0.18 percentage points. According to model 4, a one percentage point increase in the crude divorce rate decreases the probability of being not at all satisfied with life. The sign of the divorce rate may contradict to our assumption. However, the significance is relatively low (in model three it was not significant on the standard levels). We did not find a statistically significant correlation between being not at all satisfied with life and education participation, nor between the change in the number of working years and being not at all satisfied with life.

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Table 20

Fixed effect difference models regressing being not at all satisfied with life d(NAAS).

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
C	0.004474	0.003392	0.004362	0.000578	0.005535
	0.0003	*0.0063*	*0.0011*	*0*	*0.0002*
EMP_C	-0.001481	-0.001545	-0.001497	-0.002037	
	0.0349	*0.0353*	*0.0274*	*0.0096*	
D(DIVORCE)			-0.002931	-0.008712	
			0.5953	*0.0521*	
RGDP	-0.001732	-0.00182	-0.001669		-0.002437
	0.0006	*0.0016*	*0.0033*		*0.0002*
INF		0.00087			
		0.3919			
D(WORKING_YEARS)					0.000208
					0.9457
D(EDU)					-0.030297
					0.6782
Fixed effects	**CS., Per.**	**CS., Per.**	**CS., Per.**	**CS., Per.**	**CS., Per.**
R-squared	0.215255	0.217126	0.216728	0.166706	0.288607
Prob(F-statistic)	0.001797	0.002062	0.002818	0.052847	0.002251
Total panel observations:	369	369	364	396	220

DOI: 10.14267/phd.2014001

6.5 Cross section analysis

In this part we will show a cross section model estimation to explain those country effects that were controlled in the fixed country effect models. As life satisfaction variance is relatively large among the analyzed European countries, cross section models can give further information about the country specific differences. Country specific constants in fixed effect models differ strongly and thus cross section analysis may explain somewhat of these differences. The problem with fixed effect estimations is that models cannot deal with the level differences in the beginning period. As is chapter 4 we summarized many economic variable has a strong effect on life satisfaction (and on happiness). For instance the level of life satisfaction and income can be composed on a logarithmic function.

Table 21

Correlation between LS and the explanatory variables

Variables	Correlation
HDI	80,32%
Divorce	7,82%
EMP rate	66,06%
Healthy	12,48%
INF	-49,96%
Life_ex	56,58%
Marriage	5,92%
Pps_gdp	72,44%
Rgdp	-4,14%

Source: own table based on Eurostat and Eurobarometer

DOI: 10.14267/phd.2014001

The cross section models are based on the same dataset. We used the average levels of the data to regress the life satisfaction. Correlation among the dependent and the independent variables can give a hint which socioeconomic indicators may be necessary to be included in our regressions. As table 21 portrays the correlations between LS and HDI, LS and the employment rate, LS and life expectancy, and LS and per capita pps GDP in percentage of the EU average are the strongest ones. Besides, LS is a decreasing function of inflation rates. Despite the fact that in model estimations marriage and divorce rates were statistically significant over time, the correlations between LS and these explanatory variables in a cross section are very low.

Table 22

Results of the cross section regressions

Variables	**Mod. 1**	**Mod. 2**	**Mod. 3**	**Mod. 4**	**Mod. 5**	**Mod. 6**	**Mod. 7**	**Mod. 8**
C	0.1925	0.1657	0.2205	0.2528	0.2282	-	-	-
	0.172	*0.274*	*0.1409*	*0.0279*	*0.034*			
INF	-0.0013	-0.0013	-0.0013	-0.0009	-	-	-0.0007	-0.0007
	0.0185	*0.0205*	*0.0177*	*0.0451*			*0.0881*	*0.0757*
EMP	0.0086	0.00882	0.00883	0.00615	0.00454	0.00733	0.00941	0.00491
	0.0005	*0.0005*	*0.0005*	*0.002*	*0.234*	*0*	*0*	*0.0079*
RGDP	-	0.00548	-	-	-	-	-	-
		0.603						
Marriage	-	-	-0.0076	-	-	-	-	-
			0.5093					
PPS_GDP	-	-	-	0.00091	0.00303	0.00083	0.00123	0.00072
				0.0005	*0.0007*	*0.0033*	*0.0007*	*0.004*
PPS_GDP^2	-	-	-	-	-7E-06			
					0.0157			
EU12_DUM	-	-	-	-	-	-	0.04277	-
							0.099	
LIFE_EX	-	-	-	-	-	0.01224	-	-
						0.0589		
HDI	-	-	-	-	-	-	-	0.4324
								0.0039
Observations	27	27	27	27	27	27	27	27
R-squared	0.55482	0.56014	0.56335	0.74065	0.760787	0.6983	0.71513	0.77769

DOI: 10.14267/phd.2014001

Table 22 summarizes the most important results of model estimations we found using cross section averages for the EU27. In this case we have only 27 ‘observations’, thus we could include maximum four variables in each OLS regressions. It has to be noted that due to the relative low number of observations results should be taken cautiously. We found that on average when inflation rises by one percentage point the probability of answering being satisfied with life declines by 0.13 percentage points. Meanwhile the effect of a one percentage point increase of employment rate raises the probability of replying being satisfied with life by 0.86 percentage points. Thus, in the long run in a monetary policy relevant comparison the same change in employment is 6.8 times more relevant on life satisfaction than that of inflation. The key question for monetary policy decision making is the trade-off between the two variables. Assuming a Phillips curve, what is the inflation cost of increasing employment by one percentage point? According to the cross section model estimations employment growth increases life satisfaction until its inflation cost is larger than 6.8 times. This is only a theoretical conclusion as in practice those countries have higher employment rate, which have lower inflation.

Model 2 suggests that the effect of the average real GDP growth rate on life satisfaction is statistically not significant. Yet, on average per capita pps GDP compared to the EU average has a significant effect. A one percentage point increase in per capita pps GDP increases the probability of being satisfied with life by 0.09 percentage points. However, including the square of pps per capita GDP as a variable, its effect on life satisfaction increases. Due to the mathematic representation of regression 5, one percentage point change in pps per capita GDP will have different effect on life satisfaction based on the level of it. Calculating with a 60 percentage employment rate and a per capita pps GDP average which is 60 percent of the EU27 average, an increase in pps per capita GDP by one percentage point raises the probability of being satisfied with life by 0.219 percentage points. Yet, the same one percentage point increase in per capita pps GDP at the level of 90 percent in share of the EU average results in an only 0.177 percentage points rise in the probability of being satisfied with life. This method is in line with the findings of literature (see chapter 4) about income and subjective well-being and the decreasing marginal utility concept.

DOI: 10.14267/phd.2014001

Moreover, the effect of marriage on life satisfaction is not significant (see Model 3). In contrast with the fixed effect models (see appendix) cross section estimations found that life expectancy at the age of 65 years tend to have a positive effect on life satisfaction. If life expectancy increases by one year, the probability of answering being satisfied with life rises by 1.2 percentage points. Finally, the new member states are on average more satisfied with their life if we control for the per capita GDP levels, employment rates and inflation averages. On average being a new member state raises the probability of being satisfied with life by 4.27 percentage points. (The coefficient is only significant at the 10 percentage level.) It is important to add that the life satisfaction of Cyprus and Malta are well above the EU12 average. If we omit Cyprus and Malta from this dummy in the same regression, the coefficient for the dummy will be only 0.0103. It means that being a new member state (but not Cyprus and Malta) increases the probability of being satisfied with life by 1.03 percentage points (if we control for the per capita GDP levels, employment rates and inflation averages).

DOI: 10.14267/phd.2014001

6.6 Backward testing of subjective data

In this chapter we focus on the difference between imagined preferences and reported life satisfaction levels. We decided to choose a relatively simple method to test the differences.

The 69th standard Eurobarometer survey (2008) contained questions about human preferences on happiness.[53] European Union citizens were asked which values had they associated the most important in connection with their idea of happiness. According to the answers of citizens they had a very clear preference on happiness. Health the most important value (73%), well ahead of love (44%), followed by work (37%), peace (35%) and money (32%). We decided to avoid peace from this framework due to two arguments. Firstly, the analyzed countries were not dangered by wars, except terror actions during the period we focused on. Secondly, peace is a relevant value but not directly related to socioeconomic analysis. Thus, we normalized the other four most important values (health, love, work, money) and by choosing similar indicators (life expectancy, marriage rate, employment, per capita pps GDP in share of the EU average) tried to test the answers backwards to win an estimated life satisfaction level and compare these results with the general survey based life satisfaction levels of Eurobarometer.

