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DOES JEALOUSY OF OTHERS MAKE US HAPPY?

Master´s Thesis

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I declare on my honor that I have written my master's thesis individually and unaided using the bibliography I have referred to.

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Abstract:

The relative income is often cited as a reason why happiness of nations does not grow in time with growing GDP. The study replicates the methodology of several different researchers from basic scatterplots, standard OLS and ordered probit models to hierarchical linear multilevel models (HLM). The results provide evidence that the happiness is actually rising with the growing GDP, although slowly and with the GDP measured in logarithm. On the contrary, the relevance of relative income to happiness is ambiguous through all the proposed models. Furthermore, the individual characteristics like marital status or employment status are proved to explain the differences in happiness much better than income. Finally it is shown that income has similar effects on different measurements of subjective well-being (health, happiness and emotional well-being).

Key Words: Happiness, Emotional Well-Being, Relative Income, Absolute Income, HLM

JEL Classification: I15, I30, I31

Abstrakt:

Teorie relativního příjmu je často citována jako důvod, proč úroveň štěstí mezi národy neroste v čase s rostoucím HDP. Tato studie replikuje metodologii vyvinutou několika jinými vědci od základních X-Y diagramů, standardní metody nejmenších čtverců a pořádkových probitů až po hierarchické mnohoúrovňové lineární modely (HLM). Výsledky ukazují, že štěstí ve skutečnosti roste s rostoucím HDP, nicméně pomalu a s HPD v logaritmickém tvaru. Naopak význam relativního příjmu pro štěstí se jeví nejednoznačný ve všech použitých modelech. Dále bylo ukázáno, že jiné subjektivní charakteristiky jako osobní nebo pracovní status, mají vliv větší vliv na subjektivně vnímané štěstí než příjem. Nakonec je ukázáno, že příjem má podobný vliv na různé druhy subjektivně vnímaného blahobytu (zdraví, štěstí, emocionální pohodu).

Klíčová slova: Štěstí, Emocionální pohoda, Relativní příjem, Absolutní příjem, HLM

JEL Klasifikace: I15, I30, I31

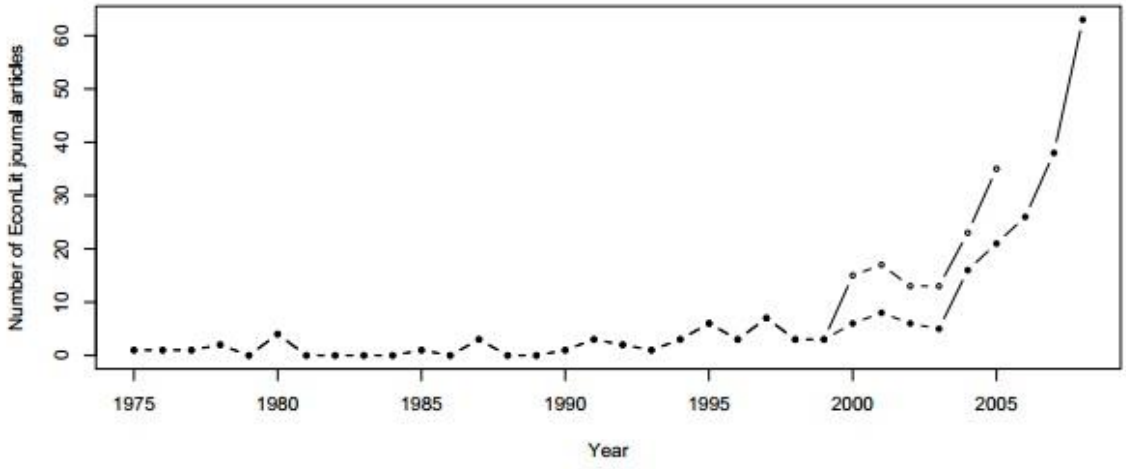
Contents

Introduction

"Every pitifulest whipster that walks within a skin has had his head filled with the notion that he is, shall be, or by all human and divine laws ought to be, 'happy'" (Thomas Carlyle).

The happiness economics is a booming field of economic research. The number of papers has been growing exponentially in the last 10 years as documented by MacKerron (2011), who plots the number of Econlit articles with titles including happiness, well-being, wellbeing or life satisfaction by year (see Figure 1).

Figure 1: The number of articles in Econlit. The bottom line excludes article from Journal of Happiness Studies. Source: MacKerron (2011).



The main discussion in the happiness economics has been about the seemingly weird notion that the reported happiness does not grow over time, but the GDP and average real income grow almost all over the world. Easterlin (1974) was the first economist to observe and map the effect and he proposed explanation in a relative income theory. According to Easterlin (1974): *"Income and aspirations in time and space tend to go together, and people seemingly can make something out of what appears, in some absolute sense, to be a sorry lot."*

The explanation implicitly assumes that people care more about their social status than about their absolute level of consumption and because status is a zero-sum game the *"Carlyle's pitifulest whipster will indeed be made happier by higher income, but only at the expense of someone else or his own future self"* (Clark, Frijters and Shields 2008, 140). The main question therefore stands: *"Does jealousy of others make us happier?"* Or in other words is relative income more important for one´s happiness than absolute income.

This study will try to provide at least a partial answer. Furthermore the similarity of the link between happiness and income measured on aggregated level (i.e. Gross National Product) and on an individual level is going to be discussed and more measurements of happiness or subjective well-being are going to be introduced. Finally the comparison between these measurements is going to be reviewed.

In the first chapter the current state of the literature of Happiness Economics including historical overview of the main arguments will be introduced. Second chapter is going to formulate the detailed hypotheses based on the literature. Third chapter is going to discuss the used datasets in detail and provide the basic analysis of explanatory variables. Fourth chapter will provide first simple models and analysis based on macroeconomic indicators. The research of Easterlin (1974) and of Stevenson and Wolfers (2008) is going to be replicated there. Fifth chapter will introduce the economic model from which standard OLS and ordered probit models are going to be derived for econometrical analysis of the microeconomic variables and their results discussed. Sixth chapter is including macroeconomic variables and joint micro and macro variable to the OLS model derived in chapter five to study the impact of both micro and macro level characteristics on happiness. The seventh chapter compares the income relationship with different measurements of well-being (happiness, health and emotional well-being) and the final chapter concludes.

1 Literature Overview

This sections first, introduces the history of debate between Easterlin and his opponents, second, it discusses the relationship between absolute and relative income with happiness. Third it provides an overview of different measurements of well-being. Fourth the connection between self-reported happiness and utility is discussed and finally econometrical problems of analyzing happiness are resolved for the purpose of this study.

1.1 Easterlin Paradox: Historical Debate

Easterlin (1974, 118) concludes his seminal paper: "*Within the countries there is noticeable positive association between income and happiness – in every single survey, those in the highest status group were happier, on the average, than those in the lowest status group. However, whether any such effect exists among countries at a given time is uncertain. Certainly, the happiness differences between rich and poor countries that one might expect on the within country differences by economic status are not borne out by the international data."* This empirically found

relationship has been called "Easterlin Paradox" ever since. Easterlin is basically arguing that increase in the country´s income (measured by GPD) over time does not improve the well-being of its inhabitants. His explanation for this phenomena is that people´s happiness is derived more from comparing themselves to others than from the absolute level of income or consumption.

Veenhoven (1991) makes similar research as Easterlin (1974), but instead of linear relationship between GDP and happiness he works with the GPD in a logarithmic form and he concludes, that happiness cannot be explained only by comparison to peers. The argument goes straight against explanation of Easterlin Paradox, however in this article it is not based on better statistics, but more on a logical argumentation.

Easterlin (1995, 44) repeats the analysis with a larger dataset and more profound methodology and his findings are the same: *"... raising the incomes of all does not increase the happiness of all. This is because the material norms on which judgments of well-being are based increase in the same proportion as the actual income of the society."* He also dismissed the critique by stating that: *"The resistance is no doubt due in part to reluctance to abandon the Benthamite conception of the social good ..."* (Easterlin 1995).

The first critique that cannot be dismissed so easily come from Hagerty and Veenhoven (2003). They enlarge the sample for poorer countries and have longer time series and their results rejected both the hypothesis that happiness does not grow with income over time and the possibility of relative income comparison within the states. However they do not reject the possible effect of adaptation (see section 1.2 for discussion of adjustability theorem).

Easterlin (2005) rebuttal is brief declaring that the results of Hagerty and Veenhoven (2003) are not in accordance with other literature and his own statistics. He for example states that for United States *"H-V's result arises from mixing together two sets of non-comparable surveys"* (Easterlin 2005, 440) or: *"The results of studies by other scholars of European countries and of the United States do not support their claim [H-V] either."*

Stevenson and Wolfers (2008) join the discussion testing the Easterlin Paradox on a much larger dataset. The similarity of between and within-country effects of income on happiness is their main conclusion, hence they reject the Easterlin Paradox and effectively prove much smaller than expected effect of relative income on happiness.

Easterlin et al. (2010) in response argue that the Paradox is still in place, but it does not hold for time periods shorter than 10 years. The research is based on a sample of around 50

countries in two datasets and Easterlin et al. (2010, 23466) argue that it is "*the broadest evidence yet assembled."*

Sacks, Stevenson and Wolfers (2013) have recently prepared even larger evidence (6 different datasets) confirming their previous results and once again casting doubts on the Easterlin Paradox existence and the theories of adaptation and relative income and furthermore they provide proofs that the GDP has positive effect on happiness even in long run.

Veenhoven and Vergunst (2013) have used data from the World Database of Happiness (Veenhoven nd.). "*These data are from 67 nations and over periods running from a minimum of 10 years to 46 years, which gave us 1531 data points."* (ibid. p. 17) Their results are again indicating a positive effect of GDP on happiness. Particularly, they claim that gaining one point on the 10 point scale requires 60 years of steady GDP growth of 5%.

To sum up, the more data are available the closer is the final answer on the effect of income and/or GDP on happiness, however for now the discussion is still in progress and is probably even more fierce than 20 years ago.

1.2 Income and Happiness

First, the relationship between absolute income and happiness is going to be discussed and second, the most often proposed explanations of the Easterlin Paradox (adjustability and relative income) will be introduced.

The literature confirms almost unanimously a positive correlation between income and happiness on micro level on different cross-sectional data (Ball and Chernova 2008, Wu and Li 2013, Stutzer 2004, Kahneman and Deaton 2010) and also on panel data from UK and Germany (Felix, et al. 2013), the same relationship in one point of time is confirmed on the macro level in most of the studies (Deaton 2008, Veenhoven 1991), even Easterlin et al. (2010) restates the paradox: "*at a point in time both among and within nations, happiness varies directly with income, but over time, happiness does not increase when a country's income increases".* An exception is a study of Wu and Li (2013) which finds no effect of GDP on happiness in China´s districts when the household income is controlled for even at the same point of time.

Similar agreement rests (Stevenson and Wolfers 2008, Easterlin, et al. 2010, Deaton 2008) about the shape of the income and happiness relationship. The relationship is observed to be concave, meaning that one dollar for a rich person has a smaller effect on his happiness then one dollar for a poor person, but the effect is similar between rich and poor when income is in

logarithmic terms. Kahneman and Deaton (2010) indicate that if the relationship is measured in logarithmic terms then happiness does not satiate with income.

Relative or comparison income is often cited as the explanation of the Easterlin Paradox (Easterlin 1974, Blanchflower and Oswald 2011, Clark, Frijters and Shields 2008). The idea can be best explained on a set of experimental studies. Alpizar, Carlsson and Johanson-Stenman (2005) presented the respondents a choice between imaginary societies[1] for their grandchildren:

Society A: Your grandchild's income is 300.000 Colones/month
The average income in society A is 360.000 Colones/month

Society B: Your grandchild's income is 288.000 Colones/month
The average income in society B is 240.000 Colones/month

Comparison is make between the society A where the grandchild would have higher absolute income that would translate to only 80% of the average income in the society and the society B where the grandchild would have lower absolute income that would however translate into 120% of the average income in the society. The main finding from the study confirms both relative and absolute income hypotheses, where the effect of relative and absolute income is split almost 50:50. Similar studies (Solnick and Hemenway 1998, Johannsson-Stenman, Carlsson and Daruvala 2002) confirmed strong effect of relative income. The taste for fairness and hence for relative income is also confirmed by survey evidence (Kahneman, Knetsch and Thaler 1986) and by the results of ultimatum games (V. L. Smith 1994).

The empirical literature of happiness mostly confirms the general positive effect of relative income on an individual´s happiness. The main discussion is about the magnitude and the difference among different sets of countries. Veenhoven (1991) postulates that relative income plays a role in an individual´s happiness, but is not a major driver, since other stable factors such as absolute income are driving the happiness more. On the contrary Ball and Chernova (2008, 526) suggest that there exists a *"strong evidence that changes in relative income tend to have larger effects on happiness than do comparable changes in absolute income*."

[1] They produced 7 different societies B which were always compared to society A. Only one example is reported.

Several studies (Senik (2004) in Russia, Felix et al. (2013) in Germany and UK) even provide a proof of a "tunnel effect" introduced by Hirschman and Rothschild (1973). The tunnel effect is basically assuming an individual has almost no information about her future income and therefore she derives her probable income from the income of her peers. Therefore the higher the income of her peers the more happy she is. Caporale et al. (2009) confirm the hypothesis of tunnel effect for Eastern European countries, but find a strong relation between relative income and happiness for the other countries.

The impact of income inequality in the form of Gini coefficient on happiness is also often analyzed and the results are similar to the relative income and happiness relationship on micro level. Oischi, Kesebir and Diene (2011) find negative correlation between Gini coefficient and happiness for the US dataset. Even more severe effect of inequality on happiness in European countries is observed by Alesina et al. (2004). However, for example Graham and Felton (2006) conclude the Gini coefficient is not a significant determinant of happiness.[2]

Second explanation proposed by Easterlin (1995) for his Paradox is the theory of adjustability. Famous study of Brickman, Coates and Janoff-Bulman (1978) shows that the lottery winners are happier than others at the time of winning the lottery, but they adjust to the new wealth and after a year and half they do not feel on average happier than general population. Similarly, they find that paraplegics adjust in time and their general level of happiness is the same as of population after a year and half from the occurrence of a situation that caused their illness. However Gardner and Oswald (2007) find significantly positive relationship between winning a small amount in a lottery and mental well-being and Lucas (2007) observes that although there is a slight adjustment to certain negative or positive events, it is not as significant as the literature generally expects.

Important caveat has to be made. Whatever are the results of the studies on income and happiness relationship, the impact of the income variables is usually much weaker than of the individual characteristics like unemployment, marital status, age or religion (Ball and Chernova (2008), Blanchflower and Oswald (2004), Clark and Oswald (1994), Frey (2008), Gerdtham and Johannesson (2001), Okulicz-Kozaryn (2010)) and this is going to drive one of the hypothesis and interpretation of the results.

[2] For further discussion and literature overview about the relationship between income inequality and happiness see Verme (2011).

To conclude the current research is not definite about the relationship between relative income (respectively income inequality) and happiness as it is definite about the absolute income and happiness relationship. Nevertheless, the studies strongly suggest negative correlation between relative income (respectively income inequality) and happiness. The theory of adjustability also provides a mixed results, but generally the literature accepts the theory that in time people adjust their level of happiness to the average population level. The only question is about magnitude of the adjustment. Furthermore, the impact of income is usually much weaker than that of the other individual characteristics.

1.3 Measurements of Well-Being

The most common measurements of subjective well-being are responses to one-item scale questions about happiness and life satisfaction. The specific questions in surveys asking about these measures may differ significantly. World Database of Happiness (Veenhoven nd.) contains almost 1000 different questions which have been asked in surveys concerning happiness. Nevertheless, the studies show similar results for whichever measurement is used and the question of different target variable is not debated in a great detail (MacKerron 2011, 710) and hence will not be discussed in this study either and the terms happiness, life satisfaction and well-being will be used interchangeably when not stated otherwise.

Two exceptions from previous statement about not differentiating the subjective well-being questions exist: emotional well-being and health status. These two are being differentiated the most from the general question about happiness or life satisfaction and hence are examined separately also in this study.

The emotional well-being is distinguished by Kahneman and Deaton (2010) and others ((Diener 1984, Graham 2009). Kahneman and Deaton (2010) compared four different measurement of subjective well-being: positive affect (average of three dichotomous variables: frequent happiness, laughter and smiling), blue affect (average of worry and sadness), the measurement of stress and finally the life-satisfaction. The results of their study suggest that there are differences between the effect of income on life satisfaction and on the other variables; the income has more positive effect on life-satisfaction than the emotional well-being. Their results also show that the impact of income on emotional well-being satiates for the highest income group (at around 75 000 USD). Furthermore Stevenson and Wolfers (2008) include also the emotional well-being

characteristics into their analysis and find similar effect of GDP on happiness and on emotional well-being.

The health status is technically often not considered as a measurement of subjective well-being, but rather as an explanatory variable (Diener 1984, Gerdtham and Johannesson 2001). However the causality among income, health and happiness is not very clear and probably the only clear conclusion from the literature is that these attributes are highly correlated both on individual and community level (Subramanian, Kim and Kawachi 2005).

The results of studies (Mantzavinis, et al. 2006, Ettner 1996) where only health and income are included tend to produce similar results as studies (see section 1.2) concentrating on the absolute income happiness relationship (i.e. health is positively correlated with absolute income). However the impact of the relative income on happiness (respectively income inequality measured by countries Gini coefficients) is ambiguous. Babones (2008) cites and confirms the robust literature, which suggests that the more unequal the country is the worse self-reported health status of its inhabitants. On the contrary Mellor and Milyo (2002) and Beckfield (2004) find no prove for this effect and Pulok (2012) even provides contradictory results (i.e. the individuals in more unequal countries are happier).

To conclude the relationship of other measurements of well-being and income is not the same as the relationship between happiness and income, but at least in most of the research it seems pretty similar and hence will be analyzed this way.

1.4 Happiness vs. Utility

One of the central questions for the fruitfulness of the economic research of happiness is: Can happiness measured as a response on one-item scale question in a survey be at least a proxy of utility?