Tale 21 portrays the survey based life satisfaction averages (LS) for the EU27, the estimated life satisfaction levels and their differences. LS stands for the satisfied with life country averages for the given period (averages of the reported Eurobarometer levels). Estimated LS was calculated by the country weights of the four values being the most important for happiness. Using these weights we used the average (over time) of the four chosen indicators (life expectancy, marriage rate, employment, per capita pps GDP in share of the EU average). The results were recalculated on a 0 to 1 scale based on the methodology of the HDI calculation.

$$ILS = \frac{\max(X_j) - X_j}{\max(X_j) - \min(X_j)}$$

[53] Due to the timing of the survey (fieldwork between April-May 2008) we were lucky, as these values could have been effected by the media due to the immediate effects of the crisis.

DOI: 10.14267/phd.2014001

We took the average of these recalculated life satisfaction indices and multiplied the estimated results with a constant to get the same average of the new estimated life satisfaction indices as LS had. After this multiplication we got the estimated LS percentages. In table 23 'Estimated LS' evaluates the percentage of people who should be satisfied with their life based on the four most important socioeconomic variables and on the country value weights.

Table 23

Life satisfaction averages and estimated life satisfactions

	LS	Estimated LS	Difference	WB_EU	WB_EU Difference
BE	78.00%	83.21%	5.21%	75.09%	-2.92%
BG	53.82%	62.25%	8.43%	47.36%	-6.46%
CZ	72.94%	67.95%	-4.99%	63.41%	-9.53%
DK	90.33%	55.10%	-35.22%	83.11%	-7.22%
DE	74.47%	78.25%	3.78%	77.07%	2.60%
EE	69.45%	64.35%	-5.11%	57.60%	-11.86%
EL	64.41%	71.03%	6.62%	63.94%	-0.47%
ES	74.39%	83.47%	9.08%	68.97%	-5.41%
FR	72.99%	81.69%	8.69%	72.64%	-0.35%
IE	80.67%	95.62%	14.95%	81.93%	1.27%
IT	70.11%	84.44%	14.32%	69.52%	-0.60%
CY	78.85%	61.49%	-17.37%	69.49%	-9.36%
LV	64.96%	65.45%	0.49%	52.68%	-12.29%
LT	64.74%	71.02%	6.28%	54.13%	-10.61%
LU	83.45%	133.69%	50.24%	120.84%	37.39%
HU	60.35%	69.16%	8.80%	53.29%	-7.07%
MT	76.21%	59.73%	-16.48%	57.71%	-18.51%
NL	85.21%	71.17%	-14.04%	86.27%	1.07%
AT	76.67%	80.30%	3.63%	78.23%	1.57%
PL	71.11%	58.71%	-12.40%	50.52%	-20.59%
PT	63.19%	80.38%	17.20%	61.73%	-1.46%
RO	59.03%	56.79%	-2.24%	48.67%	-10.36%
SI	77.33%	62.35%	-14.97%	64.04%	-13.29%
SK	68.93%	65.47%	-3.46%	54.33%	-14.59%
FI	80.51%	64.55%	-15.96%	74.11%	-6.41%
SE	84.62%	66.62%	-18.00%	78.25%	-6.36%
UK	79.73%	77.31%	-2.43%	76.59%	-3.15%

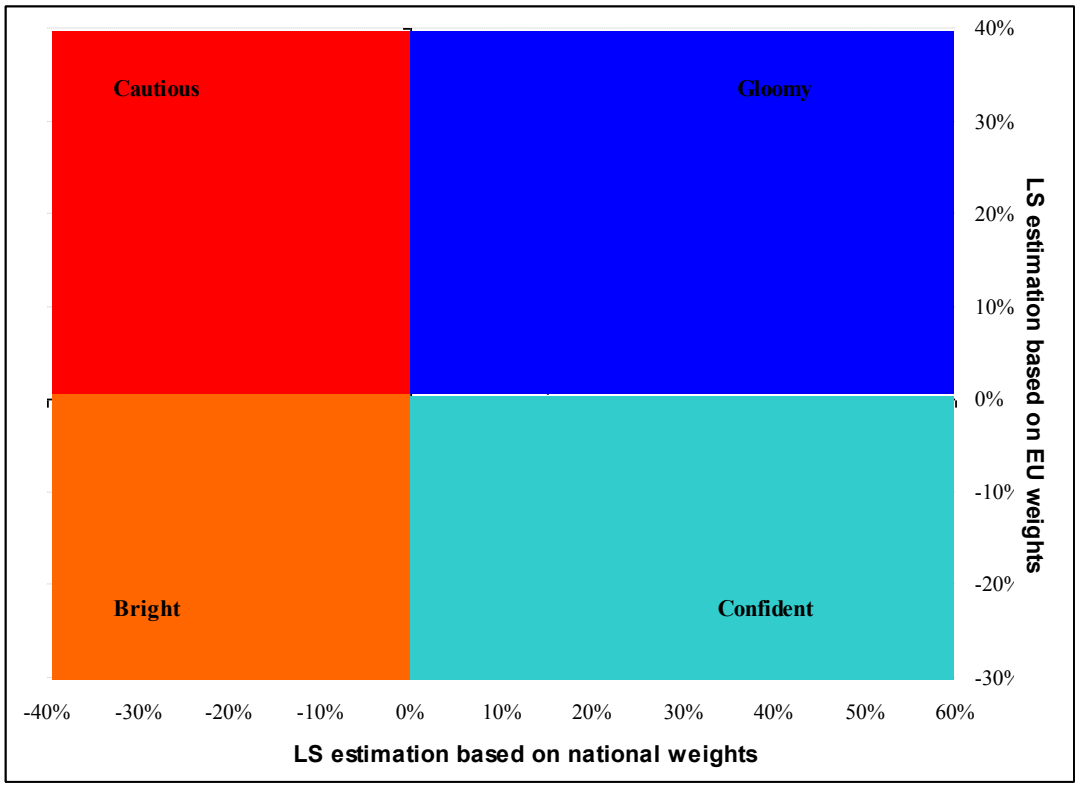
Source: Own calculation based on Eurobarometer and Eurostat

DOI: 10.14267/phd.2014001

The other column (WB_EU) represents a similar calculation method, but results came from using constant weights. For the four values (health, money, love, work) we used the average weights of the whole European Union. The two estimations differ strongly. In some cases even the sign of the differences change. If we compare these calculated life satisfactions with the Eurobarometer survey replies, it is easy to realize the deviation. Table 23 also contains this deviation from the Eurobarometer surveys. Based on these deviations we classified all the 27 European Union member states into four groups.

Figure 14

Classification of countries based on the differences of the two estimated life satisfaction indices from Eurobarometer life satisfactions



The classification of figure 14 is based on the LS estimations comparison to Eurobarometer. If the difference[54] is positive that means the estimation is larger than the reported Eurobarometer survey value. This means that based on the chose

[54] Difference = Estimated LS value – Eurobarometer LS value.

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weights and socioeconomic indicators the country should have reported a higher life satisfaction level. If the difference was negative, it means that the citizens of the given country are happier than they should be based on the value weights and the values of indicators. The four groups are the following based on the relative positions.

The largest country group is for 'bright' countries. A country is in the group of 'brights' if the differences are negative for national value weight estimations and EU constant weight estimations as well. Denmark, Malta, Cyprus, Poland and Slovenia are the most optimistic countries from this group. In these 12 countries reported life satisfaction should be lower by using not only the national weights on values, but also by using constant EU average weights.

The second largest country group contains 'confident' countries. We called a country confident if its national weight based LS estimation is higher than the reported Eurobarometer LS value, and the EU weight based estimation of LS is lower than the Eurobarometer LS value. This means that using the common EU weights the citizens of such a country should be less satisfied with their life than the reported level, while based on their own weights they should be more satisfied than their reported Eurobarometer value. Baltic countries, Hungary and Spain are the most confident countries.

The third largest group covers 'gloomy' countries with four members. These countries should be more satisfied with their life calculating even with national value weights and with the EU constant value weights as well. Thus the reported subjective life satisfaction value (Eurobarometer) underestimates the level, which can be calculated by their socioeconomic indicators. Luxemburg is the only country, which has got an extremely high estimated life satisfaction level with both calculations. This can be attributed to its very high level of per capita pps GDP. The other three pessimistic countries are Austria, Germany and Ireland.

The group of 'cautious' countries has only one member. A country is cautious if its citizens should be more satisfied with their life based on EU value weights, but it should be less satisfied if we calculate with the national value weights. The only country in this group is the Netherlands.

DOI: 10.14267/phd.2014001

Based on the constant weights calculation most of the countries should have reported higher life satisfaction. Taking into account that such a simplifying estimation method can include large estimation mistakes (for instance omitting important variables), most European citizens make large ‘mistakes’ by subjective understanding of values that are important for their happiness, or at least they are not perfectly informed for an international comparison about their position.

DOI: 10.14267/phd.2014001

6.7 Monetary policy relevant preferences

Since the beginning of the current global financial crisis economic policy faces new changes. In Europe the debt sustainability, economic growth and employment/unemployment and the imperfection of the currency area makes the economic policy mix more problematic. From these problems we would like to focus on the classic monetary policy related question regarding employment and unemployment.

Understanding the impact of policies is the primary goal of applied research. Due to the lack of empirical evidence on utility and individual preferences it is problematic to evaluate policy measures. This is especially the case for monetary policy, which is strongly rule based. Monetary policy decision making relies on social utility functions (or social loss functions) as given goal functions for base rate decisions. Central banks of 27 countries use the strategy of inflation targeting and in these regimes they strive to achieve their primary objective, price stability. As Felcser and Lehmann (2012) argued the inflation targeting regime was successful in curbing inflation. One may ask at what cost could these central banks achieved their objective. Mankiw (1997) described the question "How costly is inflation?" as one major unsolved problems of economics. Furthermore, Lehmann (2012) summarized some experience of the social well-being benefit calculations of unconventional monetary policy tools and interventions. These DSGE model estimations also lack of empirical evidence about a utility or the social well-being function.

Applied research attempted to formulate monetary policy relevant preferences based on subjective well-being data. These papers usually focus on the subjective well-being cost of inflation and unemployment. Gandelman and Hernández-Murillo (2009) used the Gallup World Poll answers and the World Development Indicators database on inflation and unemployment (World Bank database) to estimate preferences. Besides Di Tella, MacCulloch and Oswald (2001) also estimated monetary policy relevant regressions to support decision making with formulating preferences on an optimal policy rule. Ruprah and Luengas (2011) used Latin American subjective well-being data and using fixed effect panel models they found that both unemployment and inflation reduce subjective well-being.

DOI: 10.14267/phd.2014001

However results in the literature were different. Di Tella et al (2001) estimated that the subjective well-being trade of between unemployment and inflation is around 2.33. This means that the same percentage point increase in unemployment rate has a greater effect on subjective well-being than that of inflation rate. According to Ruprah and Luengas (2011) the cost of inflation in terms of unemployment, is about one to eight. Blachflower (2007) also found that unemployment is more costly than inflation in terms of subjective well-being. According to his conclusion on the European Union, same levels increase in the unemployment rate decreases subjective well-being by almost 1.6 times as much as that that of the inflation rate. Yet, according to Gandelman and Hernández-Murillo (2009) the subjective well-being cost of inflation is 1.35 times larger than that of unemployment. It is also important to mention other type of findings related unemployment. Lucas, Clark and Diener (2004) found on a longitudinal data that those who experienced a longer period of unemployment did not return to their former level of life satisfaction. Such an effect was not proved in the literature for inflation. Blanchflower et al (2013) extended the previous findings by analyzing a longer time period and including more countries. They found that both unemployment and inflation decreased the level of happiness. Furthermore the effect of unemployment was two and a half time larger than that of the same percentage point change in the inflation rate.

Our model estimations focused on the relative costs of inflation, price level changes and employment (instead of unemployment). We decided to use employment as it varies more and the national rules about unemployment differ too much. Our cross section analysis found that on average a one percentage point rise in inflation decreases the probability of answering being satisfied with life by 0.13 percentage points. Meanwhile the effect of a one percentage point increase of employment rate raises the probability of replying being satisfied with life by 0.86 percentage points. Thus, in the long run in a monetary policy relevant comparison the same change in employment is 6.8 times more relevant on life satisfaction than that of inflation. Using fixed effect panel model estimations for testing satisfied with life employment and inflation did not have a statistically significant effect on life satisfaction. However, regressing being not at all satisfied with life we found that a one percentage point increase in inflation raises the probability of being not at all

DOI: 10.14267/phd.2014001

satisfied with life by 0.309 percentage points, while that of employment rate decreases the probability of being not at all satisfied by only 0.193 percentage points.

We got much better results when we used first difference fixed effect panel models for the whole EU27. These estimations suggested that the effect of employment was in absolute value relatively similar to that of inflation. Although, most models suggested that the positive effect of employment was somewhat larger than the coefficient of inflation in absolute value. One percentage point increase in the employment growth rate resulted in a 0.13-0.14 percentage point's increase in the probability of being satisfied with life. Meanwhile models suggested that a one percentage point increase in inflation decreases the probability of answering being satisfied with life by 0.13-0.14 percentage points.

DOI: 10.14267/phd.2014001

6.8 Summary of the estimation results

Choosing between models and explaining the results is not trivial. However, results of the fixed effect panel models, first difference models and the cross section analysis are used for approving or rejecting the four hypotheses we chose.

1. EU accession in 2004 and 2007 has not increased the life satisfaction on average in new EU member states.

According to the estimations using the data of EU12 we can approve this hypothesis. We found that EU accession (or membership) do not have any statistically significant effect on life satisfaction in the new member states.

2. Adopting the euro increased the life satisfaction in the participating countries.

According to the regression for the whole data set (EU 27) we found that adopting the euro decreased the probability of being satisfied with life by 0.472 percentage points (see Appendix) or in other models it had no significant effect on life satisfaction. However, euro adaptation increased the probability of being very satisfied with life. We have to reject hypothesis number 2.

3. Real GDP growth has a significant effect on life satisfaction in the new member states (EU12).

According to model estimations real GDP growth has a statistically significant effect on life satisfaction in the new member states. A one percentage point increase in real GDP growth rate raises the probability of being satisfied with life by approximately 0.09 to 0.12 percentage points in EU12. We have to approve the hypothesis, but our results show a less strong effect than other findings did in the literature (see chapter 4).

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4. Employment in absolute value is more relevant for life satisfaction than inflation.

According to cross section analysis, we found that on average a one percentage point rise in inflation decreases the probability of answering being satisfied with life by 0.13 percentage points. Meanwhile the effect of a one percentage point increase of employment rate raises the probability of replying being satisfied with life by 0.86 percentage points. Thus, in the long run in a monetary policy relevant comparison, the same change in employment is 6.8 times more relevant on life satisfaction than that of inflation. Using fixed effect first difference panel model estimations the positive effect of a one percentage point increase of the employment rate has a relatively similar effect on life satisfaction that the same level increase of inflation has with a different sign. As we got one model estimation in which the effect of inflation was larger than that of employment we cannot decide about the hypothesis without doubts. However, most of the model estimations suggest that employment in absolute value has a larger effect on life satisfaction than inflation.

Besides our main hypothesis, first difference models suggested that real GDP growth has not got a significant positive effect on life satisfaction within the EU 27. Participation in education also did not have a significant effect on life satisfaction in the whole EU.

Fixed effect models suggested that IMF programmes decreased life satisfaction remarkably. The number of working years also trends negatively with life satisfaction.

However, life expectancy at the age of 65 increases the probability of being very satisfied with life within the whole EU27. Crude divorce rate had a strong negative effect on being very satisfied with life. Euro adaptation increased the probability of being very satisfied with life.

Moreover, real GDP growth rate decreased the probability of being not at all satisfied with life, while inflation increased it. In absolute values the effect of

DOI: 10.14267/phd.2014001

inflation was larger. Divorce rate increased the probability of being not at all satisfied with life, while marriages decreased it.