Clark et al. (2008, 122) define two requirements for a measure of happiness to fulfill in order to become a proxy for utility:

a) Level of happiness has to guide individual choice in maximizing her stream of utility
b) Level of happiness has to be the outcome of choices, but also of chance factors, that are outside the control of the individual, but whose possibility was accounted for

Of course, direct measurement of these requirements is almost impossible, however the physiological response of an individual when he is answering the happiness question can be measured.

The requirement a) can be proven by studies showing that individuals who report higher happiness or life satisfaction are also more prone to smile (Fernández-Dols and Ruiz-Belda 1995, Ekman, Davidson and Friesen 1990). Furthermore, the research in neuroeconomics (Knutson, et al. 2001, Davidson 2004) proves that activity of parts of the brain called Nucleus Accumbens (NAcc) and other parts of prefrontal cortex, which is responsible for feeling of pleasure or reward, is strongly correlated with the self-reported evaluation of happiness. Shedler et al. (1993) found a significant correlation between blood pressure and heart rate measurements of stress and subjective well-being.

The fulfillment of the requirement b) can be observed in many studies studying the relationship between self-reported subjective well-being and other objective situation in one´s life like unemployment and inflation (Di Tella, MacCulloch and Oswald 2001). Oswald and Wu (2010) and Gabriel et al. (2003) suggest a correlation between compensating differentials and self-reported well-being. Another part of literature focuses on the correlation of the self-reported well-being and the evaluation of an individual well-being by an external observer and finds a significant correlation between spouses (Costa and McCrae 1988) and between friends and relatives (Sandvik, Diener and Seidlitz 1993).

To sum up, the current research suggests that it is meaningful to use self-evaluated measure of well-being like happiness as a proxy of an individual utility. The objections still persists (Hamermesh 2004, V. K. Smith 2008), however growing number of authors (Welsch 2006, Ott 2010, George 2007, Di Tella and MacCulloch 2006) is arguing that the happiness research based on the self-reported subjective well-being should complement the standard economic research.

1.5 Analyzing Happiness

MacKerron (2011, 713) points out that three questions are crucial when using econometrical modelling to assess happiness and its explanatory variables:

1. What questions are going to be addressed? (i.e. which variables are going to be used)
2. What type of data are available? (e.g. micro, macro, cross-sectional, panel-data, etc.)
3. What type of assumption can reasonably be made about the happiness and explanatory variables?

The first question is addressed in section 2, where all the hypotheses are set up. The answer on the second question will be described in detail in section 3, where the datasets are going to be introduced and all variables fully explained.

The first basics for answering the third question were developed section 1.3, where the connection between happiness and utility was discussed. If the assumption that reported happiness is a good proxy for utility stands then the economic theory[3] assumes ordinal preferences for happiness (see for example (Gravelle and Rees 2004).

To model the ordinal comparison of happiness between individuals a researcher is required to use ordered logit, multinomial logit or ordered probit[4] not standard OLS models that are based on the assumption of cardinality of preferences (happiness). This is the case for most of the current economists studying happiness (e.g.: Graham (2008), Caporeale et al. (2009), Stevenson and Wolfers (2008)), however exceptions are made when the data are aggregated so the cardinality assumption is basically forced upon the researcher (Welsch 2006) or when the results based on logit or probit models provide similar results as OLS (Blanchflower and Oswald 2004, Moro, et al. 2008, Wu and Li 2013).

Second assumption that most of the studies make is that the causality is from income or other explanatory variables to happiness and not vice-versa. This assumption can be problematic as discussed by (Kenny 1999). The problem is that happiness can increase the ability of an individual to achieve higher income. Such conclusion is reached by a study of Graham, Eggers and Sukhtankar (2004). They study Russian panel data and prove that individuals who are happier in one period achieve higher income in the next periods. Similar ambiguity of causality can be seen for instance for health and happiness (Gerdtham and Johannesson 2001).

To sum up, this study is based on the prevailing assumptions of ordinal preferences and income to happiness causality. The econometrical models hence start with a probit modelling, but because the results are similar to OLS (see section 5) the OLS modelling is used for easier interpretation. The causality problem cannot be resolved based on the data available for this study, hence all the results are interpreted based on the prevailing income to happiness and explanatory variables to happiness assumption. Nevertheless a reader should always keep in mind that the

[3] See for example Gravelle and Rees (2004).

[4] MacKerron (2011) provides detailed discussion of further different econometrical techniques used in the research of happiness.

causality can go in the opposite direction and that further research is necessary to definitely prove the direction of causality.

2 Hypotheses

The literature review leads to five different hypotheses that are tested in this study[5]:

Hypothesis 1: Income of an individual increases her happiness and the relationship is concave, hence can be modeled by income in logarithmic form. (Absolute income theory)

Hypothesis 2: An individual's happiness is influenced by her social status (i.e. her rank in income distribution). The higher the status, the happier is and individual. (Relative income theory)

Hypothesis 3: Other individual´s characteristics have much stronger effect on her happiness than household income.

Hypothesis 4: Macroeconomic characteristics (GDP, Gini, growth of GDP) are able to explain the level of individual happiness in a similar way as microeconomic characteristics (income, income quartile).

Hypothesis 5: Income and income quartile influence similarly different measurements of an individual well-being (happiness, health status and emotional well-being).

3 Data

This chapter describes all the datasets that are used as inputs for the models. The data are divided into two parts: Macro Data and Micro Data. Macro Data concerns with Gross Domestic Product, Purchase Power Parity and Gini coefficients. Micro Data describes the structure of the target variable(s) (happiness, health and emotional well-being), household income and control socio demographic variables.

The source of the data, the structure of the data and first data analysis are discussed in each subchapter. Tables concerning the number of observations, means and relationships of the variables

[5] For testing of Hypotheses 1 and 2 see mainly section 5, for Hypothesis 3 see mainly sections 4 and 5 and for Hypothesis 4 see mainly section 7.

to happiness are also provided. When a variable is in bold it means that it is going to enter into models under that name.

3.1 Macro Data

Two sources of macro data are used World Development Indicators (henceforth "WDI") and UNU-WIDER World Income Inequality Database (henceforth "WIID").

WDI is a name for a database of the World Bank. *"The primary World Bank collection of development indicators, compiled from officially-recognized international sources. It presents the most current and accurate global development data available, and includes national, regional and global estimates."* (World Bank Group 2014). WIID is a database that *"collects and stores information on income inequality for developed, developing, and transition countries."* (UNU-WIDER 2014)

Three indicators are obtained from the WDI: Gross Domestic Product per Capita ("*GDP per capita, PPP (constant 2011 international $)*"), Purchase Power Parity conversion factor ("*PPP conversion factor, private consumption (LCU per international $)*") and Growth of Gross Domestic Product ("*GDP growth (annual %)*").

GDP per Capita indicator is measured in constant PPP adjusted international dollars with 2011 as the base year. It is transformed to logarithmic form (**log_GDP**), because of the expected concave relationship between GDP per capita and happiness is assumed. GDP growth (**GDP_growth**) is simply taken as an annual difference between total GDPs in a country.

Table 1 shows log_GDP for countries that have data about happiness, income and GDP. All the countries in the sample with the exceptions of Philippines and Ukraine are counted between developed countries according to World Bank with log_GDP between 9 and 11 (8 000 to 60 000 USD). The average GDP seems to be raising, but the growth of GDP per capita in logarithm was only approximately 1.5 % between years 1991 and 2011.

PPP conversion factor is *"the number of units of a country's currency required to buy the same amounts of goods and services in the domestic market as U.S. dollar would buy in the United States*" (World Bank Group 2014). This conversion factor is specifically for private consumption (i.e., household final consumption expenditure) and is obtained from the 2011 International Comparison Program (henceforth "ICP") or is imputed using a statistical model based on the 2011 ICP. The factor is used for adjustment of absolute income (see section 3.2) to have a comparable measure of income amongst the countries and time.

Table 1: log_GDP

Country	ISSP1991	ISSP1998	ISSP2001	ISSP2007	ISSP2008	ISSP2011
Australia	10.24		10.47	10.61	10.62	10.64
Austria		10.19	10.30	10.40		
Belgium				10.61	10.61	10.59
Bulgaria		9.04		9.6		9.65
Canada		10.42	10.51			
Croatia				9.96	9.98	9.92
Cyprus		9.22	9.44	10.03	10	
Czech Republic		9.32	9.54	9.97	10.02	10.02
Denmark	9.12	9.47	9.58	9.85	9.90	9.99
Dominican Republic				9.13	9.17	
Finland			10.42	10.61	10.60	10.56
France	9.73	9.91	10.03	10.29	10.32	10.25
Germany		9.82	9.91	10.2	10.22	10.21
Hungary		9.71	9.82	10.04	10.05	
Chile	9.97	10.41		10.78	10.74	
Ireland		8.32	8.36	8.56	8.58	8.65
Israel		9.58	9.61	9.81	9.84	9.91
Italy	10.07	10.29	10.37	10.52	10.51	10.46
Japan	10.34	10.47	10.54	10.66	10.67	
Korea, Rep.				10.18	10.19	10.28
Latvia		10.23	10.34		10.42	
Lithuania						10.02
Mexico				9.66	9.66	
Netherlands		10.51			10.70	10.67
New Zealand	10.02	10.16	10.26	10.38	10.35	
Norway		10.08	10.12	10.24	10.26	10.31
Philippines	10.37	10.44		10.59	10.6	10.62
Poland	10.50	10.67	10.73	10.84	10.83	10.82
Portugal		10.06			10.18	10.16
Russian Federation		10.71	10.76	10.84	10.85	10.85
Slovak Republic		9.62			10.12	10.13
Slovenia	10.69	10.93	10.99	11.08	11.07	11.03
South Africa				9.35	9.37	9.38
Spain		10.56	10.62		10.69	10.64
Sweden		10.37		10.64	10.62	10.64
Switzerland		10.38	10.45	10.51	10.51	10.50
Turkey					9.71	9.80
Ukraine					9.08	
United Kingdom		10.36	10.38	10.47	10.46	10.44
United States	10.31	10.40	10.47		10.48	
Uruguay				9.53	9.60	
Venezuela, RB					9.79	
Total respondents	10.13	10.05	10.15	10.15	10.17	10.28

Gini is the only variable obtained from the WIID. The Gini coefficient is not measured on regular basis in all countries around the world, for some countries there are many Gini coefficients for the same year and for some there are none. Average is taken when the country registers more than one Gini coefficient for a particular year and the country is removed from the analysis when it does not fulfill the criteria described in the next paragraph or is simply missing in the dataset.

Furthermore, different methodologies are used to calculate the Gini coefficients. Therefore only the coefficients that are calculated for the whole population and area of a country based on the disposable income and adjusted to household level are included. This and the missing data significantly decrease the number of total observations from 161 to 126 (from 42 to 38 countries[6]), but this methodology is absolutely necessary to keep the Gini comparable amongst the countries and waves.

The Gini coefficients are shown in Table 2. The average Gini coefficient in the sample is around 30 and it seems that the income inequality slightly increased amongst the countries in the sample. The highest inequality is in South Africa and Chile where the coefficient is more than 50 in other words twice as high as in the most equal countries like for example Denmark, Sweden, Slovenia, the Czech Republic or Austria.

[6] Dominican Republic, Philippines, Turkey and Ukraine are completely removed from the sample

Table 2: Gini coefficients

Country	ISSP1991	ISSP1998	ISSP2001	ISSP2007	ISSP2008	ISSP2011
Australia			31.10		33.60	33.40
Austria		24.00	24.00	26.35	26.15	
Belgium				26.60	26.70	26.30
Bulgaria		34.50		33.60		35.10
Canada		32.32	31.70			
Croatia				29.00	28.00	31.00
Cyprus				29.80		
Czech Republic			25.00	25.40	25.15	25.20
Denmark		22.40	22.00		24.65	27.80
Finland			26.18	26.30	26.10	25.80
France		27.80	27.57	27.90	29.55	30.80
Germany		26.91		29.57	29.45	29.00
Hungary		26.23	26.10	26.40	25.20	
Chile		55.21				50.10
Ireland		34.00		30.30	29.60	
Israel			38.12	36.90	37.10	37.75
Italy	29.05	35.04	29.00		31.63	
Japan		31.88			30.20	
Korea. Rep.				31.20	31.40	31.10
Latvia		34.37		35.40	37.70	
Lithuania						32.90
Mexico					46.90	
Netherlands		25.00			28.10	25.80
New Zealand	33.40	33.80	33.90		33.00	
Norway	24.11	27.20	26.70	23.70	25.05	22.90
Poland	24.50	32.60	32.05	31.53	31.25	31.10
Portugal		37.00			35.55	34.20
Russian Federation				37.00		35.40
Slovak Republic		26.20			24.03	25.70
Slovenia	26.52	23.30	22.79	23.43	23.50	23.80
South Africa					59.40	59.40
Spain		34.00	33.00		31.50	
Sweden		24.20		23.40	24.97	24.40
Switzerland				30.30	32.00	29.70
United Kingdom	34.92	33.24	33.65	34.13	34.05	33.00
United States	35.93	35.70	36.00	37.70	37.80	37.65
Uruguay				45.00	44.00	
Venezuela. RB					38.00	
Total Countries	7	23	17	23	32	25
Wave Average	29.78	31.17	29.34	30.47	31.92	31.97

3.2 Micro Data

The source of Micro Data is the International Social Survey Programme (ISSP). *"The ISSP is a continuing annual programme of cross-national collaboration on surveys covering topics important for social science research"* (ISSP 2010). The first international social survey was done in 1985 and was investigating role of government. The ISSP is the main source of the data for the models. Six different waves of the survey are used: ISSP 1991 Religion, ISSP 1998 Religion II, ISSP 2001 Social Networks, ISSP 2007 Leisure Time and Sports, ISSP 2008 Religion III and ISSP 2011 Health and Health Care. These are the only waves of ISSP containing the question about happiness, which is the target variable for this study.

Table 3 shows the number of respondents within different countries and waves for which the data on happiness, household income and GDP[7] exists. Data for Cyprus from ISSP 2008 where excluded because the average income in the country almost doubled the data from ISSP 2007 which does not correspond to the Cyprus´s economic development in that year. The data for Slovak Republic is represented only for ISSP 2008, although it participated even in the ISSP 2007, because both of these waves were conducted together with the same respondents in the Slovak Republic. The total number of observations amounts to 177 053[8] in 42 distinct countries.

[7] The data about Brazil and Argentina are missing in WDI and are excluded, but these two countries participated in only one wave of the ISSP and hence the exclusion does not make a significant difference.

[8] The total number of observations was 248 257 therefore the reduction to at least the basic necessary variables reduced the sample by 29%.

Table 3: Number of observations

Country	ISSP1991	ISSP1998	ISSP2001	ISSP2007	ISSP2008	ISSP2011
Australia	1421	0	1211	2253	1406	1295
Austria	854	668	652	721	721	0
Belgium	0	0	0	1065	1103	2219
Bulgaria	0	907	0	633	0	697
Canada	0	873	941	0	0	0
Croatia	0	0	0	783	776	659
Cyprus	0	787	812	844	0	0
Czech Republic	0	727	830	665	1077	1223
Denmark	0	929	1158	0	1780	1357
Dominican Republic	0	0	0	1998	1896	0
Finland	0	0	1152	1017	907	838
France	0	899	1119	1622	1845	2248
Germany	1674	1480	0	1171	1334	1417
Hungary	0	840	791	850	800	0
Chile	0	1320	1263	1170	1062	1103
Ireland	888	808	0	981	981	0
Israel	0	858	888	983	857	810
Italy	859	632	734	0	471	0
Japan	0	1207	1171	1045	1026	1067
Korea, Rep.	0	0	0	1357	1433	1381
Latvia	0	1078	845	653	725	0
Lithuania	0	0	0	0	0	870
Mexico	0	0	0	863	534	0
Netherlands	0	1553	0	0	1806	1264
New Zealand	909	827	999	862	896	0
Norway	1259	1299	1323	986	909	1537
Philippines	0	1108	1152	1114	1139	1182
Poland	907	1015	1076	1143	1105	606
Portugal	0	1121	0	0	569	842
Russian Federation	0	1150	1813	1715	781	1090
Slovak Republic	0	1208	0	0	899	708
Slovenia	1493	698	606	512	613	485
South Africa	0	0	0	2170	2622	2088
Spain	0	1676	813	0	1626	0
Sweden	0	981	0	1079	1009	976
Switzerland	0	981	654	755	854	889
Turkey	0	0	0	0	1429	1225
Ukraine	0	0	0	0	1171	0
United Kingdom	1792	711	1575	752	1675	757
United States	1233	1142	1034	1402	1209	1411
Uruguay	0	0	0	1337	970	0
Venezuela, RB	0	0	0	0	908	0
Total respondents	13289	29483	24612	34501	42924	32244
Total countries	11	29	24	31	38	28

Happiness is the target variable and is measured as a response to a question: *"If you were to consider your life in general these days, how happy or unhappy would you say you are, on the whole?"* The response is measured on four point scale from 1 = "not at all happy" to 4 = "very

happy" in all surveys except of ISSP 2011. Seven point scale is used in ISSP 2011 from 1 = "completely unhappy" to 7 = "completely happy". The measure is not the same as used by Easterlin (1974) where he uses life satisfation as a measurement of subjective well-being. Nevertheless, Easterlin (1995) and others (e.g. Clark, Frijters and Shields (2008) Frey (2008), Veenhoven (2008)) than use both of these measurements interchangably depending on the data availability.

The happiness values are standardized (Woolridge 2009) to resolve the problem of different scaling in the ISSP 2011 wave. The means for each wave are subtracted from the original values of happiness and the result is then divided by a standard deviation of each wave. This standardization provides adjusted happiness (**happiness_adj**) as a target variable for the models where comparison between scales is necessary. A more sophisticated method exists, where separate probit regressions of happiness on a specified fixed effects are created and the values of the regressions enter the OLS regression. It is called *"probit-adapted OLS"* (van Praag and Ferrer-i-Carbonell 2008). Nevertheless this method is much more complicated for interpretation and according to Stevenson & Wolfers (2008) the results from this method are comparable. Therefore the simpler and easier method to interpret is chosen.

Average level of happiness in countries is shown in Table 4. Keep in mind that happiness is measured on seven point scale in ISSP 2011 and only on four point scale in the other waves, therefore in this subchapter only the data from ISSP 1991 to ISSP 2008 will be compared. Average happiness circulates around the number 3, i.e. around "Fairly Happy" statement. The happiness seems to stay on the same level when average happiness from ISSP 1991 to ISSP 1998 is compared. However in the ISSP 1991 wave the most developed countries are overrepresented which can lead to a higher average level of happiness for this wave.

More balanced panel exists between years 1998 and 2008 and the average happiness between those years increased by approximately 3 % where the average GDP per capita in logarithm terms increased only by approximately 1% (for reference see Table 1). This simple analysis suggests a possible correlation between log of GDP and happiness.

Table 4: Average happiness

Country	ISSP1991	ISSP1998	ISSP2001	ISSP2007	ISSP2008	ISSP2011
Australia	3.25		3.16	3.22	3.23	5.37
Austria	3.17	3.12	3.16	3.16	3.16	
Belgium				3.23	3.32	5.12
Bulgaria		2.48		2.68		4.66
Canada		3.07	3.27			
Croatia				2.78	2.98	5.02
Cyprus		2.88	2.70	3.06		
Czech Republic		2.86	2.85	3.10	2.77	5.07
Denmark		3.19	3.16		3.12	5.27
Dominican Republic				3.15	3.33	
Finland			2.98	2.95	3.00	5.24
France		2.92	3.18	2.84	2.91	5.05
Germany	2.93	2.86		3.00	3.01	5.18
Hungary		2.42	2.83	2.69	2.62	
Chile		2.80	3.18	3.07	2.93	4.94
Ireland	3.33	3.36		3.43	3.39	
Israel		2.98	2.90	3.01	3.03	5.30
Italy	2.84	2.84	2.82		2.80	
Japan		3.01	3.12	3.03	3.02	5.24
Korea. Rep.				2.89	2.87	4.83
Latvia		2.46	2.54	2.75	2.55	
Lithuania						4.49
Mexico				3.38	3.38	
Netherlands		3.25			3.23	5.34
New Zealand	3.18	3.27	3.31	3.29	3.29	
Norway	3.09	3.10	3.10	3.23	3.16	5.23
Philippines		3.03	3.07	3.10	3.08	5.32
Poland	2.80	2.98	2.87	3.08	3.12	5.37
Portugal		2.68			2.84	4.83
Russian Federation		2.48	2.06	2.59	2.74	4.52
Slovak Republic		2.63			2.82	5.07
Slovenia	2.59	2.74	2.87	2.95	2.90	5.20
South Africa				3.03	2.88	5.00
Spain		3.03	2.98		3.04	
Sweden		3.10		3.16	3.15	5.20
Switzerland		3.17	3.34	3.33	3.28	5.50
Turkey					2.56	4.73
Ukraine					2.46	
United Kingdom	3.25	3.24	3.22	3.19	3.17	5.24
United States	3.29	3.24	3.32	3.32	3.33	5.45
Uruguay				3.07	3.09	
Venezuela. RB					3.32	
Wave average	3.06	2.94	2.99	3.06	3.03	5.10

Five countries with the highest and five with the lowest GDP growth from 1998 to 2008 are chosen to see a clearer picture of the happiness and GDP relationship. The graphs of the evolution of happiness between these years are shown in Figure 2 for the Top 5, respectively in

Figure 3 for the Bottom 5 countries according to GDP growth. In the top five growing countries the happiness increase in all of them except of the Czech Republic (the fifth most growing country) and in the bottom five the happiness decrease or stayed flat in all of them except of Norway (the fifth least growing country).

Figure 2: Evolution of happiness Top 5 fastest growing countries

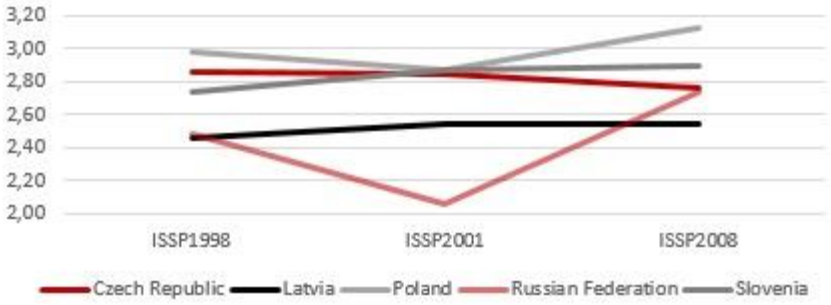
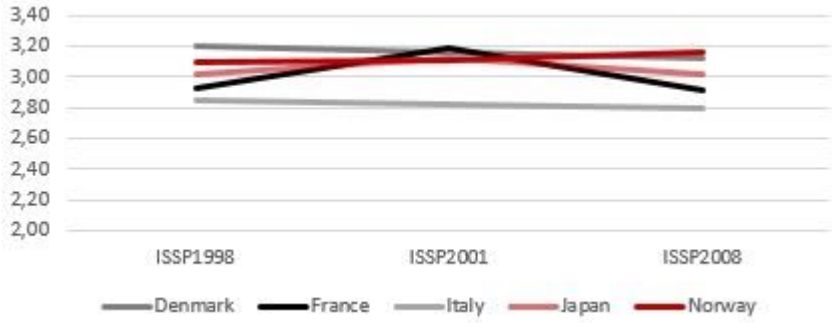


Figure 3: Evolution of happiness Bottom 5 growing countries



The graphs indicate that GDP growth is important for happiness, but they can also indicate that there is a cap from which GPD no longer affect happiness, because the top 5 fastest growing countries had both lower absolute GDP (average 19 199 USD) and happiness levels at 1998.[9]

All of the health and emotional well-being variables are included only in ISSP 2011. Responses to five different questions are chosen as a measurement of daily emotional well-being (experiences in past 4 weeks):

1. *"Have you had difficulties with work or household activities because of health problems?"*
2. *"Have you had bodily aches or pains?"*
3. *"Have you felt unhappy and depressed?"*

[9] Top 5 fastest growing countries had average GDP of 19 119 USD (9.85 in log terms) and average happiness of 2.70 in comparison to average GDP of 41 872 USD (10.64 in log terms) and average happiness of 3.01 for the 5 least growing countries.

4. *"Have you lost confidence in yourself?"*
5. *"Have you felt you could not overcome your problems?"*

The responses to all of these questios range form 1 to 5 where 1 = "Very often"and 5 = "Never" and are coded consecutively **health_problems**, **bodily_aches**, **unhappy_depressed**, **lost_confidence**, **not_over_problems**. The distribution of answers to these questions is shown in Table 5. There are no huge differences in the variables, however the responses are not uniform either, with bodily_aches as the main outlier.

Table 5: Distribution of answers to emotional well-being questions

Question	Very often	Often	Sometimes	Seldom	Never	No Data
health_problems	5%	8%	19%	21%	41%	6%
bodily_aches	7%	12%	27%	24%	24%	6%
unhappy_depressed	3%	7%	23%	27%	34%	6%
lost_confidence	2%	5%	17%	24%	46%	7%
not_over_problems	3%	5%	17%	24%	45%	7%

The evaluation of overall health is another different measurement of well-being, where an individual is trying to aggregate all his problems connected with psychical and physical status and hence is used as a separate variable (**overall_health**). The variable is measured as a reponse to the question: *"In general, would you say your health is"* with the answer ranging from 1 = "Poor" to 5 = "Excellent". See the distribution of answers on overall health question in Table 6. All of the aforementioned variables are also standardized in the same way as happiness.

Table 6: Distribution of answers to overall health question

Variable	Poor	Fair	Good	Very Good	Excellent	No Data
overall_health	6%	22%	40%	24%	8%	1%

The variables described in previous two paragraphs will be used as target variables for models comparing the effects of income on happiness, health and emotional well-being. Two more metrics are used as controls for these models. First the body mass index (**BMI**): the individual's weight divided by the square of her height and a second dummy variable **smoker** which is coded 1 = if the person smokes at least 1 cigarette a day and 0 = otherwise.

The subjective information about household income is used and then adjusted for the size of household according to the equation: household income divided by square root of the number of people in the household (similar method is used for example by Barrington-Leigh (2010)).

The measurement of household income variable differs amongst the different waves and countries. Sometimes they are measured as continuous variables and sometimes only as intervals amongst which the respondent can choose from. To make these two different types of measurement comparable the mid points of intervals are taken. The assumption for this to hold is that the highest incomes do not have as high influence on happiness, i.e. that the influence is concave (see section 1.2 for discussion of this assumption). Two variables based on income have to be developed: first the absolute income and second the relative income quartiles.

Absolute income (**log_income**) is derived by combination of the income measured as a continuous variable (either in original study or approximation of midpoints: see the previous paragraph) and PPP private conversion factor as defined by World Bank. It has to be converted to the monthly income for all the countries, because the question asked about yearly income in some of them. Other problem is that some countries adopted EURO and the World Bank does not take this into account. Hence the incomes in those countries prior to EURO adoption are adjusted by the fixed EURO conversion rates (European Central Bank 2014). The dependence between income and happiness is assumed to be concave and therefore the final result is in logarithmic form.

The average monthly adjusted household income per country in 2011 international dollars in logarithmic form is shown in Table 7. The log income is oscillating somewhere nearby 7 which means around 1 100 USD monthly, 13 200 USD yearly. If personal incomes are assumed create 60% of GDP then the yearly GDP is 22 000 USD (i.e. 10 in log terms), which is close to the presented GDP data. This assumption seems reasonable and indicates that the sample´s incomes are representative of the whole countries.

Table 7: Average monthly income per country in 2011 international dollars

Country	ISSP1991	ISSP1998	ISSP2001	ISSP2007	ISSP2008	ISSP2011
Australia	7.11		7.40	7.46	7.49	7.74
Austria	6.83	6.99	7.05	7.29	7.30	
Belgium				7.37	7.40	7.52
Bulgaria		5.23		6.23		6.17
Canada		7.43	6.99			
Croatia				6.40	6.66	6.77
Cyprus		6.88	7.02	6.91		
Czech Republic		6.26	6.42	6.86	6.83	7.03
Denmark		7.54	7.71		7.91	7.91
Dominican Republic				5.70	5.63	
Finland			7.29	7.67	7.77	7.92
France		7.23	7.34	7.48	7.56	7.67
Germany	6.62	7.13		7.27	7.32	7.47
Hungary		5.82	6.01	6.40	6.51	

Chile		5.30	5.49	5.89	5.92	6.08
Ireland	6.59	6.66		7.39	7.38	
Israel		6.22	6.66	6.77	6.82	7.04
Italy	6.71	6.81	6.77		7.06	
Japan		7.25	7.26	7.39	7.39	7.55
Korea, Rep.				7.39	7.54	7.59
Latvia		5.61	5.77	6.19	6.37	
Lithuania						6.53
Mexico				5.87	6.06	
Netherlands		9.86			7.62	7.47
New Zealand	7.05	7.24	7.32	7.49	7.54	
Norway	7.08	7.53	7.82	7.88	8.02	8.14
Philippines		5.16	5.17	5.18	5.27	5.11
Poland	5.73	6.02	6.03	6.43	6.67	6.62
Portugal		6.08			6.70	6.77
Russian Federation		4.89	5.20	6.20	6.22	6.69
Slovak Republic		6.17			6.66	6.75
Slovenia	6.40	6.61	6.61	6.92	7.17	7.13
South Africa				5.68	5.77	5.77
Spain		6.49	6.57		7.09	
Sweden		7.27		7.72	7.87	7.83
Switzerland		7.48	7.59	7.74	7.86	8.05
Turkey					5.52	6.25
Ukraine					6.04	
United Kingdom	6.75	7.12	7.17	7.46	7.49	7.50
United States	7.14	7.37	7.59	7.74	7.70	7.74
Uruguay				6.11	6.13	
Venezuela. RB					6.17	
Wave average	6.73	6.68	6.76	6.86	6.91	7.10

The relative income variable is in reality a set of four dummies according to a country based quartiles. Basically the country population in each wave is divided into quartiles based on the absolute income. Then the **first_quartile** comprises of the richest 25 % of the country's population and the **fourth_quartile** the poorest 25 % with the **second_quartile** and **third_quartile** in the middle. The quartiles (i.e. the relative income) seem to have an inverse U-shape relationship with happiness, where the second quartile has always the highest probability of the "Very happy" or "Completely happy" response (see Table 8 and Table 9). Nevertheless it can be concave effect of income that is producing this relationship, because the quartiles may not have sufficient granularity to distinguish the differences in high incomes.

Six different attributes are used as control socio demographic variables: gender, age, marital status, employment status, education and religion. The variables are discussed one by one

according to the influence on the happiness based on the simplest data analysis: the responses to target variable are divided based on the values of explanatory variables (see Table 8 and Table 9).

Gender is coded as 1 = Male and 0 = Female, therefore **male** is used as a dummy variable in models.[10] The simple data analysis shows no significant differences between males and females.

Age is inputted in two ways: first, as a continuous variable **age** and second the square of age (**age_sq**) is used as another continuous variable, because the effect of age on happiness is supposedly U-shaped (e.g. Oswald (1997), Frey and Stutzer (2002), Blanchflower and Oswald (2011)). This hypothesis seems to hold according to the data in both datasets as the percentage of the best answers "Very happy" and "Completely happy" firstly decreases with age and then slightly increases for individuals over 60 years old.

The marital status is coded as 1 = married or in registered partnership and 0 = other statuses (Single, Widowed, Separated, Divorced) and is used as a dummy **married** to control if an individual has a stable relationship. The effect of being in a legally sanctified relationship on happiness is visible from the percentage of married people who answered "Very happy"; the number is seven percentage points higher than for those without a partner. In ISSP 2011 married individuals were answering "Completely happy" with probability higher by three percentage points.

Two dummies are derived from employment status: first, dummy **unemployed** is coded 1 = an individual is unemployed otherwise = 0; and second, dummy **sick** coded as 1 = disabled or permanently sick and 0 = otherwise. The effect of unemployment and permanent sickness (or disability) is mostly visible on the "unhappiness" of the respondents. The answer "not at all happy" had three times higher probability to be chosen by unemployed or sick than by others. The same is true for the cumulative percentage of the worst three answers in ISSP 2011 (15% for unemployed, 17% for sick and only 5% for others).

Education is a continuous variable measuring how many years an individual spent at school. Threshold of 24 years at school is set as a maximum. The education has positive effect on happiness in all the waves. The probability of the "not at all happy" answer is eight times higher for those with almost no education (less than 8 years) than for those with at least 16 years of education (i.e. the respondent probably at least successfully finished high school).

[10] Only one dummy variable for the same characteristic can be used in the models and in this case it is male.

Religion drives two dummy variables. First, dummy **strong_religion** is coded as 1 = an individual visits a church at least once a weak and 0 = otherwise. Second, dummy **weak_religion** is coded 1 = an individual visits a church less than once a week but at least once a month. These dummies are capturing the effect of religion on happiness better than simple belonging to a church or a denomination. As Okulicz-Kozaryn (2010, 166) concludes: *"Most of the happiness that religiosity brings about seem to come from the social setting it offers, it satisfies the so called "need to belong" that is one of the most fundamental conditions for human happiness."*[11] The religion seems to have positive effect on happiness. The more religious a person is, the more probable it is that she is "very happy" or "completely happy" (10 respectively 3 percentage point difference between the strongly religious people and those who visit the church less than once a month).

[11] Interesting question not in the scope of this study is also how the religious diversity influences happiness. According to Okulicz-Kozaryn (2011) the higher religious diversity leads to less happy countries, therefore religion probably creates bonding as opposed to bridging social capital. This is in accordance to Putnam's (2001, 1993) research on social capital, where "bonding social capital" brings individual happiness, but maybe is not optimal for a society as a whole.