DOI: 10.14267/phd.2014001

7. Conclusion

7.1 The summary of the most relevant conclusions of the dissertation

Our dissertation focused on a relatively little part of the well-being problem of social sciences, on subjective well-being. This tool is a relatively new one for economists and it can be used for several types of analysis. We tried to summarize some of the most interesting findings and attempted to give some new application of the life satisfaction dataset. We believe subjective well-being is a great tool to show some limitations of standard economics.

Neoclassical economics assumes that economics is mostly about material values. Neoclassic models do not express income as a direct goal, but these models assume that individual utility maximization comes from maximizing consumption. It also assumes that higher opulence generates higher utility and higher well-being level. The conclusion is that the meaning of life is to become rich. We have to understand that human behavior is more complex as people's utility or happiness is affected by more other factors. A significant problem with the neoclassical approach is that they assumed a utility function as a goal function, without understanding human motives. Basically, neoclassical models are not maximizing human utility but only consumption utility. The problem is that consumption does not cover human well-being as a whole. On the other hand this mentality resulted in the economic growth doctrine and thus neoclassical economists imagine increasing human well being only in material enrichment. The greatest scholars of all time previously (for instance Adam Smith or Keynes) explained that economic prosperity does not trivially mean happiness. Furthermore, Smith (1776) noted that human happiness is more than material opulence. Despite enlightened scholars' thoughts, today's standard economics is only based on material well-being.

To understand people's mind, feelings and what they would call a good life, we have to study human happiness and well-being in details. CA and HA can give these essential and necessary knowledge to mainstream economics. As crime

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increased significantly and human relations degraded in the past 50 years in rich Western countries as Layard (2005a) explained, we have every reason to rethink our basic assumptions and the task of economics as a whole. We believe that instead of consumption maximization economics should deal with good human life.

Both approaches (CA and HA) and their applications have methodological weaknesses. It is important to conclude that despite methodology debates, both concepts have important meaning. If a society can be characterized with good objective indices (income, unemployment rate, Gini-coefficient, poverty rate, health or educational indices etc), it does not obviously mean that people feel good or they are satisfied with their life. On the other hand if people report high level of subjective well-being or the national average of reported well-being is high, it is also insufficient requirement to call the state of the society perfect or good. The two approaches can strengthen each other. Some countries like Switzerland and the United Kingdom are pioneers in the application of the happiness approach, which can complete usage of objective indices.

People's final goal is experiencing positive emotions and for many people happiness is an ultimate goal. As Frey (2010, p. 17.) drew up "that is not the case for other things we may want, such as job security, status, power, and especially money (income)." If we reject the application of subjective well-being, we can not collect direct feedback from the society. Yet, due to the imperfection of happiness measurement neither rejection nor building solely upon subjective data would be a good idea.

Besides, combining economics with psychology may be also useful to understand why rising income and higher level of living standards do not necessarily increase the level of individual's life-satisfaction. As Csikszentmihalyi (1990) argues in capitalist systems materialistic values have brought an erosion of social capital, which may explain stagnating happiness despite the material opulence. The tools of economics are insufficient to analyze changes in social life and to evaluate the human consequences of these transformations. Happiness approach may also give us the needed tools for such research. To sum up we believe that the happiness approach is relevant and useful for analysis.

Our dissertation aimed at explaining some details about the subjective well-being within the European Union. In the literature there is a strong contradiction

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regarding the life satisfaction effect of many socioeconomic indicators. We examined the data to get a clear view about the correlations within the European Union. We estimated models for the former European Union members and the new member states. Despite the fact that in CEE countries real income rose, the quality of life improved in terms of national averages, subjective well-being has not increased in all countries during the past 20 years. Tools of economics can't represent and model all the socioeconomic processes like the transition in CEE. To understand such developments better we think it is necessary to give insights into the major findings of subjective well-being research and also to show its consequences on economics. As transition resulted in not only economic growth but also unemployment, many people suffered a large life satisfaction loss. Standard economics does not deal with the negative effects of unemployment, however many findings show that it has a relatively strong effect on subjective well-being. This is only one example, but without studying these effects we cannot analyze the effects of a measure perfectly.

Findings about the effects of income, rivalry and adaptation on life satisfaction are crucial to understand how complex is the valuation of income by individuals. Furthermore the effect of macroeconomic variables and sociologic variables is also crucial for understanding life satisfaction and also socioeconomic developments.

This dissertation gave an attempt to decide the truth of the following hypothesis:

1. EU accession in 2004 and 2007 has not increased the life satisfaction on average in new EU member states.

According to the estimations using the data of EU12 we can approve this hypothesis. We found that EU accession (or membership) do not have any statistically significant effect on life satisfaction in the new member states.

2. Adopting the euro increased the life satisfaction in the participating countries.

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According to the regression for the whole data set (EU 27) we found that adopting the euro decreased the probability of being satisfied with life by 0.472 percentage points (see Appendix) or in other models it had no significant effect on life satisfaction. However, euro adaptation increased the probability of being very satisfied with life. We have to reject hypothesis number 2.

3. Real GDP growth has a significant effect on life satisfaction in the new member states (EU12).

According to model estimations showed real GDP growth has a statistically significant effect on life satisfaction in the new member states. A one percentage point increase in real GDP growth rate raises the probability of being satisfied with life by approximately 0.09 to 0.12 percentage points in EU12. We have to approve the hypothesis, but our results show a less strong effect than other findings did in the literature.

4. Employment in absolute value is more relevant for life satisfaction than inflation.

According to cross section analysis, we found that on average a one percentage point rise in inflation decreases the probability of answering being satisfied with life by 0.13 percentage points. Meanwhile the effect of a one percentage point increase of employment rate raises the probability of replying being satisfied with life by 0.86 percentage points. Thus, in the long run in a monetary policy relevant comparison, the same change in employment is 6.8 times more relevant on life satisfaction than that of inflation. Using fixed effect first difference panel model estimations the positive effect of a one percentage point increase of the employment rate has a relatively similar effect on life satisfaction that the same level increase of inflation has with a different sign. As we got one model estimation in which the effect of inflation was larger than that of employment we cannot decide about the hypothesis without doubts. However, most of the model estimations suggest that employment in absolute value has a larger effect on life satisfaction than inflation.

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Besides our main hypothesis, first difference models suggested that real GDP growth has not got a significant positive effect on life satisfaction within the EU 27. Participation in education also did not have a significant effect on life satisfaction in the whole EU. None of the models suggested that pps per capita GDP level had a significant effect on life satisfaction. This means that the European Union is not realized as a single region and citizens do not compare their income within the integration.

Fixed effect models suggested that IMF programmes decreased life satisfaction remarkably. The number of working years also trends negatively with life satisfaction.

However, life expectancy at the age of 65 increases the probability of being very satisfied with life within the whole EU27. Crude divorce rate had a strong negative effect on being very satisfied with life. Euro adaptation increased the probability of being very satisfied with life.

Moreover, real GDP growth rate decreased the probability of being not at all satisfied with life, while inflation increased it. In absolute values the effect of inflation was larger. Divorce rate increased the probability of being not at all satisfied with life, while marriages decreased it.

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7.2 Further research

We believe that our research covered some new finding for the EU27 and the differences between EU12 and EU15, but there are several questions that were not answered.

Firstly, the length of the period we covered was not very long and this suggests that the research and model estimations have to be retested in the future. Due to the relatively little number of observation years covered it may be useful to reestimate the regressions later.

Besides, as the current global crisis is still alive, deleveraging continues in the EU countries, every further year may give important notes and correlations among economic variables and subjective well-being. The current debt and banking crisis in the Eurozone seems to deepen. Since the closing of the model estimation Cyprus also asked for an international bail-out package. The effects of the deal may be more severe than that of the previous stand-by agreements.

Thirdly, due to the features of the possible data set we collected, we think further room exists for methodological maneuvers. Our models can be developed and thus the results might be replaced by more exact conclusions. Sometimes fixed effect models and first difference models gave controversial results. We tried to choose the best specifications, but several questions should be clarified. As there is a great variance of life satisfaction among EU countries, it would be useful to know more about the so called ‘country specific unobserved variables’. Despite the large number of used socioeconomic variables we believe that using other data may help reducing the variance that we could not explain with independent variables in the models.

Moreover, it would be exciting to study micro level panel data. In international comparisons the reference group is usually very misleading as the reference can be observed by individuals based on anecdotic information. A micro level analyses is based on somewhat more observable information, thus these datasets might be more efficient for such analysis.