Table 8: Division of answers between independent variables - ISSP 1991 - ISSP 1998

Variable	not at all happy	not very happy	fairly happy	very happy
Quartile				
first_quartile	2%	15%	59%	24%
second_quartile	2%	12%	56%	30%
third_quartile	3%	14%	58%	25%
fourth_quartile	6%	24%	53%	17%
Gender				
Male	3%	15%	58%	24%
Female	4%	17%	56%	24%
Age				
<30	2%	14%	56%	28%
30-44	3%	15%	57%	25%
45-60	4%	17%	58%	21%
>60	5%	18%	55%	22%
Partnership				
Married	2%	13%	58%	27%
Without partner	5%	20%	55%	20%
Employment				
unemployed	8%	27%	47%	19%
sick	9%	27%	50%	14%
other status	3%	15%	57%	25%
Education				
<8	8%	25%	46%	21%
8-11	4%	18%	56%	22%
12-15	2%	14%	59%	25%
>15	1%	10%	60%	28%
Religion				
strong_religion	3%	14%	51%	32%
weak_religion	3%	16%	54%	27%
no_religion	3%	16%	59%	22%
Total	**3%**	**16%**	**57%**	**24%**

Table 9: Division of answers between independent variables ISSP 2011

Variable	1	2	3	4	5	6	7
Quartile							
first_quartile	0%	1%	4%	17%	42%	28%	8%
second_quartile	1%	1%	4%	12%	41%	31%	10%
third_quartile	0%	1%	3%	13%	47%	28%	7%
fourth_quartile	1%	3%	7%	22%	39%	22%	6%
Gender							
Male	1%	1%	4%	15%	43%	28%	8%
Female	1%	2%	5%	16%	42%	27%	7%
Age							
<30	1%	2%	4%	12%	39%	33%	10%
30-44	1%	1%	4%	14%	42%	30%	8%
45-60	1%	1%	5%	17%	45%	25%	6%
>60	1%	2%	5%	19%	43%	24%	7%
Partnership							
Married	0%	1%	3%	14%	43%	30%	9%
Without partner	1%	2%	7%	20%	41%	23%	6%
Employment							
unemployed	1%	5%	9%	21%	36%	21%	6%
sick	3%	4%	10%	23%	36%	16%	7%
other status	0%	1%	4%	15%	43%	28%	8%
Education							
<8	1%	4%	9%	23%	35%	20%	7%
8-11	1%	2%	5%	18%	43%	23%	8%
12-15	0%	1%	4%	15%	44%	28%	8%
>15	0%	1%	3%	11%	43%	35%	8%
Religion							
strong_religion	1%	2%	4%	14%	39%	29%	10%
weak_religion	1%	2%	5%	15%	39%	28%	9%
no_religion	1%	1%	4%	16%	44%	27%	7%
Smoking							
Smoker	1%	2%	6%	19%	42%	23%	7%
Non-smoker	1%	2%	4%	15%	42%	29%	8%
BMI							
underweight	0%	2%	6%	17%	42%	25%	8%
normal	0%	1%	4%	15%	43%	28%	8%
overweight	1%	1%	4%	18%	43%	26%	7%
Total	**1%**	**2%**	**5%**	**16%**	**42%**	**27%**	**8%**

4 Preliminary Analysis

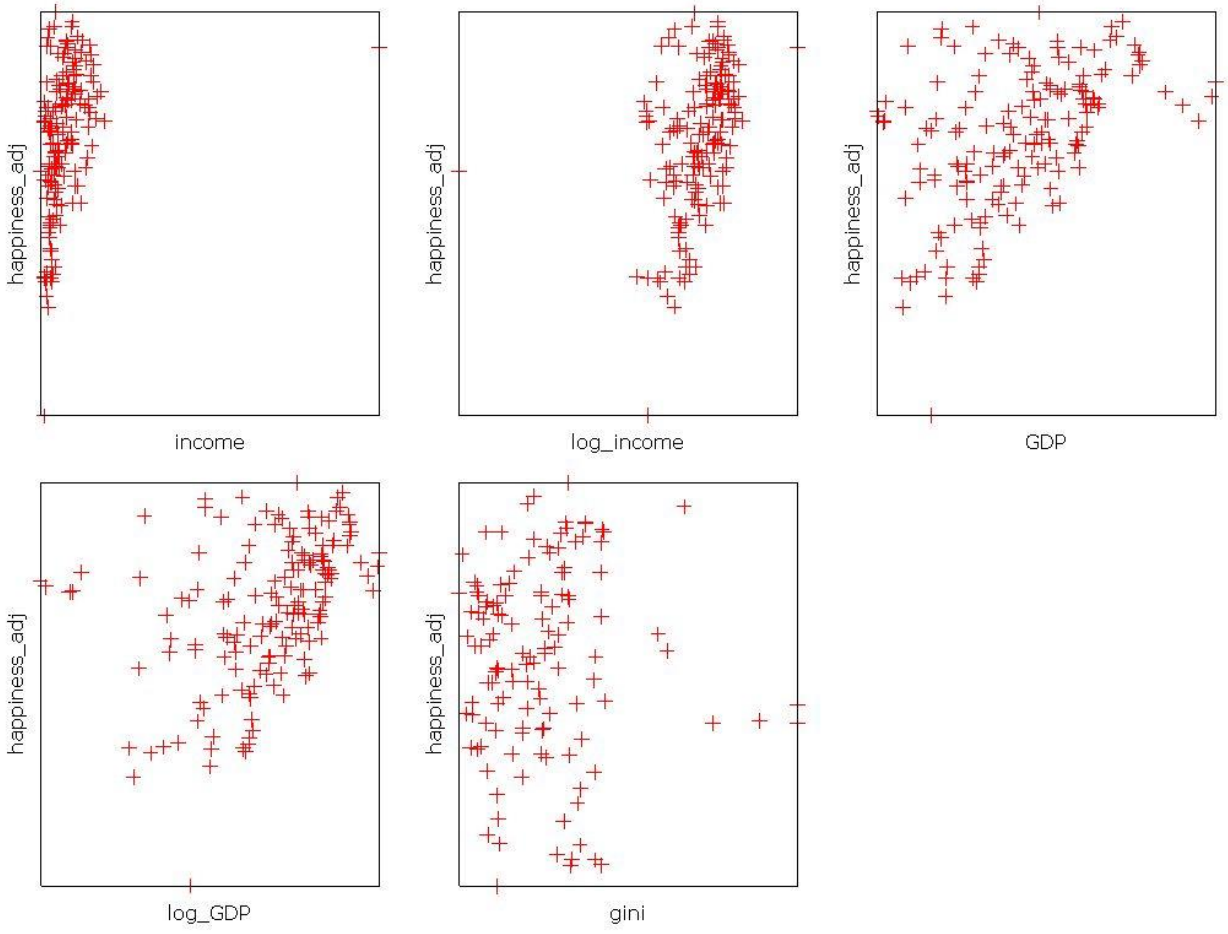
Two types of basic modeling are used in this chapter. First, analysis of basic scatterplots is conducted. Easterlin (1974, 1995, 2003) uses scatterplots as one of the main tools of the analysis

in his first works and in a changed form with annual data also in his further works in cooperation with others (Easterlin, et al. 2010, Easterlin and Angelescu 2009). Scatterplots are used as a starting point also by other authors (Stevenson and Wolfers 2008, Ball and Chernova 2008, Veenhoven 1991).

Second analysis is based on the research of Sacks, Stevenson & Wolfers (2013) where they compare between and within-country beta coefficients of the GDP variable. If the within-country beta coefficient (i.e. time dependent coefficient) is significantly different from zero and not significantly different from the between-country beta coefficient it is an indication, that growth of GDP has a significant effect not only statically (i.e. between countries), but also dynamically through time. Gretl is used to both to produce the scatterplots and to replicate the research of Sacks, Stevenson & Wolfers (2013).

4.1 Scatterplots

Figure 4: Scatterplots: Full Sample



Five different scatterplots are produced based on the data and showed in the Figure 4. They show the dependency between adjusted happiness and average income per country and year and its logarithm, GDP per capita and its logarithm and Gini coefficient. The scatterplots indicate that the assumption about concavity relationship between income, GDP and happiness holds and therefore these variables will be shown in the logarithmic form from now on.

Furthermore, these are the first indications that the relationship between GDP and happiness exists. This relationship seems stronger than relationship of average income with happiness and Gini coefficient with happiness. However it is only logical that the between-country relationship is not so strong for average income, because the income variable relates more to within-country relationship and furthermore is often capped from the above in the dataset. Furthermore, such results are very similar to Stevenson & Wolfers (2008) analysis.

The relationship between happiness and Gini coefficient is more interesting. At the first glance it predicts much weaker dependency of happiness on relative income measured by Gini coefficients. However it is important that Gini coefficients are not available for all the countries and therefore the samples are not the same. Therefore another set of scatterplots for the subsample of 127 observations with not null Gini (henceforth "Gini sample") is derived in the Figure 5. These show no significant change from the full sample scatterplots.

No statistically significant relationship between Gini and happiness is reported in Gretl. On the contrary the relationship between GDP and happiness is reported in Gretl as shown in the Figure 6 for the Gini sample (Equation: happiness_adj = - 4.27 + 0.414 log_GDP) and in the Figure 7 for the full sample (Equation: happiness_adj = -2.51 + 0.244 log_GDP), hence the relationship seems even more significant for the Gini sample.

The results suggest that the GDP has to grow 11 times (resp. 55 times) for the Gini sample (resp. for full sample) for happiness to change by one standard deviation, which somehow explains why no significant difference is visible when looking on simple happiness and GDP relation graph. The results of this simple analysis are close to much more sophisticated method by Stevenson & Wolkers (2008), where they report the beta coefficient to be between 0.3 and 0.4.

Figure 5: Scatterplots Gini sample

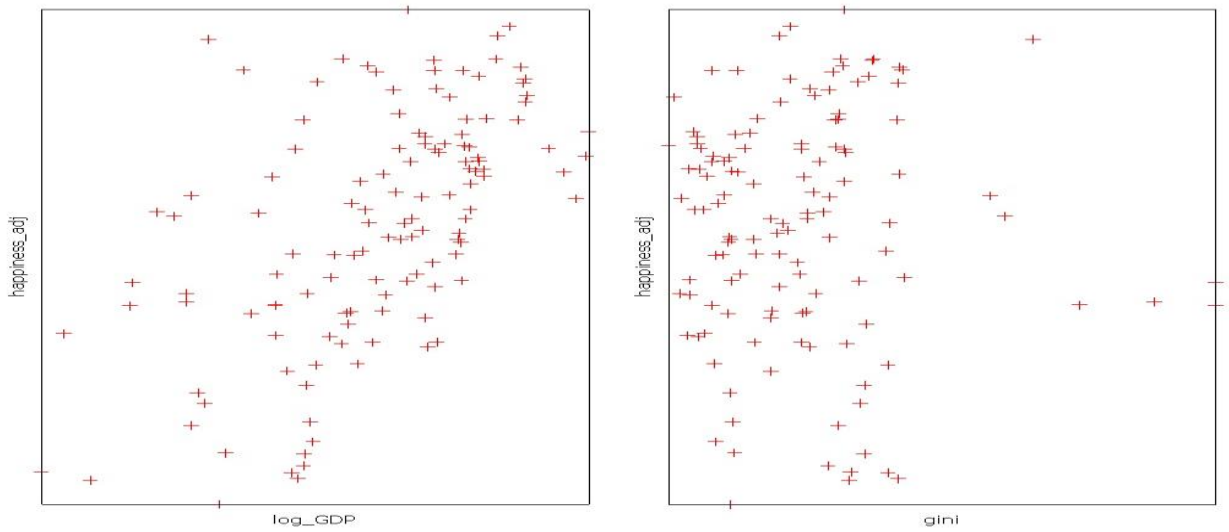


Figure 6 GDP regression Gini sample

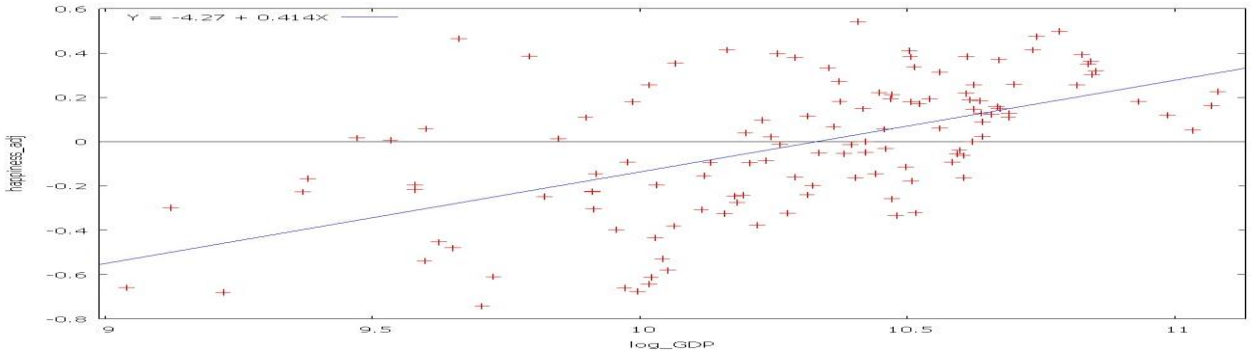
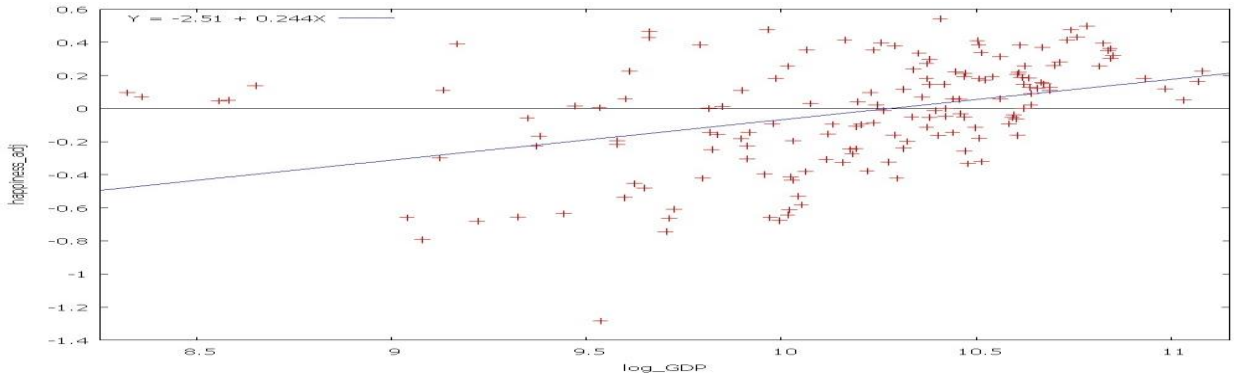


Figure 7: GDP regression full sample



4.2 Between and Within Country Gradients

The model (Stevenson and Wolfers 2008) is based on two separate regressions:

(1) **Between-country variation**: $AVG(Happiness\_adj)_c = \beta^{between} AVG(log\_GDP)_c + \varepsilon_c$

(2) **Within-country variation**: $\text{Happiness\_adj}_{cw} = \beta^{within}(\text{log\_GDP})_{cw} + \text{Country}_c + \text{Wave}_w + \varepsilon_{cw}$

where:

$AVG(Happiness\_adj)_c$ is country average of adjusted happiness in all surveys,

$AVG(log\_GDP)_c$ is country average of GDP per capita in logarithmic form in all surveys,

$Happiness\_adj_{ct}$ is adjusted mean of country happiness in a wave of ISSP

log_GDP_{ct} is GDP per capita in a country in a wave of ISSP

$Country_c$ are dummies for all the countries

$Wave_w$ are dummies for all the waves of ISSP

The data sample needs to be drastically decreased, because it is important to have balanced panel for this part of the analysis. Therefore only fourteen countries are included: Czech Republic, Denmark, France, United Kingdom, Chile, Israel, Japan, Norway, Philippines, Poland, Russia, Slovenia, Switzerland and United States in four waves: ISSP 1998, 2001, 2008, 2011. This leaves 56 observations altogether.

The results of the regressions are shown in the Table 10. The beta coefficients are more distant from the empirically found range between 0.3 and 0.4 (Stevenson and Wolfers 2008), but are close to the results 0.20 respectively 0.63 found for ISSP data in different waves and for little bit different sample of countries by Sacks, Stevenson & Wolfers (2013).

Standard t-tests respectively z-tests (Paternoster, et al. 1998) are made to test the hypothesis that $\beta^{within} = 0$ respectively that $\beta^{within} = \beta^{between}$ and one-tail p-value is reported in the Table 10, because the assumption is the β^{within} could be in interval $<0; \beta^{between}>$. The high p-value suggest that we cannot reject the null hypothesis that $\beta^{within} = 0$ and also the null hypothesis that $\beta^{within} = \beta^{between}$. This indicates that there is no difference between the observed relationship between rich and poor countries at one point of a time is similar within one country relationship of present and future population. Note that it takes long time for rising GDP to influence the happiness within one country, because the regression coefficients are not very high. The result is in accordance with Sacks, Stevenson & Wolfers (2013).

Table 10: Comparison of $\beta^{between}$ and β^{within}

$\beta^{between}$	β^{within}	Test $\beta^{within} = 0$	Test $\beta^{within} = \beta^{between}$
0.18*** (0.06)	0.74*** (0.25)	p=0.388	p=0.2747

4.3 Discussion of results

The preliminary analysis confirms the results of Sacks, Stevenson and Wolfers (2013) and of Veenhoven and Vergunst (2013) and predicts much lower relevance of relative income for an individual happiness. The scatterplots show higher correlation between logarithmic form of GDP and happiness than correlation of Gini and happiness and the Easterlin Paradox does not seem to hold in the case of comparing small ISSP sample of mostly developed countries.

5 Happiness and Income Relationship on the Micro Level

This section concentrates on the relationship between an individual income and her level of happiness, i.e. on the Hypothesis 1. First the economic model is defined; second, the methodology to measure its' predictions is established; third, the results are introduced; and finally the results are discussed in detail including a discussion about the influence of control variables. GRETL is the software used for statistical analysis made in this chapter.

5.1 Economic Model

The standard economic model assumes axioms of completeness, transitivity, reflexivity, continuity and non-satiation (Gravelle and Rees 2004, 11-15). These condition presuppose the maximization of an individual utility from her consumption, which is bounded by constraints like income or time. The non-satiation condition presupposes that an individual wants to consume more goods every time the constraint is shifted upward and therefore her utility increases: U'>0 (i.e. ceteris paribus: with higher income the individual is able to consume more goods and hence her utility rises). In formal way an individual i´s utility function can be written as[12]:

$$\mathbf{u_i = U(y_i)}$$

where u_i is an individual´s utility and y_i is an individual´s income.

The non-mainstream economists since Veblen (1949) are arguing that interdependent preferences (i.e. the reference income) play a significant role in one´s utility function (Duesenberry 1949, Frank 1985, Elster and Roemer 1993). To include a possibility of such an effect a utility function developed by Clark et al. (2008, 102) serves as the base for this study:

[12] The usual assumption is also that the marginal utility is decreasing with increasing income (i.e.: U''< 0).

$$U_{it} = U_i(u_1(y_{it}),u_2(y_{it}|y_{it}^*),u_3(Z_{it}))$$

where U_{it} is a common function for an individual i denoting how the utilities u_1, u_2 and u_3 are combined into final utility function U; the subscription t denotes time. In this setup y_{it} is an individual i´s income in time t, y_t^* is an income of a reference group for individual i and Z_{it} is a vector of socio-economic and demographic characteristics of an individual i in time t.

The status function is assumed to be homogeneous of degree zero, so that $u_2(ay_{it}|ay_{it}^*) = u_2(y_{it}|y_{it}^*)$, hence the proportional increase in income and reference income does not lead to a change in level of happiness through status. This comparison function can be used for comparison to income others as well as to one's past income as shown by Clark et al. (2008).

In empirical testing this equation is typically transformed to:

$$U_{it} = \beta_1 log(y_{it}) + \beta_2 log(y_{it}/y_{it}^*) + \gamma(Z_{it})$$

where y_{it} is a measure of household income, y_{it}^* is a measure of reference income and Z_{it} include the demographic characteristics.

In this study the reference income is not measured in the same way, but rather as an income quartile of an individual i in a country c in time t, because of certain data constraints. Nevertheless the income quartile should be a good proxy for the relative income defined in the equation as has been shown by Barrington-Leigh (2010). Therefore the empirical equation transforms into:

$$U_{it} = \beta_1 log(y_{it}) + \beta_2 q1_{ict} + \beta_3 q2_{ict} + \beta_4 q3_{ict} + \beta_4 q4_{ict} + \gamma(Z_{it})$$

Where $q1_i$, $q2_i$, $q3_i$, $q4_i$ is a set of dummies of each respective income quartile in a given country c and in a given time t (the highest = q1 and the lowest = q4).

This equation is used for micro level income comparison. The macro level comparison also includes the effects of gross national product (GDP), Gini coefficient and annual growth of GDP to control for the absolute income, relative income and the time adjustment in income on macro level[13].

[13] For discussion how the macro characteristics are included in the econometrical model see section 6.1.

5.2 Model

Standard OLS and ordered probit models[14] are used to analyze the relationship of the happiness and income on the micro level for each individual (i.e. no GDP or Gini is entering into the equations). All the models are calculated by robust standard error method to control for heteroscedasticity and multicollinearity is indicated in GRETL only for age and age_sq, where it is expected. Ordered probit is statistically more correct to use instead of OLS because target variable is not continuous. However often the models provide similar results and OLS is much easier to interpret (for further discussion see section 1.5). Furthermore, with OLS regression a standardized variable can be used as a target. This is not possible with ordered probit, because the target variable is no longer discrete.

Eight models are developed in total. The results from the models are shown in Table 11. The data from ISSP 1991 to ISSP 2008 waves is considered as one dataset and ISSP 2011 is separated, because the target variable differs in scale, which causes problems for probit models, where the target variable has to be discrete. First, only the income variables are included:

(3) **OLS:** $\text{Happiness\_adj}_i = \beta_1\text{log\_income}_i + \beta_2\text{first\_quartile}_i + \beta_3\text{third\_quartile}_i + \beta_4\text{fourth\_quartile} + \sum\beta_c\text{Country}_{ci} + \sum\beta_w\text{Wave}_{wi} + \varepsilon_i$

(4) **Ordered Probit** $\text{Happiness}_i = \beta_1\text{log\_income}_i + \beta_2\text{first\_quartile}_i + \beta_3\text{third\_quartile}_i + \beta_4\text{fourth\_quartile}_i + \sum\beta_c\text{Country}_{ci} + \sum\beta_w\text{Wave}_{wi} + \varepsilon_i$

(5) **OLS (2011):** $\text{Happiness\_adj}_i = \beta_1\text{log\_income}_i + \beta_2\text{first\_quartile}_i + \beta_3\text{third\_quartile}_i + \beta_4\text{fourth\_quartile}_i + \sum\beta_c\text{Country}_{ci} + \varepsilon_i$

(6) **Ordered Probit (2011): :** $\text{Happiness}_i = \beta_1\text{log\_income}_i + \beta_2\text{first\_quartile}_i + \beta_3\text{third\_quartile}_i + \beta_4\text{fourth\_quartile}_i + \sum\beta_c\text{Country}_{ci} + \varepsilon_i$

The income variables are explained in the section 3.2, Country_{ci} are country dummies and Wave_{wi} are the ISSP wave dummies. Wave dummies are not included for the model of ISSP 2011 wave where the inclusion would not make any sense. The dummy for the second income quartile is excluded, because in the preliminary data analysis it produced a peak in happiness.

[14] Ordered logit provided similar results, but only the results of probit are reported, because the maximum likelihood ratios indicated probit as a better model.

The results of the simple models seem to confirm the Hypothesis 1, that the income has positive concave relationship with happiness. Nevertheless the first results suggest contradictory effect of relative income. Those in the highest income are the least happy and those in the lowest income quartile are the most happy. This outcome holds only for the aggregated data. In the ISSP 2011 only the effect of fourth quartile and only in probit model is significant and has the expected negative sign (i.e. being in the lowest income quartile has negative impact on happiness).

Ambiguity of the simple models asks for the inclusion of control variables, hence complete models are derived and described by the following equations:

(7) **OLS:** $\text{Happiness\_adj}_i = \beta_1\text{log\_income}_i + \beta_2\text{first\_quartile}_i + \beta_3\text{third\_quartile}_i + \beta_4\text{fourth\_quartile}_i + \beta_5\text{male}_i + \beta_6\text{age}_i + \beta_7\text{age\_sq}_i + \beta_8\text{married}_i + \beta_9\text{unemployed}_i + \beta_{10}\text{sick}_i + \beta_{11}\text{education}_i + \beta_{12}\text{weak\_religion}_i + \beta_{13}\text{strong\_religion}_i + \sum\beta_c\text{Country}_{ci} + \sum\beta_w\text{Wave}_{wi} + \varepsilon_i$

(8) **Ordered Probit** $\text{Happiness}_i = \beta_1\text{log\_income}_i + \beta_2\text{first\_quartile}_i + \beta_3\text{third\_quartile} + \beta_4\text{fourth\_quartile} + \beta_5\text{male}_i + \beta_6\text{age}_i + \beta_7\text{age\_sq}_i + \beta_8\text{married}_i + \beta_9\text{unemployed}_i + \beta_{10}\text{sick}_i + \beta_{11}\text{education}_i + \beta_{12}\text{weak\_religion}_i + \beta_{13}\text{strong\_religion}_i + \sum\beta_c\text{Country}_{ci} + \sum\beta_w\text{Wave}_{wi} + \varepsilon_i$

(9) **OLS (2011):** $\text{Happiness\_adj}_i = \beta_1\text{log\_income}_i + \beta_2\text{first\_quartile}_i + \beta_3\text{third\_quartile}_i + \beta_4\text{fourth\_quartile}_i + \beta_5\text{male}_i + \beta_6\text{age}_i + \beta_7\text{age\_sq}_i + \beta_8\text{married}_i + \beta_9\text{unemployed}_i + \beta_{10}\text{sick}_i + \beta_{11}\text{education}_i + \beta_{12}\text{weak\_religion}_i + \beta_{13}\text{strong\_religion}_i + \sum\beta_c\text{Country}_{ci} + \varepsilon_i$

(10) **Ordered Probit (2011): :** $\text{Happiness}_i = \beta_1\text{log\_income}_i + \beta_2\text{first\_quartile}_i + \beta_3\text{third\_quartile}_i + \beta_4\text{fourth\_quartile}_i + \beta_5\text{male}_i + \beta_6\text{age}_i + \beta_7\text{age\_sq}_i + \beta_8\text{married}_i + \beta_9\text{unemployed}_i + \beta_{10}\text{sick}_i + \beta_{11}\text{education}_i + \beta_{12}\text{weak\_religion}_i + \beta_{13}\text{strong\_religion}_i + \sum\beta_c\text{Country}_{ci} + \varepsilon_i$

Inclusion of the control variables leaves the effect of the absolute income intact, but now only the fourth quartile dummy is significant and negative. In 2011 wave the effect of relative income (respectively quartiles) on happiness is completely insignificant.

Table 11: Happiness regressions – Micro Data

	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
const	-0.793*** (0.054)		-2.238*** (0.112)		0.075 (0.059)		-1.176*** (0.118)	
log_income	0.195*** (0.006)	0.226*** (0.006)	0.247*** (0.014)	0.255*** (0.014)	0.145*** (0.006)	0.174*** (0.007)	0.188*** (0.014)	0.201*** (0.015)
first_quartile	-0.026** (0.012)	-0.030** (0.015)	0.022 (0.029)	0.027 (0.032)	-0.014 (0.012)	-0.018 (0.016)	-0.018 (0.029)	-0.019 (0.033)
third_quartile	0.011 (0.009)	0.006 (0.011)	0.021 (0.022)	0.000 (0.024)	0.004 (0.009)	-0.003 (0.012)	0.009 (0.022)	-0.012 (0.025)
fourth_quartile	-0.041*** (0.013)	-0.052*** (0.015)	-0.046 (0.032)	-0.072** (0.035)	-0.029** (0.014)	-0.042** (0.017)	-0.002 (0.032)	-0.027 (0.036)
male					-0.024*** (0.005)	-0.032*** (0.006)	-0.020* (0.011)	-0.024* (0.012)
age					-0.036*** (0.001)	-0.044*** (0.001)	-0.035*** (0.002)	-0.041*** (0.002)
age_sq					0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
married					0.329*** (0.006)	0.405*** (0.007)	0.342*** (0.012)	0.394*** (0.014)
unemployed					-0.222*** (0.013)	-0.257*** (0.016)	-0.289*** (0.029)	-0.314*** (0.031)
sick					-0.269*** (0.021)	-0.311*** (0.024)	-0.355*** (0.039)	-0.352*** (0.041)
education					0.013*** (0.001)	0.016*** (0.001)	0.010*** (0.002)	0.011*** (0.002)
weak_religion					0.060*** (0.008)	0.076*** (0.011)	0.062*** (0.02)	0.073*** (0.022)
strong_religion					0.168*** (0.008)	0.217*** (0.01)	0.169*** (0.018)	0.198*** (0.021)
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES
Wave dummies	YES	YES	NO	NO	YES	YES	NO	NO
R^2	0.13		0.09		0.17		0.14	
Adjusted R^2	0.13		0.09		0.17		0.14	
Log-likelihood	-195595	-145215	-44247	-45057	-166388	-122680	-40002	-40787
N	144809	144809	32244	32244	126413	126413	29912	29912

Standard error in parenthesis

***** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1**

5.3 Discussion of the Results

The results from Table 11 indicate a strong similarity between ordered probit and OLS models. All the coefficients have the same sign and except of one (the fourth quartile dummy in ISSP 2011 simple models) are significant on the same level. The interpretation of ordered probit requires calculation of marginal effects for a predefined individual (e. g. male, 35 years old, unemployed, married, etc.) and it is not very meaningful when other method is possible. In this case similarity of models justifies to use the OLS coefficient interpretation as a very close proxy

of ordered probit coefficients. Therefore the OLS coefficients are going to be used for discussion of the results[15].

The R^2 of the models are low (around 0.10), but this is expected and usual result in research concentrating on abstract target variables such as happiness. All variables will be discussed in the next paragraphs; first, variables of interest (log_income and quartile dummies) and control variables second.

Absolute Income. The coefficient for absolute income have positive signs and is statistically significant in full OLS models with values 0.145 respectively 0.201 for ISSP 2011 wave, thus 10% increase in an individual income results in increase of happiness by 0.014 to 0.019 standard deviation in comparison to wave mean. The results therefore confirm the Hypothesis 1, absolute income has a positive effect on an individual´s subjective well-being.

Interpretation of the effect of control variables can be compared with income using a methodology discussed by Blanchflower and Oswald (2004). The coefficient are always compared to a change in income necessary to compensate for the effect calculated in percentage (i.e. using equation $\beta_1 \log(x + \text{change (in \%)} / 100) = \beta_{z)}$. Nevertheless the interpretation has to be taken with a grain of salt, because it is the effect for an average individual based on the results of statistical modelling. In this chapter coefficient 0.18 is going to be assumed as $\beta_{1,}$ because it is in the middle of the predicted models coefficients.[16]

Comparing the magnitude to different studies is not simple because of different scale, but for example Ball and Chernova (2008) conclude that 10% increase of income leads to 0.011 point increase on 10-point scale suggesting that even the magnitude can be similar to this study. Furthermore the coefficients are comparable to the one calculated for the between-country gradient in section 0 (0.18), which makes sense, because all the incomes are recalculated to the same PPP adjusted international dollars and therefore are comparable between countries. There are also more countries than waves, hence the coefficient should be closer to between countries than within countries coefficient.

Income Quartiles. The coefficients of income quartiles in the simple model without control variables confirm the data analysis made in section 3.2, where it seemed the peak of happiness is

[15] Keep in mind that the target variable for OLS is standardized and hence all the results have to be interpreted as by how many standard deviations one´s happiness changes from the survey mean.

[16] 0,173 is the mean, but it is rounded upwards, because of the hypothesis that other variables have stronger effect on happiness. This allows the comparison to be more conservative.

at the second highest quartile.[17] Nevertheless only the fourth quartile dummy remains significant when other variables are controlled for. At least one plausible explanations of this effect exist. The people in first income quartile are on average older by almost half a year (see Table 12) and older people are less happy. Therefore the inclusion of age as a control variable can be one of the main reasons why now only the negative coefficient of the fourth_quartile dummy remains significant.

Table 12: Quartile vs. age

quartile	age
1	46,9
2	46,5
3	45,0
4	45,8

The significance of the fourth_quartile dummy suggests that the income comparison is relevant only for the poorest 25%. The effect of being in the lowest quartile is approximately -0.03 standard deviation, hence the effect of increasing income is even multiplied for an individual moving from the bottom ranks of the income distribution. Nevertheless, the dummy is completely insignificant for the 2011 wave and the results are not fully in accordance with the literature and Hypothesis 2. Note that developed, developing and Eastern European countries are mixed in the sample and for some of them like Russia the tunnel effect (Hirschman and Rothschild 1973) has been confirmed (Senik 2004). Furthermore, Graham and Felton (2006) find that the effect of comparison income can be often higher for the poor.

The comparison of the results for the pooled sample of ISSP 1991 to ISSP 2008 and for the ISSP 2011 could also indicate that the effect of relative income is rather within countries than between countries. The quartiles are calculated for each wave and country, but the coefficients are significant only for the pooled data (1991 – 2008) suggesting adjustability (see section 1.2) as a possible explanation of the negative coefficient for fourth quartile dummy (i.e. the ones on the bottom are always "jealous" of those at the top).

Gender. Being a male reduces an individual happiness by 0.024 (respectively 0.02) standard deviation. Comparison with income shows that women are happier than men even when their salary is approximately 15 % lower.[18] The result confirms the general opinion that women are happier than men (Blanchflower and Oswald 2004, Caporale, et al. 2009, Frey and Stutzer 2002,

[17] The second quartile dummy is omitted and hence the coefficients of other dummies are comparing the given quartile with the second one.

[18] Log (1.15)*0.18 = 0.25

van Praag and Ferrer-i-Carbonell 2008), but the effect is not as significant as of other explanatory variables. The coefficient for ISSP data confirms the theory even more because it is not statistically significant on 0.01 level, but only on 0.05 level.

Age. The age and happiness relationship has been predicted to take a U-shape form. Purely statistically the result was confirmed, because the coefficient for both variables age and age_sq are statistically significant. However the peak where the effect of age is equal to age_sq is approximately 120 years $(0.036*120 = 0.0003*120)^2$. The conclusion is that happiness is decreasing with age however not exactly linearly, similar conclusion can be found in several other studies (Ball and Chernova 2008, Blanchflower and Oswald 2008). Growing older from 30 to 40 decreases individual happiness by 0.15[19] standard deviation, this means in the same way as would approximately 57 %[20] decrease in household income.

Marriage. Being married as opposed to not being in legally binding relationship[21] has significant positive impact on level of happiness. Marriage increases happiness by 0.339 (respectively 0.342) standard deviation. The increase of salary to compensate for not being married would have to be 550%[22], which is a really large number. Nevertheless, the results of this study are similar to Blanchflower and Oswald (2004) who estimate the value of marriage on 100 000 USD and of other authors (Wu and Li 2013, Stutzer 2004).

Unemployment and Sickness. Both being unemployed and being permanently sick predicts a large effect on happiness that is comparable only with marriage, but with the opposite sign. Losing a job leads to a decrease of happiness by 0.222 (respectively by 0.289) standard deviation. This translates into the same effect as a decrease of income by approximately 75%.[23] The effect of disability or permanent sickness is even more severe resulting into decrease of happiness by 0.269 (respectively by 0.355) standard deviation. Decrease of household income by approximately 80%[24] would produce a comparable effect.

The results are completely in accordance with literature, which overwhelmingly shows strong significant effect of both unemployment and health on an individual happiness (Ball and

[19] $-0.036*(40-30) + 0.0003*(40^2-30^2) = -0.36 + 0.21 = -0.15$
[20] Log $(0.43)*0.18 = -0.15$
[21] See the definition of dummy Married in section 3.2
[22] Log $(6.5)*0.18= 0.34$
[23] $\text{Log}(0.25)*0.18 = - 0.25$
[24] $\text{Log}(0.2)*0.18 = - 0.29$

Chernova 2008, Blanchflower and Oswald 2004, B. Frey 2008, Clark and Oswald 1994, Gerdtham and Johannesson 2001).

Education has predicted effect on happiness, every year at school increases happiness by 0.013 (respectively by 0.010) standard deviation, therefore five years at school result in increase of happiness by 0.05 standard deviation. The household income would have to rise by 30%.[25] The effect of education seems smaller than the other control variables included except of gender. Similar effect is reached by Blanchflower (2009) for international data, by Cuñado and Gracia (2012) for Spain and Clark and Oswald (1994) for Britain.

Religion. The church visits have positive impact on happiness and the impact is growing with increasing frequency of visits (i.e. the more one visits a church the happier she is). At least one visit in a church per month increases happiness by 0.060 standard deviation. A monthly church visit is therefore comparable to an increase of household income by 40%.[26] If an individual increases the visits to a church to once a week her happiness level will increase by 0.168 standard deviation compared with a church non-goer. A person not visiting church would need to achieve an increase of 150% in her household income to achieve the same level of happiness as a regular weekly visitor of church.

The magnitude of these results is higher than in regular studies (Ball and Chernova 2008), where religion is measured as a belonging to a certain denomination, but it is in line with studies concentrating more on social capital of a church visit than on the religiosity itself (Helliwell and Putnam 2004, Okulicz-Kozaryn 2010).