Finally, we believe that a monetary policy relevant utility function (or loss function) could be estimated for the Euro area. Based on Gallup World Poll data two researchers of the Federal Reserve Bank of St. Louis, Gandelman and Hernández-

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Murillo (2009) built models to estimate the impact of inflation and unemployment on subjective well-being. Despite the fact that the dataset they used is not available for public, such a broad data exists for Europe as well. A larger dataset may give more trustworthy results and the larger number of observations is expected to give more room for using panel model estimations.

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DOI: 10.14267/phd.2014001

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http://hdr.undp.org/en/media/HDI_methodology.pdf

DOI: 10.14267/phd.2014001

Appendix 1

1. Kimball and Willis (2005) p. 24-31 attempted to formalize the relationship between utility any happiness. In this appendix we do not interpret the whole derivation, but some of their assumptions and the basic formulas.

Their assumptions were:
(1) rational expectations,
(2) perfect memory,
(3) happiness is the sum of baseline mood and elation,
(4) baseline mood is exogenous to the individual, and
(5) elation is a positive linear combination of lifetime utility innovations, as of time *t*, maximizing the expected present discounted value of affect is equivalent to maximizing lifetime utility.

Proof: Let elation e_t be given by

$$e_t = \sum_{\ell}^{n} a_{\ell}' \quad _{\ell}$$

then the expected present discounted value of happiness is

$$E_t\left\{\sum_{j=0}^{T-t}\beta^j A_{t+j}\right\} = E_t\left\{\sum_{j=0}^{T-t}\beta^j M_{t+j} + \sum_{j=0}^{T-t}\beta^j e_{t+j}\right\} = E_t\left\{\sum_{j=0}^{T-t}\beta^j M_{t+j} + \sum_{j=-n}^{T-t} b_{j,t}\iota_{t+j}\right\},$$

where

$$b_{j,t} = \sum_{\ell}^{n} \beta^{j+\ell}\alpha_{\ell}$$

as long as time *t* is at least *n* periods away from death, and somewhat less if *t* is less than *n* periods from death. Using the definition of lifetime utility innovations, perfect memory and the fact that the expectation of lifetime utility innovations

DOI: 10.14267/phd.2014001

conditional on previous information is zero, one can simplify the expected present discounted value of happiness further, to

$$E_t\left\{\sum_{j=0}^{T-t}\beta^j A_{t+j}\right\} = \sum_{j=0}^{T-t}\beta^j E_t M_{t+j} + b_{0,t}(v_t - E_{t-1}v_t) + \sum_{j=-n}^{-1} b_{j,t}\iota_{t+j}.$$

Given the exogeneity of baseline mood M and the perspective of time t, everything in this expression is fixed except for $b_{0,t}\, v_t$. Thus, maximizing the expected present discounted value of happiness is equivalent to maximizing $b_{0,t}\, v_t$, which in turn is equivalent to maximizing v_t.[55]

[55] Note that only exogeneity of the conditional *mean* of baseline mood is needed for this result. An ability to control the variance of baseline mood, with no effect on the mean, would still leave elation totally dominant in the expected present discounted value of happiness.

DOI: 10.14267/phd.2014001

Appendix 2

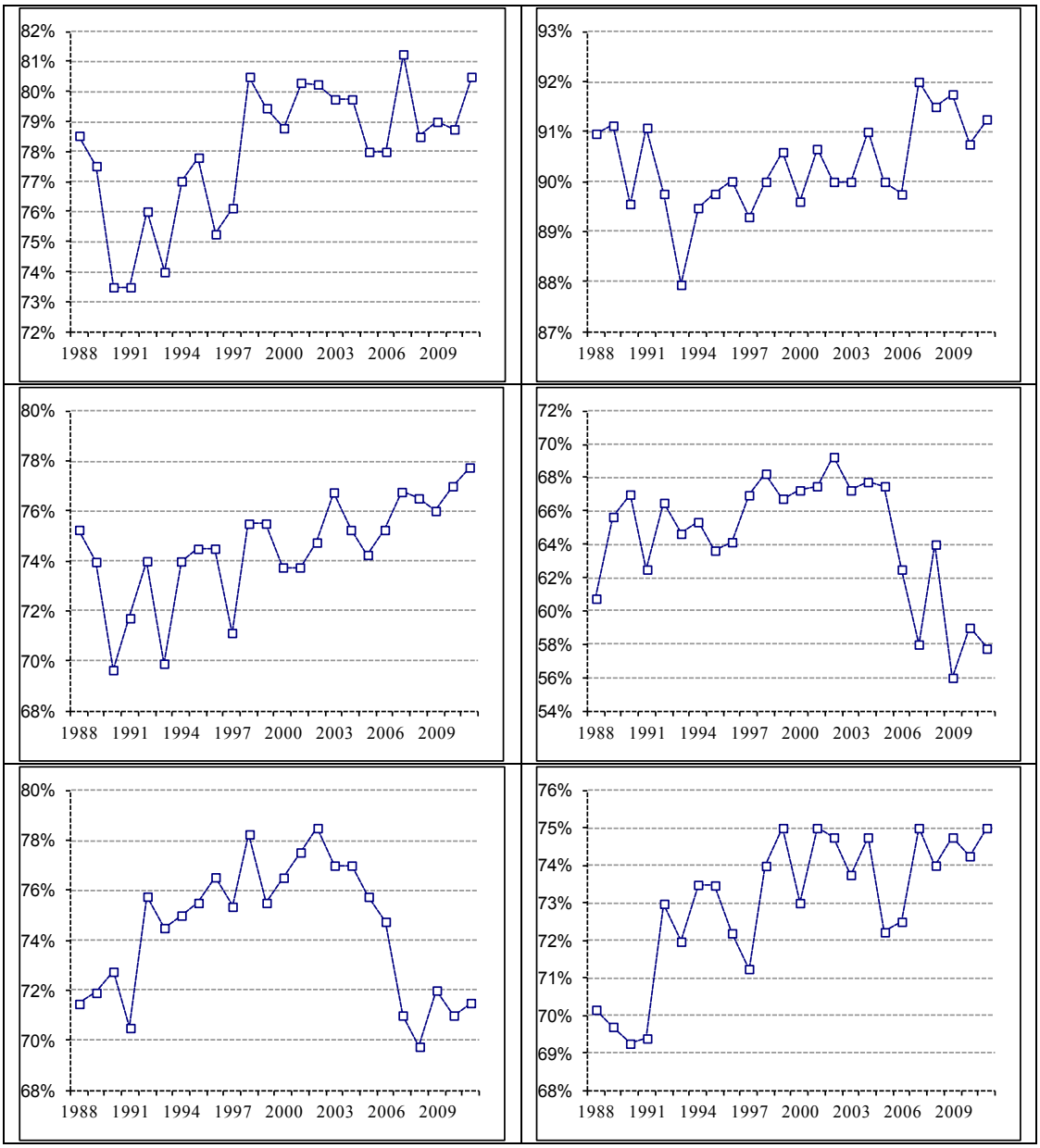
Trends of dependent variable LS in EU countries (Czech Republic, Estonia, Republi of Cyprus, Latvia, Lithuania, Hungary)

DOI: 10.14267/phd.2014001

Trends of dependent variable LS in EU countries (Malta, Poland, Sloveina, Slovakia, Bulgaria, Romania)