Summary

The coefficient of absolute income is positive and statistically significant through all the models and therefore Hypothesis 1 is confirmed. The impact of the relative income measured by the income quartile dummies is ambiguous, because the fourth quartile dummy is the only one significant and only for the pooled data. Nevertheless the dummy has the predicted negative sign and hence provide cautious confirmation of Hypothesis 2. Almost all control variables (except of education and gender) have large effect in comparison to income (e. g. being unemployed has the same effect as 75% decrease in household income and being married has the same effect as 550 % increase in household income, which confirms Hypothesis 3.

[25] Log(1.3)*0.18 = 0.05
[26] Log(1.4)*0.18 = 0.06

6 Happiness and Income (GDP) relationship on Macro Level

The models in previous section were based on the micro data about personal income and other control variables (like being a man, age of a respondent or marital status). The similarity of the ordered probit and OLS models creates an opportunity to use even more sophisticated modeling based on the OLS. This section is building upon the conclusions of the previous models and enlarges the analysis by including the macroeconomic characteristics: GDP, Gini coefficient and Growth of GDP to test the Hypothesis 4.

6.1 Models

The hierarchical linear multilevel model (henceforth "HLM") is used to take into account also macroeconomic characteristics. The HLMs enable us to estimate patterns of variation within and across countries simultaneously, by allowing intercepts to vary (Raudenbush and Bryk 2002). Similar multilevel strategy has been adopted recently by a number of authors studying the relationship between income and happiness (Pittau, Zelli and Gelman 2010, Wu and Li 2013). Given the significant differences between the levels of economic development of the countries in the ISSP sample the HLM provides a good platform to test the effect of macro variables on the subjective well-being of individuals.

The HLM used in this study is always two leveled. The next steps follow the methodology set by Raudenbush and Bryk (2002) and Wu and Li (2013). In the first level the individual´s (i.e. micro) characteristics are taken into account which are based on previous OLS and ordered probit models. The equation is set up as following:

$$\textbf{Happiness\_adj}_{ic} = \beta_{0c} + \beta_{1c}\text{log\_income}_{ic} + \beta_{2c}\text{first\_quartile}_{ic} + \beta_{3c}\text{third\_quartile}_{ic} + \beta_{4c}\text{fourth\_quartile}_{ic} + \beta_{5c}\text{male}_{ic} + \beta_{6c}\text{age}_{ic} + \beta_{7c}\text{age\_sq}_{ic} + \beta_{8c}\text{married}_{ic} + \beta_{9c}\text{unemployed}_{ic} + \beta_{10c}\text{sick}_{ic} + \beta_{11c}\text{education}_{ic} + \beta_{12c}\text{weak\_religion}_{ic} + \beta_{13c}\text{strong\_religion}_{ic} + \varepsilon_{ic}$$

All the variables are defined in the section Data, β_{0c} is a coefficient for the intercept, the notation i describes an individual who is always nested in a country c and ε_{ic} is an individual-level error. The country characteristics entry into the equation through the intercept, therefore the second level equations are defined as follows:

(a) $\boldsymbol{\beta_{0c}} = \gamma_{00} + u_{0c}$

(b) $\boldsymbol{\beta_{0c}} = \gamma_{00} + \gamma_{01}\text{log\_GDP} + u_{0c}$

(c) $\boldsymbol{\beta_{0c}} = \gamma_{00} + \gamma_{01}\text{log\_GDP} + \gamma_{02}\text{Gini} + u_{0c}$

(d) $\boldsymbol{\beta_{0c}} = \gamma_{00} + \gamma_{01}\text{log\_GDP} + \gamma_{02}\text{Gini} + \gamma_{03}\text{GDP\_growth} + u_{0c}$

where the variables are defined in the section Data, β_{0c} is the intercept for the first level equation, the notation c means a country and u_{0c} is a country level error.

Separate equations for coefficients of all the rest of the variables is necessary:

(e) $\boldsymbol{\beta_{nc}} = \gamma_{n0} + u_{nc}$

where β_{nc} is a coefficient for a variable n defined in the first level equation (13 in total), γ_{n0} is an intercept for the n variable and u_{nc} is a country level error term for variable n.

Input of the equation a – e into first level equation produces four different equations for the model:

(11) $\textbf{Happiness\_adj}_{ic} = \gamma_{00} + \sum\gamma_{n0}X_n + u_{0c} + \sum u_{nc}X_n + \varepsilon_{ic}$

(12) $\textbf{Happiness\_adj}_{ic} = \gamma_{00} + \sum\gamma_{n0}X_n + \gamma_{01}\text{log\_GDP}_c + u_{0c} + \sum u_{nc}X_n + \varepsilon_{ic}$

(13) $\textbf{Happiness\_adj}_{ic} = \gamma_{00} + \sum\gamma_{n0}X_n + \gamma_{01}\text{log\_GDP}_c + \gamma_{02}\text{Gini}_c + u_{0c} + \sum u_{nc}X_n + \varepsilon_{ic}$

(14) $\textbf{Happiness\_adj}_{ic} = \gamma_{00} + \sum\gamma_{n0}X_n + \gamma_{01}\text{log\_GDP}_c + \gamma_{02}\text{Gini}_c + \gamma_{03}\text{GDP\_growth}_c + u_{0c} + \sum u_{nc}X_n + \varepsilon_{ic}$

where X_n is nth variable from the happiness equation.

The main variable of interest for the study is income comparison, hence in the final model also the interaction variable between log_income and Gini is included. The second level equations in this case equal to:

(f) $\boldsymbol{\beta_{0c}} = \gamma_{00} + \gamma_{01}\text{log\_GDP}_c + \gamma_{02}\text{Gini}_c + \gamma_{03}\text{GDP\_growth}_c + u_{0c}$

(g) $\boldsymbol{\beta_{1c}} = \gamma_{10} + \gamma_{11}\text{Gini}_c + u_{1c}$

Therefore the final equation equals to:

(15) $\textbf{Happiness\_adj}_{ic} = \gamma_{00} + \sum\gamma_{n0}X_n + \gamma_{01}\text{log\_GDP}_c + \gamma_{02}\text{Gini}_c + \gamma_{03}\text{GDP\_growth}_c + u_{0c} + \gamma_{11}\text{Gini} + u_{1c} + \sum u_{nc}X_n + \varepsilon_{ic}$

The results of HLMs are shown in Table 13. The p-values in Table 13 are not based on the standard t-tests of the variables, because such tests are not possible in the HLM. The standard testing is based on ANOVA comparison of the results of a model where certain variable is included and of a model where it is not and the p-values of the chi-squared tests for such comparisons are provided.

The R (R Core Team 2014) provides the statistics to calculate the HLM, particularly, lme4 (Bates, et al. 2014) package is used to calculate the linear model itself and lmerTest package (Kuznetsova, Brockhoff and Bojesen Christensen 2014) provides the tests of statistical significance.

Table 13: Hierarchical Linear Models

	(11)	(12)	(13)	(14)	(15)
const	-0.457***	-1.117***	-1.547***	-1.380***	-0.926***
	(0.057)	(0.169)	(0.214)	(0.215)	(0.226)
log_income	0.144***	0.137***	0.134***	0.136***	0.059***
	(0.004)	(0.005)	(0.006)	(0.006)	(0.013)
first_quartile	-0.008	0.000	-0.007	-0.010	-0.002
	(0.011)	(0.011)	(0.013)	(0.013)	(0.013)
third_quartile	-0.002	-0.008	-0.002	-0.001	0.000
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
fourth_quartile	-0.042***	-0.054***	-0.063***	-0.058***	-0.056***
	(0.011)	(0.011)	(0.013)	(0.013)	(0.013)
male	-0.023***	-0.023***	-0.022***	-0.022***	-0.022***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
age	-0.035***	-0.035***	-0.036***	-0.036***	-0.035***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
age_sq	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
married	0.334***	0.335***	0.349***	0.348***	0.348***
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)
unemployed	-0.240***	-0.241***	-0.258***	-0.258***	-0.253***
	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)
sick	-0.281***	-0.281***	-0.298***	-0.299***	-0.300***
	(0.016)	(0.016)	(0.017)	(0.017)	(0.017)
education	0.012***	0.012***	0.013***	0.013***	0.013***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
weak_religion	0.064***	0.065***	0.064***	0.063***	0.064***
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
strong_religion	0.172***	0.173***	0.167***	0.167***	0.167***
	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)
log_gdp		0.071***	0.082***	0.068***	0.074***
		(0.017)	(0.021)	(0.022)	(0.022)
gini			0.011***	0.009***	-0.007**
			(0.002)	(0.002)	(0.003)
GDP_growth				0.009***	0.009***
				(0.001)	(0.001)
gini*log_income					0.002***
					(0.000)
Micro-variance	0.824	0.824	0.785	0.785	0.785
Macro-variance	0.083	0.081	0.058	0.061	0.062
Explained variance	0.091	0.090	0.069	0.072	0.073
Log-likelihood	-206844	-206835	-157658	-157637	-157615
N -micro	156325	156325	121385	121385	121385
N -macro	42	42	38	38	38

Standard error in parenthesis

***** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1**

6.2 Discussion of the Results

The results for control variables and micro economic variables of interests are almost identical to the models in the section 5 and do not differ even between the HLMs therefore they will not be discussed and the reader is referred to discussion in section 5.3. The only thing worth mentioning is that the fourth income quartile dummy is statistically significant in all the models covering the whole sample and that the adjustability hypothesis is indicated even stronger than in section 5. In the next paragraphs the macroeconomic indicators are going to be discussed.

Gross Domestic Product in logarithmic form is statistically significant predictor in all the models and it´s predictive power is approximately half of the individual income (0.07 of standard deviation). Such result was expected by Hypothesis 2. It is contradicting the effect of GDP observed by Wu and Li (2013). They provide evidence the GDP does not influence the life satisfaction in China. Nevertheless, the research (Pittau, Zelli and Gelman 2010) based on European sample shows statistically significant positive effect of GDP on individual happiness even when household income is controlled for.

Results in this study provide an indication that both absolute level of individual income as well as country´s level of income (GDP) have positive effect on happiness on average in this sample of 42 (respectively 38) countries. The magnitude of the GDP effect on happiness could differ with the level and structure of government spending and with level of corruption (Tanzi a Davoodi 2000), which is correlated with GPD, but does not have to be the same among similarly wealthy countries. This is a potential for further research in individual countries.

Gini Coefficient. The impact of income inequality measured by Gini coefficients is statistically significant and positive until the joined effect of income inequality and household income is controlled for. Then the sign of the coefficient turns negative while remaining statistically significant. However the whole time the magnitude of the coefficient remains small (between 0.01 and -0.01 standard deviation).

The positive coefficients in the first models would suggest that the tunnel effect is observed on average among the countries similarly to Caporale et al. (2009). However introduction of the joint coefficient of Gini and personal income shows the effect of income inequality on happiness is probably channeled through the level of household income. Rich households in the more unequal countries are observed to be happier than poor households in unequal countries. Furthermore, in equal countries the effect of Gini is diminished and also the effect of income is diminished as can

be seen on the decrease of household income coefficient. Similar differences between effect of income inequality between rich and poor is reported by Graham and Felton (2006).

GDP growth has a statistically significant slightly positive effect on an individual´s happiness. It is debatable whether the coefficient is high enough to indicate the Easterlin Paradox does not hold at all, however it does provide an evidence of the influence of not only the current level of GDP, but also of yearly change. Nevertheless, Easterlin (2010) recently reformulated the paradox to take effect only in longer period of times and if working with definition the necessary prove needs more time-series data.

Summary

The results of HLMs provide an evidence that Hypothesis 4 stands. The national income impacts happiness in a similar way as household income and even complementary to it. The effect of Gini coefficient seems ambiguous, which is however similar finding to the one of the micro level models. Further research is necessary to confirm if Hypothesis 4 works even in very long run and to provide evidence on the difference between the impact of GDP level and GDP growth on individual happiness.

7 Different Measurements of Well-Being

Models based on micro and macro indicators explaining happiness have been developed in previous sections. This section uses almost the same indicators to explain other measurements of well-being: health and emotional well-being. The similarity between OLS and probit modeling of happiness was proved in section 5. The ordered probit model was applied on the health and emotional well-being, too, however the outcome was the same as in section 5 and therefore only the OLS models are reported.

7.1 Model

Two new control variables are introduced to the models: BMI and smoker dummy (see section 3.2 for definition of these variables), therefore also a model with happiness as a target variable is reported for a comparison. Only the data from ISSP 2011 are used, therefore no wave dummies are necessary. All target variables are in standardized form to ensure comparability and make the interpretation of similarities and differences possible. The regressions are again calculated by robust standard errors and no signs of multicollinearity are spotted by standard GRETL test. The equations for the models follow:

(16) $\textbf{Happiness\_adj}_i = \beta_1 \text{log\_income}_i + \beta_2 \text{first\_quartile}_i + \beta_3 \text{third\_quartile}_i + \beta_4 \text{fourth\_quartile}_i + \beta_5 \text{male}_i + \beta_6 \text{age}_i + \beta_7 \text{age\_sq}_i + \beta_8 \text{married}_i + \beta_9 \text{unemployed}_i + \beta_{10} \text{sick}_i + \beta_{11} \text{education}_i + \beta_{12} \text{weak\_religion}_i + \beta_{13} \text{strong\_religion}_i + \beta_{14} \text{BMI}_i + \beta_{15} \text{smoker}_i + \sum \beta_c \text{Country}_{ci} + \varepsilon_i$

(17) $\textbf{Overall\_Health\_adj}_i = \beta_1 \text{log\_income}_i + \beta_2 \text{first\_quartile}_i + \beta_3 \text{third\_quartile}_i + \beta_4 \text{fourth\_quartile}_i + \beta_5 \text{male}_i + \beta_6 \text{age}_i + \beta_7 \text{age\_sq}_i + \beta_8 \text{married}_i + \beta_9 \text{unemployed}_i + \beta_{10} \text{sick}_i + \beta_{11} \text{education}_i + \beta_{12} \text{weak\_religion}_i + \beta_{13} \text{strong\_religion}_i + \beta_{14} \text{BMI}_i + \beta_{15} \text{smoker}_i + \sum \beta_c \text{Country}_{ci} + \varepsilon_i$

(18) $\textbf{Health\_Problems\_adj}_i = \beta_1 \text{log\_income}_i + \beta_2 \text{first\_quartile}_i + \beta_3 \text{third\_quartile}_i + \beta_4 \text{fourth\_quartile}_i + \beta_5 \text{male}_i + \beta_6 \text{age}_i + \beta_7 \text{age\_sq}_i + \beta_8 \text{married}_i + \beta_9 \text{unemployed}_i + \beta_{10} \text{sick}_i + \beta_{11} \text{education}_i + \beta_{12} \text{weak\_religion}_i + \beta_{13} \text{strong\_religion}_i + \beta_{14} \text{BMI}_i + \beta_{15} \text{smoker}_i + \sum \beta_c \text{Country}_{ci} + \varepsilon_i$

(19) $\textbf{Bodily\_Aches\_adj}_i = \beta_1 \text{log\_income}_i + \beta_2 \text{first\_quartile}_i + \beta_3 \text{third\_quartile}_i + \beta_4 \text{fourth\_quartile}_i + \beta_5 \text{male}_i + \beta_6 \text{age}_i + \beta_7 \text{age\_sq}_i + \beta_8 \text{married}_i + \beta_9 \text{unemployed}_i + \beta_{10} \text{sick}_i + \beta_{11} \text{education}_i + \beta_{12} \text{weak\_religion}_i + \beta_{13} \text{strong\_religion}_i + \beta_{14} \text{BMI}_i + \beta_{15} \text{smoker}_i + \sum \beta_c \text{Country}_{ci} + \varepsilon_i$

(20) $\textbf{Unhappy\_Depressed\_adj}_i = \beta_1 \text{log\_income}_i + \beta_2 \text{first\_quartile}_i + \beta_3 \text{third\_quartile}_i + \beta_4 \text{fourth\_quartile}_i + \beta_5 \text{male}_i + \beta_6 \text{age}_i + \beta_7 \text{age\_sq}_i + \beta_8 \text{married}_i + \beta_9 \text{unemployed}_i + \beta_{10} \text{sick}_i + \beta_{11} \text{education}_i + \beta_{12} \text{weak\_religion}_i + \beta_{13} \text{strong\_religion}_i + \beta_{14} \text{BMI}_i + \beta_{15} \text{smoker}_i + \sum \beta_c \text{Country}_{ci} + \varepsilon_i$

(21) $\textbf{Lost\_confidence\_adj}_i = \beta_1 \text{log\_income}_i + \beta_2 \text{first\_quartile}_i + \beta_3 \text{third\_quartile}_i + \beta_4 \text{fourth\_quartile}_i + \beta_5 \text{male}_i + \beta_6 \text{age}_i + \beta_7 \text{age\_sq}_i + \beta_8 \text{married}_i + \beta_9 \text{unemployed}_i + \beta_{10} \text{sick}_i + \beta_{11} \text{education}_i + \beta_{12} \text{weak\_religion}_i + \beta_{13} \text{strong\_religion}_i + \beta_{14} \text{BMI}_i + \beta_{15} \text{smoker}_i + \sum \beta_c \text{Country}_{ci} + \varepsilon_i$

(22) $\textbf{Not\_Over\_Problems\_adj}_i = \beta_1 \text{log\_income}_i + \beta_2 \text{first\_quartile}_i + \beta_3 \text{third\_quartile}_i + \beta_4 \text{fourth\_quartile}_i + \beta_5 \text{male}_i + \beta_6 \text{age}_i + \beta_7 \text{age\_sq}_i + \beta_8 \text{married}_i + \beta_9 \text{unemployed}_i + \beta_{10} \text{sick}_i + \beta_{11} \text{education}_i + \beta_{12} \text{weak\_religion}_i + \beta_{13} \text{strong\_religion}_i + \beta_{14} \text{BMI}_i + \beta_{15} \text{smoker}_i + \sum \beta_c \text{Country}_{ci} + \varepsilon_i$

where most of the variables are described in section 3.2, $\sum\beta_c Country_{ci}$ is a set of country dummies and ε_i is a residual.

The results are integrated into Table 14. The adjusted R^2 is once again small (between 0.09 and 0.24), but this is usual in studying subjective well-being. However, similar model fit can be found in the literature (Graham 2008, Di Tella and MacCulloch 2006, Di Tella and MacCulloh 2005, Blanchflower and Oswald 2004).

Table 14: Happiness, Health and Emotional Well-Being

	(16)	(17)	(18)	(19)	(20)	(21)	(22)
const	-0.403***	0.340**	-0.657***	-0.728***	-0.952***	-1.148***	-0.896***
	(0.131)	(0.148)	(0.131)	(0.142)	(0.14)	(0.136)	(0.137)
log_income	0.179***	0.151***	0.147***	0.122***	0.165***	0.160***	0.164***
	(0.014)	(0.013)	(0.014)	(0.014)	(0.015)	(0.015)	(0.014)
first_quartile	-0.02	0.090***	-0.043	-0.029	0.010	-0.002	0.042
	(0.031)	(0.031)	(0.03)	(0.031)	(0.032)	(0.034)	(0.033)
third_quartile	0.037	-0.028	0.013	0.055**	0.047*	0.031	0.018
	(0.023)	(0.022)	(0.024)	(0.024)	(0.025)	(0.025)	(0.024)
fourth_quartile	0.036	-0.072**	-0.006	0.052	0.026	0.058	-0.020
	(0.033)	(0.032)	(0.035)	(0.034)	(0.036)	(0.036)	(0.035)
male	-0.009	0.097***	0.216***	0.209***	0.225***	0.225***	0.178
	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
age	-0.032***	-0.022***	0.001	-0.005**	-0.011***	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
age_sq	0.000***	0.000***	0.000***	0.000**	0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
married	0.353***	0.073***	0.056***	0.041***	0.212***	0.155***	0.137***
	(0.013)	(0.012)	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)
unemployed	-0.290***	-0.115***	-0.067**	-0.029	-0.241***	-0.236***	-0.255***
	(0.031)	(0.028)	(0.03)	(0.029)	(0.032)	(0.033)	(0.034)
sick	-0.337***	-0.824***	-1.018***	-0.810***	-0.610***	-0.534***	-0.619***
	(0.04)	(0.032)	(0.041)	(0.036)	(0.042)	(0.045)	(0.044)
education	0.006***	0.017***	0.015***	0.019***	0.010***	0.008***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
weak_religion	0.055***	0.001	-0.047**	0.002	0.017	0.011	-0.008***
	(0.02)	(0.019)	(0.021)	(0.020)	(0.021)	(0.021)	(0.021)
strong_religion	0.162***	0.066***	-0.002	-0.003	0.05**	0.077***	0.049**
	(0.019)	(0.018)	(0.02)	(0.019)	(0.02)	(0.019)	(0.020)
BMI	-0.003***	-0.026***	-0.017***	-0.019***	-0.009***	-0.007***	-0.01***
	(0.001)	(0.004)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
smoker	-0.076***	-0.130***	-0.070***	-0.073***	-0.086***	-0.057***	-0.079***
	(0.014)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Country dummies	YES	YES	YES	YES	YES	YES	YES
R2	0.14	0.24	0.15	0.16	0.10	0.09	0.09
Adjusted R2	0.14	0.24	0.15	0.16	0.10	0.09	0.09
Log-likelihood	-34801	-33721	-33041	-33186	-33686	-33617	-33497
N	26590	26477	24805	24950	24866	24790	24807

Standard error in parenthesis

***** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1**

The difference between the ability of included control variables to explain the target variables is interesting. The health status is explained the best (R^2 = 0.24), feeling of health

problems (R^2 = 0.15) and bodily aches (R^2 = 0.16) follow with the similar part of explained variability as happiness (R^2 = 0.15) and lost confidence, depressed and not over problems come last (R^2 = 0.10; 0.09; 0.09). This indicates that health is the most objective state and can be explained the best by other variables, happiness follows and the measurements of depression or lost confidence come last.

7.2 Discussion of Results

Absolute Income. The coefficient of absolute income is stable across the models ranging between 0.147 standard deviation (for health problems) to 0.179 standard deviation (for happiness). The main outlier is the coefficient for bodily aches. This outcome seems to be logical, because the question about bodily aches is the most objective between the reported measurements of well-being. The positive effect of income on health is documented for example by Mantzavinis et al. for the US data (2006) or by Gerdtham and Johannesson (2001) for Swedish data[27].

Similar impact of absolute income between models allows comparing the coefficients in household income terms in the same way as in section 5.3 (i.e. by comparing the effect to a relative increase or decrease of household income to a certain coefficient of a control variable).

Income Quartiles. The quartile dummies as a proxy for relative income are statistically insignificant in all models except of the measurement of the health status, where the first_quartile dummy coefficient is positive and statistically significant and fourth_quartile dummy is negative and statistically significant[28]. The positive effect of income quartiles on health is predicted by combined Hypothesis 2 and Hypothesis 5 and by literature (Babones 2008).

The reason why the effect is visible only for health status and not the other measurements of well-being is a puzzle. A plausible explanation can be that the prices of medicine are heavily regulated by state and hence it is more important what income does individual have in comparison to her fellow citizens than her absolute income in international terms.

Male. Interestingly, the negative effect of being a male rather than a female loses statistical significance when BMI and smoker dummy are included and 57% of men in the sample smokes compared to 41% of women. This indicates that a reason why an individual is happy or unhappy is not her gender but rather if she smokes or not.

[27] Although they use it as an explanatory variable they provide regressions also to find a potential difference between explanatory variables for health status and happiness

[28] Marginal effect (0.02 standard deviation) is found also for the fourth quartile dummy in model concentrating on the target variable not over problems.

Nevertheless the coefficient of the male dummy is positive and statistically significant for other measures of well-being. For example being a man decreases the frequency of losing confidence by 0.225 standard deviation, which is comparable to a whopping increase of household income by 280%. These findings confirm the conclusion of Fujita, Diener and Sandvik (1991) that women report lower emotional well-being but the same happiness as men.

Age coefficient is not statistically significant for three target variables: reported health problems, losing confidence and not_over_problems. Where it seems as a common sense the older people would not lose confidence more or less often than younger people the non-existing impact of age on reported health problems looks puzzling. This result in connection with statistically and economically significant effect of age on health status indicates the adjustability hypothesis plays a role here.

The effect of age is also higher for the more general target variables (happiness, overall health) than the specific emotional well-being variables. For example the total effect of growing older from 30 to 40 years is a decrease of 0.16 standard deviation for overall health and a decrease of 0.15 standard deviation for happiness, however growing from 30 to 40 years results only in increase of 0.06 standard deviation in frequency of having depression. This could be offset by a decrease in income by approximately 65% for health (respectively 56% for happiness) and only 30% decrease in income for depression frequency.

Literature confirms the negative effect of age on health (Gerdtham and Johannesson 2001) and the U-shaped function which leads to higher happiness in the "old-old" group (Ferraro 1980). The effect of age on emotional well-being is opposite to the results of (Kahneman and Deaton (2010), however not always are the coefficients significant and Carstensen, et al. (2011) show that the emotions are more complex and both negative and positive emotions are reported more by older people.

Marriage is a significant predictor for all the included variables, but the effect of marriage can be divided into three separate parts. First, the impact on happiness remains similar as in previous models and drives the happiness up in the same way as would an increase by 550 % in household income (see section 5).

Second, the effect on the health related variables (overall health, frequency of reported health problems and frequency of reporting bodily aches) is much smaller. This impact of marriage

on health variables is only approximately 0.06 standard deviation (i.e. similar as a decrease of 35% in household income).

Third, the effect on frequency of losing confidence and not overcoming problems is somewhere in the middle of previous two set of variables (see the two previous paragraphs) with the value of the coefficients around 0.15. Increase of income by 150 % would cause a similar effect on these variables.

The big impact on emotional well-being is confirmed by Kahneman and Deaton (2010) and the effect on health is lower than the one reported by Gerdtham and Johannesson (2001), however negligible effect is reported on Bulgarian data by Balabanova and McKee (2002).

Unemployment and Sickness. Unemployment and disability or permanent sickness have similarly large impact on happiness around 0.3 standard deviation, however their influence is going against each other in explaining the rest of target variables. The health related variables (see previous paragraphs) are effected only little by unemployment status and largely by the sick dummy (even 1 standard deviation). The effect on the other emotional characteristics is almost double for sickness (around 0.6 standard deviation) than for unemployment, where unemployment gets close to its impact on happiness (around – 0.25 standard deviation).

To get a better perspective the effect of the sick dummy on frequency of reporting health problems is comparable to decrease in household income by 99.9%[29] (1 standard deviation). This result is basically produced by common sense, disable person will always report health problems. The effect of unemployment on happiness is once again similar to Gerdtham and Johannesson (2001).

Education provides similar effect in all models (each year at school means improvement of approximately 0.1 standard deviation) the coefficients are also comparable to the ones found in section 5. Education and absolute income seem the most stable variables. Comparable results are provided by Kahneman and Deaton (2010) for emotional well-being and by (Gerdtham and Johannesson 2001) for health.

Religion has very different impact on happiness and on the other measurements of well-being. The happiness is the only variable where both weak and strong religion dummies have statistically significant and positive effect similar to the one predicted in section 5 (0.55 respectively 0.162 standard deviation).

[29] Log(0.001)*0.147 = -1.02

The weak religion dummy is either statistically insignificant or negative for other target variables. The lowest coefficient of the weak religion dummy is for the frequency of reported health problems. Individuals who visit church at least once a month are predicted to report health problems 0.047 standard deviation more often than those visiting church only sporadically or not at all. This can be compared to a decrease in income by approximately 27%.[30]

The effect of strong religion dummy is insignificant for the health_problems variable, but has positive effect on depression, losing confidence and not overcoming problems in amount of approximately 0.05 standard deviation (comparable to an increase in income by 35 %) and never has negative effect on the target variables.

To sum up, it seems that there exists a different impact of religion on different measurement of well-being, with the impact on general happiness being the highest. Pollner (1988) finds similar results for church attendance on the US data. He concludes that church attendance has a positive effect on happiness, but not statistically significant effect on emotional well-being variables (e.g satisfaction from individual´s physical condition).

Furthermore, the impact of strong and weak religion on emotional well-being and health seems to be opposite to each other suggesting that going into the church only once a month is actually contra productive to emotional well-being, but going into the church at least weekly improves emotional well-being.[31]

BMI of an individual is connected with negative influence on all target variables. As could be expected the coefficients are lower when the target variable is connect with health (overall_health, health_problems, bodily_aches) than with other measures of emotional well-being (depression, lost confidence) or general happiness. However even for overall health where the predictor is the strongest the effect is only 0.026 standard deviation (comparable to a decrease in income by 26%)[32] It means that for an individual with height of 180 cm an increase in his weight by 3.24 kg[33] (1 point in BMI) reduces her reported health by 0.026 standard deviation and her reported happiness by 0.003 standard deviation. Similar results for health are predicted by McGrail et al. (2009) and by Katsaiti (2012) for happiness.

[30] Log(0:73)*0.147 = 0.046

[31] The explanation can be in the division between strict and not so strict churches. Strict churches require higher attendance on religious services to reduce the free riding, however the strict churches reward such behavior by more emotional benefits (see Iannaccone (1994) for further discussion on this topic).

[32] Log(0.74)*0.151 = 0.026.

[33] 1.82^2

7.2.1 Smoker

Being a smoker has a statistically significant negative effect on all the target variables. The effect is approximately -0.07 standard deviation for all variables except of overall health (-0.13 standard), that can be compared to a decrease in household income by 37%[34]. The negative effect of smoking on self-reported health is predicted by Blaylock and Blisar (1992). The study by West and Shahab (2012) confirms the smokers are less happy than non-smokers and even provides indications the ex-smokers are happier than non-smokers.

7.2.2 Summary

The effect of absolute income is similar in sign and magnitude between all the target variables and it indicates the relationship between all happiness, health and emotional well-being and income is positive and concave. The coefficients for quartile dummies are statistically insignificant (with the exception of overall health equation). These observations are indicating Hypothesis 5 holds, the effect of income is similar on all measurements of well-being.

The impact of socio demographic variables vary between the models and provides a proof that the target variables although correlated are not the same. Often three different sets of target variables were identified according to how the effect of explanatory variable differs (i.e.: marriage, unemployment, sickness or religion): overall happiness, those connected with health (overall_health, health_problems and bodily_aches) and those signaling bad psychical condition (unhappy_depressed, lost_confidence, not_over_problems). Further research is necessary to prove or disprove different effect of socio demographic variables on these groups.

Conclusion

The main hypothesis derived from the literature was that absolute income increases happiness (Hypothesis 1). The ordered probit models in section 6 confirm the hypothesis and similarity of the coefficients between OLS and ordered probit allows to interpretinterpreting the OLS coefficients as the results of this study. The OLS models suggest that increase of household income by 10% leads to an increase of an individual level of happiness by approximately 0.017 standard deviation.

Hypothesis 2 predicted negative impact of an individual´s relative income on happiness. Such impact cannot be either confirmed or denied, because the results are ambiguous. Only the

[34] Log(0.63)*0.15 = 0.069

lowest income quartile dummy registered statistically significant negative coefficients in the OLS regressions and the significance completely disappeared when macroeconomic variables were included.

Hypothesis 3 assumed that the effect of different individual characteristics like marital status, age or unemployment on happiness is stronger than that of income. It was shown that this is the case. Being married can be offset only by 550% increase in income, being unemployed decreases happiness similarly as a 75% decrease in income would and growing older by 10 years from 30 to 40 is similar to a 57 % decrease of income. These results are robust across all models and hold even when macroeconomic variables are included into the equation.

Hypothesis 4 argued the GDP and Gini coefficients could be used as a good proxy for individual absolute respectively relative income. The replication of Sacks, Stevenson and Wolfers (2013) provided first indications that Hypothesis 4 stands. The results proved that there exists a positive correlation between GDP and average happiness in a country. The results also indicate that the effect is similar between countries in a given point of time and within a country in several periods of time suggesting the impact of relative income is not as profound as expected by Easterlin (1974).

The hierarchical linear multilevel models give further evidence that GDP in the logarithmic form is positively correlated with happiness even when the individual income is controlled for. On the contrary, the measurement of relative income or income inequality provided ambiguous results similar to micro level. The Gini coefficients were even positive suggesting the existence of the tunnel effect (Hirschman and Rothschild 1973) until the joint variable of an individual income and Gin was included in the model. The joint coefficient is positive and hence indicates that richer people in more unequal countries are happier than similarly rich people in equal countries and poorer people are happier in equal countries more than in unequal countries.

To sum up the results on macro level; clear positive effect of GDP and ambiguous effect of Gini are very similar to the results on micro level (positive effect of absolute income, ambiguous effect of relative income), therefore it seems that the Hypothesis 4 stands. Nevertheless further research is necessary to provide more details and evidence about the joint Gini and household income impact on individual happiness.

Finally the Hypothesis 5 stated that other measurements of well-being like health status, loss of confidence in last 4 weeks or feeling bodily aches in last 4 weeks are effected by income in

a similar way as happiness. The hypothesis was proven in section 7, where the OLS coefficients for household income ranged from 0.122 for feeling bodily aches in last 4 weeks to 0.179 for happiness as the target variables. The coefficients for income quartiles (proxy for relative income) were all statistically insignificant except of model with health status as the target variable. Nevertheless, the impact of other explanatory variables like marriage, religion or unemployment differed quite significantly. Finding which variable correlates with which measurement of well-being seems like a fruitful topic for further research.

To sum up the answer on the question: "Does jealousy of others make us unhappy?" would be conservative no based on this study. However, two important issues has to be kept in mind when interpreting the results. First, all the results has to be interpreted with a grain of salt, because the causality between income and the level of happiness or other well-being variables is assumed not proved as discussed in section 1.5. The reverse causality can provide a problem and should become more prevalent in further discussion and research of relationship between income and happiness. Second, the measurement of relative income is quite complicated because a reference group has to be chosen. In case of this study every country is a separate reference group, but it can be the case the reference group is either much smaller (only people from the same village or with the same education, etc.) or actually much larger (for instance whole Europe or even whole world). Therefore finding how large an individual reference group is and if that reference group has more significant impact on one´s happiness provided another potential topic for researchers to come.

References

Alesina, A., R. Di Tella, and R. MacCulloch. 2004. "Inequality and happiness: are Europeans and Americans different?" *Journal of Public Economics* 88 (9-10): 2009–2042.

Alpizar, F., F. Carlsson, and O. Johanson-Stenman. 2005. "How much do we care about absolute versus relative income and consumption?" *Journal of Economic Behavior & Organization* 56 (3): 405-421.

Babones, S. J. 2008. "Income inequality and population health: correlation and causality." *Social Science & Medicine* 66 (7): 1614-1626.

Balabanova, D., and M. McKee. 2002. "Self-reported health in Bulgaria: levels and determinants." *Scandinavian journal of public health* 30 (4): 306-312.

Ball, R. J., and K. Chernova. 2008. "Absolute Income, Relative Income, and Happiness." *Social Indicators Research* 88 (3): 497-529.

Barrington-Leigh, C. P. 2010. *Economic inequality and subjective well-being: is inequality good for the rich?* Draft Working Paper.

Bates, D., M. Maechler, B. Bolker, and S. Walker. 2014. *Lme4: Linear mixed-effects models using Eigen and S4_. R package version 1.1-7.* http://CRAN.R-project.org/package=lme4.

Beckfield, Jason. 2004. "Does Income Inequality Harm Health? New Cross-National Evidence." *Journal of Health and Social Behavior* 45 (3): 231-248.

Blanchflower, D. G. 2009. "International Evidence on Well-Being." In *Measuring the Subjective Well-Being of Nations: National Accounts of Time Use and Well-Being*, by A. B. Krueger, 155-226. Chicago: University of Chicago Press.