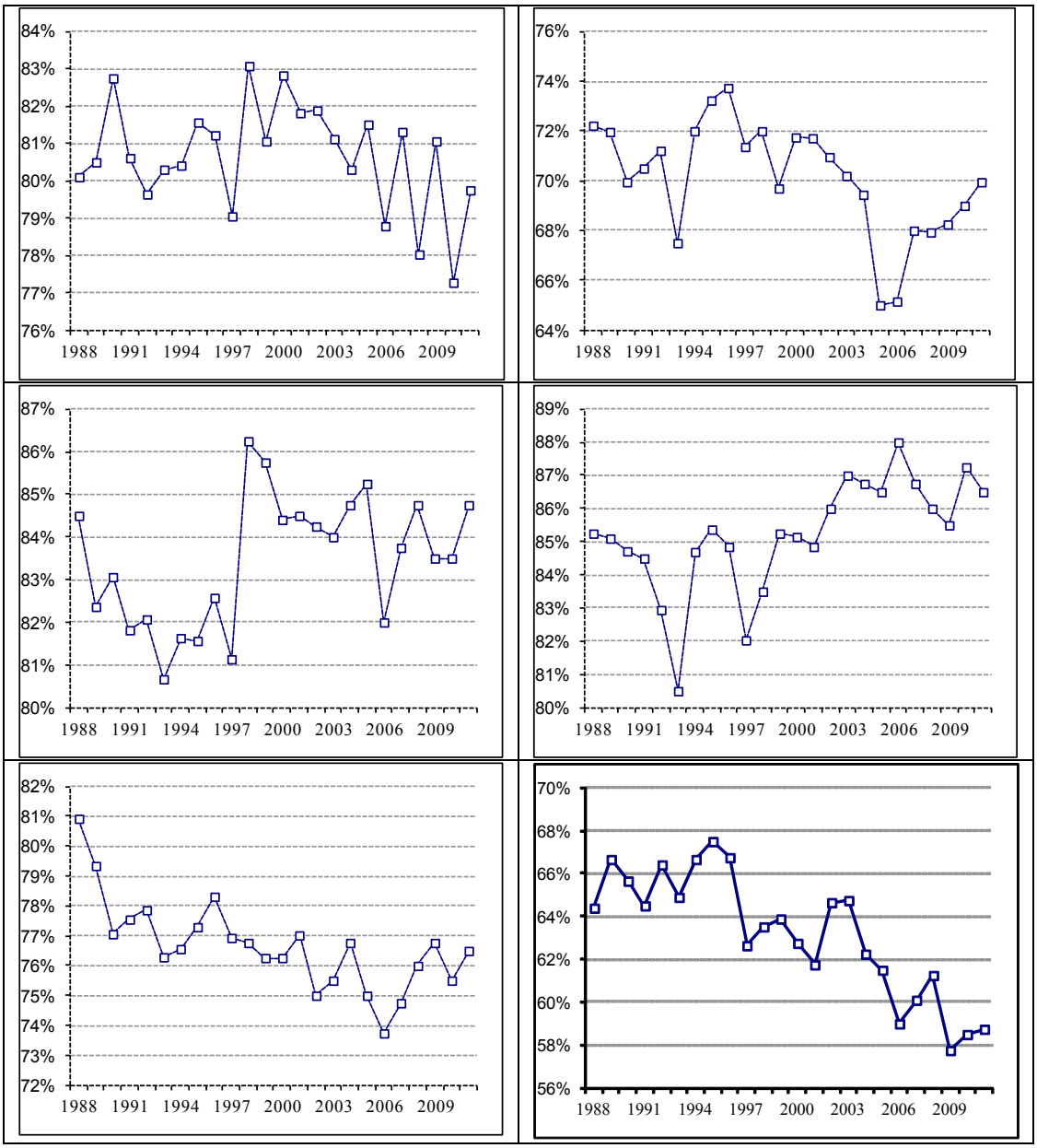
DOI: 10.14267/phd.2014001

Trends of dependent variable LS in EU countries (Belgium, Denmark, Germany, Greece, Spain, France)



DOI: 10.14267/phd.2014001

Trends of dependent variable LS in EU countries (Ireland, Italy, Luxemburg, The Netherlands, Austria, Portugal)



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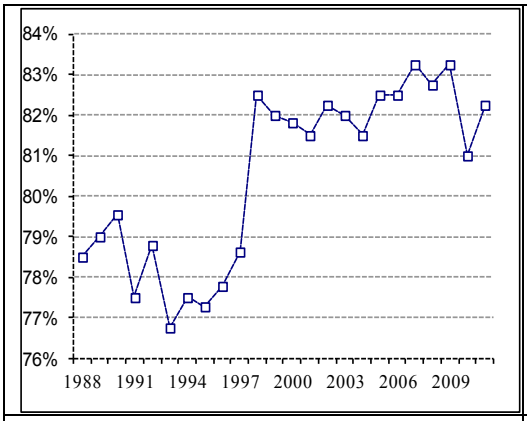
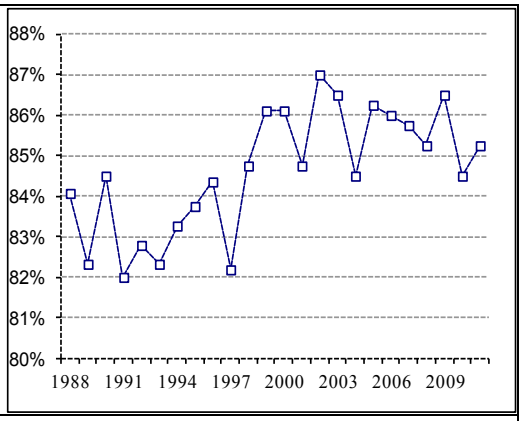
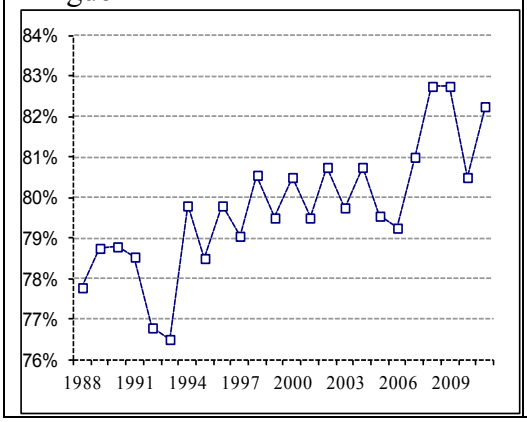
Trends of dependent variable LS in EU countries (Finnland, Sweden, UK)





United Kingdom



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Appendix 3

Table

One-way tabulation of dependent variable LS

Tabulation of LS
Sample: 1988 2011
Included observations: 528
Number of categories: 6

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0.4, 0.5)	1	0.19	1	0.19
[0.5, 0.6)	35	6.63	36	6.82
[0.6, 0.7)	122	23.11	158	29.92
[0.7, 0.8)	224	42.42	382	72.35
[0.8, 0.9)	130	24.62	512	96.97
[0.9, 1)	16	3.03	528	100.00
Total	528	100.00	528	100.00

Source: own table (Eviews table)

Table

One-way tabulation of dependent variable NAAS

Tabulation of NAAS
Sample: 1988 2011
Included observations: 435
Number of categories: 3

Value	Count	Percent	Cumulative Count	Cumulative Percent
[0, 0.1)	382	87.82	382	87.82
[0.1, 0.2)	41	9.43	423	97.24
[0.2, 0.3)	12	2.76	435	100.00
Total	435	100.00	435	100.00

Source: own table based on Eurobarometer (Eviews table)

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Appendix 4

Table

Pooled OLS regressions on LS (1)

Pooled OLS regressions on LS (2)

Variables	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
C	0.2724	0.2460	0.2425	-0.4188	-0.4176	-0.4199
	0.0010	*0.0040*	*0.0046*	*0.0000*	*0.0000*	*0.0000*
RGDP	-0.0029	-0.0031	-0.0033	-0.0001	-0.0002	-
	0.0022	*0.0014*	*0.0008*	*0.8574*	*0.8098*	-
LOG(INF)	-0.2817	-0.3009	-0.2815	-0.2547	-0.2523	-0.2508
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
EMP	0.0082	0.0081	0.0082	0.0045	0.0045	0.0044
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0001*
GERD(-1)	0.0540	0.0513	0.0511	0.0132	0.0133	0.0134
	0.0000	*0.0000*	*0.0000*	*0.0275*	*0.0269*	*0.0236*
MARRIAGE	0.0109	0.0118	0.0118	0.0119	0.0119	0.0119
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
Agri_lab	0.0912	0.0904	0.0957	-	-	-
	0.1797	*0.1843*	*0.1611*	-	-	-
Working_years	-0.0067	-0.0069	-0.0071	-	-	-
	0.0022	*0.0017*	*0.0014*	-	-	-
Edu	-	0.0620	0.0630	-	-	-
	-	*0.1564*	*0.1502*	-	-	-
IMF_dum	-	-	-0.0259	0.0036	-	-
	-	-	*0.3068*	*0.8675*	-	-
HDI	-	-	-	0.9919	0.9907	0.9950
	-	-	-	*0.0000*	*0.0000*	*0.0000*
R-squared	0.6696	0.6716	0.6729	0.7691	0.7691	0.7691
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total panel (unbalanced) observations:	279	278	278	280	280	290