Blanchflower, D. G., and A. J. Oswald. 2011. "International happiness : a new view on the measure of performance." *Academy of Management Perspectives* (Academy of Management) 25: 6-22.

Blanchflower, D. G., and A. J. Oswald. 2008. "Is well-being U-shaped over the life cycle?" *Social science & medicine* 66 (8): 1733-1749.

Blanchflower, D. G., and A. Oswald. 2004. "Well-being over time in Britain and the USA." *Journal of Public Economics* 88 (7-8): 1359–1386.

Blaylock, J. R., and W. N. Blisard. 1992. "Self-evaluated health status and smoking behaviour." *Applied Economics* 24 (4): 429-435.

Brickman, P., D. Coates, and R. Janoff-Bulman. 1978. "Lottery winners and accident victims: Is happiness relative?" *Journal of personality and social psychology* 36 (8): 917-927.

Caporale, G. M., Y. Georgellis, N. Tsitsianis, and Y. P. Yin. 2009. "Income and happiness across Europe: Do reference values matter?" *Journal of Economic Psychology* 42–51.

Carstensen, L. L., B. Turan, S. Scheibe, N. Ram, H. Ersner-Hershfield, G. R. Samanez-Larkin, and J. R. ... & Nesselroade. 2011. "Emotional experience improves with age: evidence based on over 10 years of experience sampling." *Psychology and Aging* 26 (1): 21-33.

Clark, A. E., and A. J. Oswald. 1994. "Unhappiness and Unemployment." *The Economic Journal* 104 (424): 648-659.

Clark, A. E., P. Frijters, and M. A. Shields. 2008. "Relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles." *Journal of Economic Literature* 95-144.

Costa, P. T., and R. R. McCrae. 1988. "Personality in adulthood: a six-year longitudinal study of self-reports and spouse ratings on the NEO Personality Inventory." *Journal of Personality and Social Psychology* 54 (5): 853–863.

Cuñado, J., and F. P. Gracia. 2012. "Does Education Affect Happiness? Evidence for Spain." *Social indicators research* 108 (1): 185-196.

Davidson, R. J. 2004. "Well-being and affective style: neural substrates and biobehavioural correlates." *Philosophical Transactions of the Royal Society* 359: 1395-1411.

Deaton, A. 2008. "Income, health, and well-being around the world: Evidence from the Gallup World Poll." *Journal of economic perspectives* 22 (2): 53-72.

Di Tella, R., and R. MacCulloh. 2005. "Partisan Social Happiness." *Review of Economic Studies* 72: 367–393.

Di Tella, R., and R. MacCulloch. 2006. "Some Uses of Happiness Data in Economics." *Journal of Economic Perspectives* 20 (1): 25-46.

Di Tella, R., R. J. MacCulloch, and A. J. Oswald. 2001. "Preferences over inflation and unemployment: evidence from surveys of happiness." *The Economic Journal* 91 (1): 335–341.

Diener, E. 1984. "Subjective well-being." *Psychological Bulletin* 95: 542–575.

Duesenberry, J.S. 1949. *Income, Saving and the Theory of Consumer Behavior*. Cambridge: Harvard University Press.

Easterlin, R. A. 1974. "Does Economic Growth Improve the Human Lot? Some Empirical Evidence." In *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*, by R. David and R. Reder. New York: Academic Press.

Easterlin, R. A. 2003. "Explaining Happiness." *Proceedings of the National Academy of Sciences of the United States of America* 100 (19): 11176-11183.

Easterlin, R. A. 2005. "Feeding the Illusion of Growth and Happiness: A Reply to Hagerty and Veenhoven." *Social Indicators Research* 74 (3): 429-443.

Easterlin, R. A. 1995. "Will raising the incomes of all increase the happiness of all?" *Journal of Economic Behavior and Organization* 27: 35-47.

Easterlin, R. A., and L. Angelescu. 2009. "Happiness and Growth the World Over: Time Series Evidence on the Happiness-Income Paradox." IZA Discussion Paper No. 4060.

Easterlin, R. A., L. A. Mcvey, M. Switek, O. Sawangfa, and J. S. Zweig. 2010. "The Happiness-Income Paradox Revisited." *Proceedings of the National Academy of Sciences* 107 (52): 22463-22468.

Ekman, P., R. J. Davidson, and W. V. Friesen. 1990. "The Duchenne Smile: Emotional Expression and Brain Physiology." *II. Journal of Personality and Social Psychology* 58: 342–353.

Elster, J., and J. (eds.) Roemer. 1993. *Interpersonal Comparisons of Well-Being.* Cambridge: Cambridge University Press.

Ettner, S. L. 1996. "New evidence on the relationship between income and health." *Journal of Health Economics* 15 (1): 67–85.

European Central Bank. 2014. *The Euro.* Accessed 7 31, 2014. http://www.ecb.europa.eu/euro/intro/html/index.en.html.

Felix, F., N. Michael, S. Max, and U. David. 2013. "Testing the Tunnel Effect: Comparison, Age and Happiness in UK and German Panels." *Scottish Institute for Research in Economics (SIRE).*

Fernández-Dols, J., and M. Ruiz-Belda. 1995. "Expression of emotion versus expressions of emotions: Everyday conceptions about spontaneous facial behavior." In *Everyday conceptions of emotion*, by J. Russel, J. Fernández-Dols, A. Manstead and J. Wellenkamp, 505-523. Dordrecht: Kluwer Academic Publishers.

Ferraro, K. F. 1980. "Self-Ratings of Health among the Old and the Old-Old." *Journal of Health and Social Behavior* 21 (4): 377-383.

Frank, R.H. 1985. *Choosing the Right Pond.* Oxford: Oxford University Press.

Frey, B. 2008. *Happiness: A revolution in economics.* Cambridge: Mass: MIT Press.

Frey, B.S., and A. Stutzer. 2002. *Happiness and economics: How the economy and institutions affect well-being.* Princeton: N.J.: Princeton University Press.

Fujita, F., E. Diener, and E. Sandvik. 1991. "Gender differences in negative affect and well-being: the case for emotional intensity." *Journal of personality and social psychology* 61 (3): 427-434.

Gabriel, S. A., J. P. Mattey, and W. L. Wascher. 2003. "Compensating differentials and evolution in the quality-of-life among US states." *Regional Science and Urban Economics* 33 (5): 619–649.

Gardner, J., and A. J. Oswald. 2007. "Money and mental wellbeing: A longitudinal study of medium-sized lottery wins." *Journal of health economics* 26 (1): 49-60.

George, D. A. 2007. "Consolations for the economist: The future of economic orthodoxy." *Journal of Economic Surveys* 21: 417-425.

Gerdtham, U. G., and M. Johannesson. 2001. "The relationship between happiness, health, and socio-economic factors: results based on Swedish microdata." *The Journal of Socio-Economics* 30 (6): 553-557.

Graham, C. 2008. "Happiness And Health: Lessons—and questions—for public policy." *Health affairs* 27 (1): 72-87.

—. 2009. *Happiness Around the World: The Paradox of Happy Peasants and Miserable Millionaires.* Oxford: Oxford University Press.

Graham, C., A. Eggers, and S. Sukhtankar. 2004. "Does happiness pay?: An exploration based on panel data from Russia." *Journal of Economic Behavior & Organization* 55 (3): 319-342.

Graham, C., and A. Felton. 2006. "Inequality and Happiness: Insights from Latin America." *Journal of Economic Inequality* 4: 107–122.

Gravelle, H., and R. Rees. 2004. *Microeconomics.* 3rd. Harlow: Pearson Education Limited.

Hagerty, M., and R. Veenhoven. 2003. "Wealth and Happiness Revisited – Growing National Income Does Go with Greater Happiness." *Social Indicators Research* 64 (1): 1-27.

Hamermesh, D. S. 2004. "Subjective outcomes in economics." *Southern Economic Journal* 71 (1): 1-11.

Helliwell, J. F., and R. D. Putnam. 2004. "The social context of well-being." *Philosophical transactions-royal society of London series B biological sciences* 359 (1449): 1435-1446.

Hirschman, A. O., and M. Rothschild. 1973. "The Changing Tolerance for Income Inequality in the Course of Economic Development." *The Quarterly Journal of Economics* 87 (4): 544-566.

Iannaccone, L. R. 1994. "Why Strict Churches Are Strong." *American Journal of Sociology* 99 (5): 1180-1211.

ISSP. 2010. *International Social Survey Programme.* Accessed July 25, 2014. www.issp.org.

ISSP Research Group. 1993. *International Social Survey Programme 1991: Religion I - ISSP 1991*. GESIS Data Archive, Cologne. ZA2150 Data file Version 1.0.0.

ISSP Research Group. 2000. *International Social Survey Programme 1998: Religion II - ISSP 1998*. GESIS Data Archive, Cologne. ZA3190 Data file Version 1.0.0.

ISSP Research Group. 2003. *International Social Survey Programme 2001: Social Networks II - ISSP 2001*. GESIS Data Archive, Cologne. ZA3680 Data file Version 1.0.0.

ISSP Research Group. 2009. *International Social Survey Programme 2007: Leisure Time and Sports - ISSP 2007*. GESIS Data Archive, Cologne. ZA4850 Data file version 2.0.0.

ISSP Research Group. 2012. *International Social Survey Programme 2008: Religion III (ISSP 2008).* Prod. GESIS Data Archive. GESIS Data Archive, Cologne. ZA4950 Data file Version 2.2.0.

ISSP Research Group. 2013. *International Social Survey Programme 2011: Health and Health Care - ISSP 2011*. GESIS Data Archive, Cologne. ZA5800 Data file Version 2.0.0.

Johannsson-Stenman, O., F. Carlsson, and D. Daruvala. 2002. "Measuring future grandparents' preferences for equality and relative standing." *Economic Journal* 112: 362-383.

Kahneman, D., and A. Deaton. 2010. "High income improves evaluation of life but not emotional well-being." *Proceedings of the National Academy of Sciences* 107 (38): 16489-16493.

Kahneman, D., J. L. Knetsch, and R. Thaler. 1986. "Fairness as a Constraint on Profit Seeking: Entitlements in the Market." *The American Economic Review* 76 (4): 728-741.

Katsaiti, M. S. 2012. "Obesity and Happiness." *Applied Economics* 44 (31): 4101-4114.

Kenny, C. 1999. "Does growth cause happiness, or does happiness cause growth?" *Kyklos* 52 (1): 3-25.

Knutson, B., C. M. Adams, J. W. Fongs, and D. Hommer. 2001. "Anticipation of increasing monetary reward selectively recruits nucleus accumbens." *Journal of Neuroscience* 21.

Kuznetsova, A., P. B. Brockhoff, and R. H. Bojesen Christensen. 2014. "lmerTest: Tests for random and fixed effects for linear mixed effect models (lmer objects of lme4 package).. R package version 2.0-11." http://CRAN.R-project.org/package=lmerTest.

Lucas, R. E. 2007. "Adaptation and the Set-Point Model of Subjective Well-Being Does Happiness Change After Major Life Events?" *Current Directions in Psychological Science* 16 (2): 75-79.

MacKerron, G. 2011. "Happiness economics from 35,000 feet." *Journal of Economic Surveys* 26 (4): 705-735.

Mantzavinis, G. D., T. A. Trikalinos, I. K. Dimoliatis, and J. A. Ioannidis. 2006. "Self-Reported Health in High and Very High Incomes." *Quality Of Life Research* 15 (3): 547-558.

McGrail, K. M., E. Van Doorslaer, N. A. Ross, and C. Sanmartin. 2009. "ncome-related health inequalities in Canada and the United States: a decomposition analysis." *American journal of public health* 99 (10): 1856-1863.

Mellor, J. M., and J. Milyo. 2002. "Income Inequality and Health Status in the United States: Evidence from the Current Population Survey." *Journal of Human Resources* 37 (3): 510-539.

Moro, M., F. Brereton, S. Ferreira, and J. P. Clinch. 2008. "Ranking quality of life using subjective well-being data." *Ecological Economics* 65 (3): 448–460.

Oischi, S., S. Kesebir, and E. Diener. 2011. "Income inequality and happiness." *Psychological science* 22 (9): 1095-1100.

Okulicz-Kozaryn. 2010. "Religiosity and life satisfaction across nations." *Mental Health, Religion & Culture* 13 (2): 155-169.

Okulicz-Kozaryn, A. 2011. "Does Religious Diversity Make Us Unhappy." *Mental Health, Religion & Culture* 14 (10): 1063-1076.

Oswald, A. J. 1997. "Happiness and Economic Performance." *The Economic Journal* 107 (445): 1815-1831.

Oswald, A. J., and S. Wu. 2010. "Objective confirmation of subjective measures of human well-being: Evidence from the USA." *Science* 327 (5965): 576–579.

Ott, J. 2010. "Happiness, economics and public policy: A critique." *Journal of Happiness Studies* 11 (1): 125–130.

Paternoster, R., R. Brame, P. Mazerolle, and A. Piquero. 1998. "Using the correct statistical test for the equality of regression coefficients." *Criminology* 36 (4): 859-866.

Pittau, M.G, R. Zelli, and A. Gelman. 2010. "Economic Disparities and Life Satisfaction in European Regions." *Social Indicators Research* 96: 339-361.

Pollner, M. 1988. "Divine Relations, Social Relations, and Well-Being." *Journal of Health and Social Behavior* 30 (1): 92-104.

Pulok, M. H. 2012. "Revisiting Health and Income Inequality Relationship: Evidence from Developing Countries." *Journal of Economic Cooperation & Development* 33 (4): 25-61.

Putnam, R. D. 1993. *Making Democracy Work.* New Jersey: Princeton University Press.

Putnam, R.D. 2001. *Bowling Alone: The Collapse and Revival of American Community.* New York: NY: Simon & Schuster.

R Core Team. 2014. *R: A language and environment for statistical computing.* Vienna: R Foundation for Statistical Computing. http://www.R-project.org/.

Raudenbush, S. W., and A. S. Bryk. 2002. *Hierarchical Linear Models: Applications and Data Analysis Methods.* Thousand Oaks: Sage Publications.

Sacks, D. W., B. Stevenson, and J. Wolfers. 2013. "Growth in Income and Subjective Well-Being over Time." mimeo, University of Michigan.

Sandvik, E., E. Diener, and L. Seidlitz. 1993. "Subjective well-being: the convergence and stability of self and non self report measures." *Journal of Personality* 61: 317-342.

Senik, C. 2004. "When information dominates comparison: Learning from Russian subjective panel data." *Journal of Public Economics* 88 (9-10): 2099–2123.

Shedler, J., M. Mayman, and M. Menis. 1993. "The illusion of mental health." *American Psychologist* 48 (11): 1117–1131.

Smith, V. K. 2008. "Reflections on the literature." *Review of Environmental Economics and Policy* 2: 292–308.

Smith, V. L. 1994. "Economics in the laboratory." *Journal of Economic Perspectives* 8: 113-132.

Solnick, S. J., and D. Hemenway. 1998. "Is more always better?: A survey on positional concerns." *Journal of Economic Behavior and Organization* 37: 373-383.

Stevenson, B., and J. Wolfers. 2008. "Economic Growth and Subjective Well-Being: Reassessing the Easterlin Paradox." *Brooking Papers on Economic Activity* 1-87.

Stutzer, A. 2004. "The role of income aspirations in individual happiness." *Journal of Economic Behavior & Organization* 54: 89-109.

Subramanian, S. V., D. Kim, and I. Kawachi. 2005. "Covariation in the socioeconomic determinants of self rated health and happiness: a multivariate multilevel analysis of individuals and communities in the USA." *Journal of Epidemiology and Community Health* 59 (8): 664-669.

Tanzi, V., and H.R. Davoodi. 2000. "Corruption, growth and public finances." *IMF Working Paper No. 182.*

UNU-WIDER. 2014. *WORLD INCOME INEQUALITY DATABASE V3.0A.* Accessed July 31, 2014. http://www.wider.unu.edu/research/WIID-3a/en_GB/database/.

van Praag, B. M. S., and A. Ferrer-i-Carbonell. 2008. *Happiness Quantified. A Satisfaction Calculus Approach.* New York: Oxford University Press.

Veblen, T. 1949. *The Theory of the Leisure Class.* London [Originally published by Macmillan New York]: George Allen and Unwin.

Veenhoven, R. 1991. "Is happiness relative?" *Social Indicators Research* 24 (1): 1-34.

Veenhoven, R. 2008. "Measures of Gross National Happiness." In *Statistics, Knowledge and Policy 2007: Measuring and Fostering the Progress of Societies*, 231-253. Paris: OECD.

—. nd. *World Database of Happiness.* Erasmus University Rotterdam, Happiness Economics Research Organization. Accessed August 7, 2014. http://worlddatabaseofhappiness.eur.nl.

Veenhoven, R., and F. Vergunst. 2013. "The Easterlin illusion: economic growth does go with greater happiness." *EHERO working papers: Erasmus Happiness Economics Research Organization* 2013 (1).

Verme, P. 2011. "Life satisfaction and income inequality." *Review of Income and Wealth* 111-127.

Welsch, H. 2006. "Environment and happiness: Valuation of air pollution using life satisfaction." *Ecological Economics* 58: 801-813.

Welsch, H. 2006. "Environment and happiness: Valuation of air pollution using life satisfaction data." *Ecological Economics* 58: 801–813.

West, R., and R. Shahab. 2012. "Differences in happiness between smokers, ex-smokers and never smokers: cross-sectional findings from a national household survey." *Drug and Alcohol Dependence* 121 (1-2): 38–44.

Woolridge, J. M. 2009. *Introductory Econometrics: Modern Approach.* Mason: South Western.

World Bank Group. 2014. *World Development Indicators.* Accessed July 30, 2014. http://data.worldbank.org/data-catalog/world-development-indicators.

Wu, X., and J. Li. 2013. "Economic Growth, Income Inequality and Subjective Well-being: Evidence from China." *PSC Research Report No. 13-796.*