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Appendix 4

The basic pooled OLS models (model 1, 2, 3) use only macroeconomic variables as independent ones. The primary goal of such models would be to estimate a social welfare function used for economic policy decisions. Monetary policy decision making is especially rule based, thus the lack of a social utility function is a key problem for decision makers. These models suggest that real GDP growth rate has a very little effect on the probability of answering fairly or very satisfied with life. Furthermore in model 2 and model 3 rgdp became statistically insignificant. The fact that in many cases real GDP growth rate had a negative effect on life satisfaction should not necessariliy be shocking as usually new member state countries report lower life satisfaction and the real economic growh rates in these countries are usually larger. This may explain why larger economic growth rates may result in lower life satisfaction or why it decreased the probability of answering 'being satisfied with life'. Model 1 would suggest that in the EU 27 a one percentage point increase in real GDP growth would decrease the probability of answering being satisfied with life by 0.18 percentage points. Meanwhile a one percentage point increase in the price level decreases the probability of answering being satisfied with life by only 0.026 percentage points. Besides, a one percentage point increase in the employment rate increases the probability of answering being satisfied with life by 0.9 percentage points. These results suggest that from the given three variables employment rate is most important with the largest effect on life satisfaction and inflation has the less effect on it. Using more variables in the regression we got that if the expenditures in research and development are increased by 1 percentage point the probability of replying being satisfied with life increases by 0.046 percentage points. It is important to note that such an increase is relatively large, and usually developed countries in the EU expend more on R&D. This may by the reason why the coefficient for rgdp turned positive (although statistically not significant). The crisis dummy increased the probability of answering being satisfied with life, what contradicts our general expectations.

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Table

Pooled OLS regressions on LS for the EU27 (italic numbers below the coefficients are the p-values)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
C	0.1739	0.2836	0.2697	0.2735	0.1951
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0018*
RGDP	-0.0018	-0.0007	0.0006	0.0005	-0.0005
	0.0282	*0.3356*	*0.5102*	*0.5819*	*0.5361*
LOG(PRICE_LEV)	-0.2628	-0.2024	-0.2612	-0.2502	-0.2045
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*
EMP	0.0090	0.0066	0.0067	0.0058	0.0055
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*
GERD(-1)		0.0462	0.0435	0.0520	0.0530
		0.0000	*0.0000*	*0.0000*	*0.0000*
CRIDUM	-	-	0.0318	0.0301	-
	-	-	*0.0004*	*0.0011*	-
MARRIAGE	-	-	-	0.0095	0.0079
	-	-	-	*0.0000*	*0.0007*
Agri_lab	-	-	-	-	0.1154
	-	-	-	-	*0.0359*
R-squared	0.5243	0.6122	0.6234	0.6417	0.6367
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
Total panel (unbalanced) observations:	468	431	431	415	409

Model 4 and 5 contains some relevant socioeconomic variables like crude marriage rate and the change of agricultural labour. As expected marriage rate has a positive effect on life satisfaction. If crude marriage rate increases by one percentage point, the probability of answering 'being satisfied' with life increases by 0.95 percentage points. A one percentage point increase in the crude marriage rate is relatively large, usually the rate is between 4 and 6. (That's why crude marriage rate had a relatively large effect on LS.) Agricultural labour decreased remarkably during the examined period and this trend may have affected employment (and income) in rural regions. If the employment in agricultural sector increases by 1 percentage point, the probability of being satisfied with life increases by 0.115 percentage points. Further variables suggest that a larger number of working years has a

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relatively little negative effect on life satisfaction, participation in education was not significant, like the IMF dummy. Pasting HDI to our regressions, its coefficient was relatively high, but as we used several variables (like pps GDP in percentage of the EU average and life expectancy, and participation in education) we decided to use the exact socioeconomic variables instead of the composite of them like HDI. Using each variable instead of HDI gives us more information about their correlation with LS than that of the composite indicator. (Further pooled OLS estimations with these variables can be found in Appendix 2.)

Table

Pooled OLS regressions on LS for the EU27 (italic numbers below the coefficients are the p-values)

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
C	0.7755	0.7801	0.3436	0.2374
	0.0000	*0.0000*	*0.0000*	*0.0000*
RGDP	0.0013	0.0014	0.0031	0.0029
	0.2451	*0.2051*	*0.0039*	*0.0098*
INF	-0.0221	-0.0222	-0.0145	-0.1310
	0.0000	*0.0000*	*0.0000*	*0.0000*
EMP_C	0.0038	0.0031	0.0039	0.0062
	0.0997	*0.1967*	*0.0735*	*0.0034*
EUAC_DUM		-0.0153	-	-
		0.0734	-	-
EURO_DUM	-	-	-0.0512	-0.0504
	-	-	*0.0000*	*0.0000*
Life_ex	-	-	0.0277	0.0308
	-	-	*0.0000*	*0.0000*
divorce	-	-	-	0.0272
	-	-	-	*0.0000*
R-squared	0.1278	0.1339	0.2757	0.3270
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000
Total panel (unbalanced) observations:	468	468	463	459

The table above potrays the results of more regressions by changing some independent variables to avoid the usage of level type data and also including some

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other theoreticaly important variables. Using the basic macro variables the new OLS regression suggests that real GDP growth rate is not significant (with a very little positive coefficient), while the growth rate of employment is statisticly significant at the 10% level and inflation rate is sigficant at all usual statistical levels. We found that a 1 percentage point increase of the real GDP growth rate would increase the probability of being satisfied with life by 0.13 percentage points. We also found that the growth rate of employment has a little (but almost three time larger effect than that of real GDP growth) positive effect on life satisfaction. The first model of the table suggests that inflation rate has the strongest statistical impact on satisfaction, and the impact is negative. An average one percentage point increase in inflation during the examined period results in a 2.2 percentage points decline in the probability of answering being satisfied with life. This result is much larger than the effect of inflation in other studies. Other regressions indicate that euro accession decreased the probability of answering being satisfied with life by 1.53 percetage points. The euro adaptation decreased life satisfaction by almost 5 percentages (omitting inflation gives almost the same result) from the year a country adopted the common currency. Estimations suggest that life expectancy has a positive statistical effect on life satisfaction. The only surprising result is that in the whole EU27 divorce rate increases the probability of being satisfied with life, which contradicts the conclusion of previous findings like Balchflower and Oswald (2004b).

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Appendix 5

Using the variables suggested by the pooled OLS models in fixed effect panel regressions we will get more trustworthy results as we control for unobserved variables. Models presented in table below contains similar variables like models interpreted in the previous appendix. The effect of real GDP growth is statisticaly significant, but it is very little. It suggests that a one percentae point increase in real GDP gorwth rate raises the probability of anwersing satisfied with life increases by only 0.06 percentage points. The coefficient for price level became statisticaly insignificant, but its effect is relatively large. Besides, a one percentage point increase in the employment rate increases the probability of answering being satisfied with life by 0.31 percentage points.

Table

Fixed effect model estimations regressing LS for the EU27 (italic numbers below the coefficients are the p-values)

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
C	0.537848	0.546106	0.523543	0.516784	0.546238
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*
RGDP	0.000614	0.000679	-	-	-
	0.0354	*0.0127*	-	-	-
LOG(price_lev)	-0.007121	-	-0.032115	-0.021587	-0.021521
	0.5326	-	*0.0010*	*0.0610*	*0.0401*
EMP	0.003128	0.002993	0.003406	0.003527	0.003057
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*
IMFDUM	-	-	-	-	-0.016137
	-	-	-	-	*0.0104*
EUR_DUM	-	-	-	-0.004717	-
	-	-	-	*0.0930*	-
Fixed effect	**Country**	**Country**	**Country**	**Country**	**Country**
R-squared	0.959819	0.959784	0.956042	0.956298	0.956636
Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000	0.000000
Total panel observations:	468	468	513	513	513

Omitting real GDP growth rate as an explanatory variable the logarithm of price level became significant. In contrast to pooled OLS results the effect of price

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level is much less in fixed effect models. While one percentage point increase in the price level decreased the probability of answering being satisfied with life by 0.026 percentage points in pooled OLS models, fixed effect models suggest only a maximum 0.0032 percetage points decline. Model 5 also indicates that IMF programes and macroeconomic adjustments unders stand by agreements shrank the probability of answering being satisfied with life by 1.6 percentage points.

Table

Fixed effect model estimations regressing LS for the EU27 (italic numbers below the coefficients are the p-values)

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
C	0.7386	0.7408	0.7542	0.749251	0.761437	0.9043
	0.0000	*0.0000*	*0.0000*	*0.0000*	*0.0000*	*0.0000*
RGDP	0.0013	0.0014	0.0009	0.000706	0.001282	-
	0.0000	*0.0000*	*0.0006*	*0.0144*	*0.0000*	-
EMP_C	0.0004	0.0005	0.0006	0.00084	7.62E-05	-
	0.4254	*0.3943*	*0.2480*	*0.1349*	*0.8949*	-
INF	-	-0.0003	0.0007	0.00058	-0.00069	-
	-	*0.6842*	*0.3486*	*0.4111*	*0.3412*	-
EDU	-	-	-0.0409	-0.03038	-	-
	-	-	*0.0735*	0.1911	-	-
IMFDUM	-	-	-	-0.01563	-0.01666	-0.0232
	-	-	-	*0.0381*	*0.0070*	*0.0012*
DIVORCE	-	-	-	-	-0.01046	-0.0147
	-	-	-	-	*0.0019*	*0.0008*
WORKING_YEARS	-	-	-	-	-	-0.0041
	-	-	-	-	-	*0.0003*
Fixed effect	**Country**	**Country**	**Country**	**Country**	**Country**	**Country**
R-squared	0.9554	0.9554	0.9704	0.9708	0.9722	0.9688
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total panel (unbalanced) observations:	468	468	341	341	464	297

Changing variables from level types to growth rates, results in remarkable differences in the outcome. Real GDP growth rate is statisticaly significant, but its effect on life satisfaction is relatively tiny. A one pecentage point increase in real GDP growth tend to increase the probability of answering being satisfied with life by 0.13 percentage points. Estimation suggest that employment growth rate has less

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effect on life satisfation. Including inflation rate in the regressions we found that its coefficient is statitically insignificant. Education participation changed the sign of inflation, but even if we omited edu, one percentage point increase in inflation would decrease the probability of being satisfied with life by less than 0.1 percetage points. Education participation tends to have a negative effect on life satisfaction. Estimations suggest that an IMF bail-out and the macroeconomic adjustment of the stand-by agreement decreases the probability of being satisfied with life by 1.6-2.3 percentage points. The divorce rate also decreases life satisfaction. Surprisingly the number of working years also correlates negatively with life satisfaction. Yet, life expectancy raises life satisfaction. An extra year in life expectancy increases the probability of being satisfied with life by 0.21 percentage points.

Table

Results of the Hausman Test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	0.844929	1	0.3580

** WARNING: estimated period random effects variance is zero.

Period random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
RGDP	-0.001474	-0.000453	0.000001	0.3580

Period random effects test equation:
Dependent Variable: LS
Method: Panel Least Squares
Sample (adjusted): 1990 2011
Periods included: 22
Cross-sections included: 27
Total panel (unbalanced) observations: 468

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.746258	0.005943	125.5685	0.0000
RGDP	-0.001474	0.001609	-0.916587	0.3599

Effects Specification

Period fixed (dummy variables)

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R-squared	0.043214	Mean dependent var	0.742319
Adjusted R-squared	-0.004088	S.D. dependent var	0.088628
S.E. of regression	0.088809	Akaike info criterion	-1.956753
Sum squared resid	3.509761	Schwarz criterion	-1.752875
Log likelihood	480.8801	Hannan-Quinn criter.	-1.876528
F-statistic	0.913587	Durbin-Watson stat	0.046793
Prob(F-statistic)	0.577008		

Appendix 6

Table

Calculation of the estimated LS

	Health	Love	Work	Money	SUM	Health	Love	Work	Money
BE	76%	43%	28%	33%	180%	42.2%	23.9%	15.6%	18.3%
BG	83%	31%	52%	52%	218%	38.1%	14.2%	23.9%	23.9%
CZ	82%	39%	31%	29%	181%	45.3%	21.5%	17.1%	16.0%
DK	61%	66%	15%	12%	154%	39.6%	42.9%	9.7%	7.8%
DE	80%	49%	42%	24%	195%	41.0%	25.1%	21.5%	12.3%
EE	79%	43%	30%	39%	191%	41.4%	22.5%	15.7%	20.4%
EL	84%	44%	47%	29%	204%	41.2%	21.6%	23.0%	14.2%
ES	77%	49%	47%	41%	214%	36.0%	22.9%	22.0%	19.2%
FR	66%	50%	37%	32%	185%	35.7%	27.0%	20.0%	17.3%
IE	76%	47%	28%	39%	190%	40.0%	24.7%	14.7%	20.5%
IT	67%	31%	49%	28%	175%	38.3%	17.7%	28.0%	16.0%
CY	84%	60%	28%	22%	194%	43.3%	30.9%	14.4%	11.3%
LV	78%	44%	48%	44%	214%	36.4%	20.6%	22.4%	20.6%
LT	78%	33%	48%	48%	207%	37.7%	15.9%	23.2%	23.2%
LU	79%	36%	41%	30%	186%	42.5%	19.4%	22.0%	16.1%
HU	81%	24%	43%	40%	188%	43.1%	12.8%	22.9%	21.3%
MT	82%	46%	43%	23%	194%	42.3%	23.7%	22.2%	11.9%
NL	79%	53%	21%	18%	171%	46.2%	31.0%	12.3%	10.5%
AT	78%	45%	30%	28%	181%	43.1%	24.9%	16.6%	15.5%
PL	74%	47%	42%	34%	197%	37.6%	23.9%	21.3%	17.3%
PT	75%	34%	44%	42%	195%	38.5%	17.4%	22.6%	21.5%
RO	76%	29%	26%	52%	183%	41.5%	15.8%	14.2%	28.4%
SI	85%	47%	22%	30%	184%	46.2%	25.5%	12.0%	16.3%
SK	88%	44%	43%	45%	220%	40.0%	20.0%	19.5%	20.5%
FI	79%	50%	32%	17%	178%	44.4%	28.1%	18.0%	9.6%
SE	75%	61%	31%	19%	186%	40.3%	32.8%	16.7%	10.2%
UK	63%	47%	13%	30%	153%	41.2%	30.7%	8.5%	19.6%

DOI: 10.14267/phd.2014001

	Life_ex	Marr.	Emp	pps_gdp	WB
BE	15.88	4.70	60.34	120.50	39.30
BG	15.35	6.45	57.34	37.58	29.40
CZ	16.02	5.15	65.42	78.17	32.10
DK	16.69	5.26	75.69	125.67	26.03
DE	16.91	4.90	67.18	116.42	36.96
EE	17.31	4.45	64.42	59.33	30.40
EL	15.22	4.88	58.68	89.42	33.55
ES	16.82	4.77	58.81	101.08	39.43
FR	15.73	4.77	62.92	110.42	38.59
IE	15.80	5.21	63.93	137.08	45.17
IT	16.12	4.90	55.97	107.33	39.88
CY	15.60	5.67	69.27	92.92	29.04
LV	15.70	5.11	62.50	49.25	30.92
LT	16.84	4.86	61.29	52.67	33.55
LU	16.32	5.43	63.01	255.92	63.15
HU	13.77	5.65	55.90	62.17	32.67
MT	12.72	4.91	54.72	80.50	28.22
NL	16.69	9.74	73.46	131.75	33.62
AT	12.56	5.40	69.78	126.75	37.93
PL	13.24	6.33	56.14	53.75	27.73
PT	12.95	4.71	67.08	79.08	37.97
RO	15.96	6.33	59.77	37.67	26.83
SI	13.68	5.73	65.22	85.08	29.45
SK	14.64	3.74	58.95	62.58	30.93
FI	13.12	5.35	67.74	115.08	30.49
SE	13.01	4.44	72.65	123.92	31.47
UK	13.25	6.70	70.76	117.25	36.52

DOI: 10.14267/phd.2014001

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DOI: 10.14267/phd.2014001

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