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Is it wrong to assume economic growth promotes well-being in society?

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Abstract:

Economic growth has for long been implicitly assumed to promote well-being in society, but lately scholars in the field of happiness research have raised critique towards this assumption. This paper investigate the relationship between economic growth and subjective well-being (SWB) in society, a topic that have risen in popularity over recent decades. This is done by conducting a fixed effect regression analysis on a panel data set created from the European Social Survey (ESS) data on happiness and life satisfaction in 36 European countries between 2002 and 2016 as well as indicators from the OECD. We find SWB to be positively correlated with per capita GDP level but not with its relative change, an effect that is strengthened when controlling for change in the income distribution. Furthermore, we do not find support of income inequality being a moderator of the relationship between economic growth and SWB.

Key words: Easterlin paradox, Subjective well-being, Happiness, Life satisfaction, Economic growth, Income inequality, Panel data, European Social Survey

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Abbreviations

SWB	Subjective Well-Being
GDP	Gross Domestic Product
ESS	European Social Survey
OECD	Organisation for Economic Co-operation and Development

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1 Introduction

The determinants of happiness and life satisfaction have for centuries been a research area in psychology. In recent years however, there have been an upsurge in the interest of human well-being among economists in what is referred to as the 'economics of happiness' (Easterlin 2004). In this field, survey methods are commonly used, asking respondents to report how they feel about different aspects of their life in quantifiable terms (often on an ordinal scale). There are today several large scale surveys that gather this kind of data together with other social, demographic and economic data such as the European Social Survey, the World Value Survey, the Latino Barometer and many others.

By applying statistical methods to these happiness estimates, researchers have found a range of different factors that are either suggested to promote happiness and well-being or to be cause of unhappiness and distress. Some findings mentioned in a review by Dolan et al. (2008) are that women generally report higher levels of happiness than men, that being married is associated with higher happiness, and so is also the case about being religious. Unemployment on the other hand is found to be linked to lower levels of reported happiness, together with factors such as commuting time and living in large cities compared to rural areas.

Even though there is a good case to be made that happiness is not a cause of one's gender, it is seldom feasible to determine causality in these empirical studies (Dolan et al., 2008). To what degree does unemployment cause unhappiness and to what degree are unhappy people more likely to become unemployed? A related point is that since people are decision-making agents, the situations they are in are for the most part not exogenously determined (e.g. marriage, commuting time or urban living) but instead the result of individual choice, hence one need to be cautious about making policy suggestions without considering unintended dynamic effects, resulting from changing incentive structures. As the data cannot reveal if these decisions are irrational, it can't be ruled out that choosing *not* to get married or settling down in a large city isn't because of rational (utility-maximising) reasons. If that is the case, it is unclear whether government can formulate policy that would constitute a pareto-improvement. That being said, the method of using self-reported well-being measures as proxy for utility have become more popular in economics in recent years, and based on the assumption that people have diverse preferences (Clark et al., 2005), it is not obvious that happiness will correlate with factors that are within the control of the individual. Findings of this therefore deserve attention by researchers as they can provide new insight about human behaviour.

For a long time, economic growth has been assumed to increase societal well-being, but in 1974, Richard Easterlin made the famous observation that over time, average happiness had not risen

proportional to economic growth in the USA (Easterlin, 1974). This discovery appears to go against findings that income level is correlated with happiness both within countries and between countries, meaning that relatively wealthier people are on average happier than their poorer peers in any given country, and that people in wealthier countries are on average happier than people in less wealthy countries (Easterlin, 1995; Easterlin et al., 2010). This seemingly contradictory observation have since been referred to as the 'Easterlin paradox', about which many researchers have put forward theories, as well as provided evidence both supporting and contesting its existence (Choudhary et al., 2011). So far, there is no consensus among researchers on the relation between economic growth and overall happiness in society, but certain is that the Easterlin paradox have greatly contributed to the popularity of using self-reported well-being data as a complement to other kinds of data in studying utility (Bartolini et al., 2017).

The purpose of this thesis is to explore the relationship between economic growth and self-reported well-being. In particular, we study a European context. There are two parts of this endeavour. First, by using a rich data source that, to our knowledge, have not been used to investigate this question, we replicate previous research surrounding the Easterlin paradox. The European Social Survey (ESS) data have been utilized in studies investigating the determinants of well-being before, but not with economic growth as an explanatory factor in particular. Second, by including the Gini coefficient indicator in our analysis, we explore the role of income inequality in respect to how economic growth is linked to societal well-being. By controlling for changes in the income distribution, we separate the absolute income effect from a potential relative income effect, thereafter we also investigate if the relation between economic growth and well-being is moderated by income inequality. As economic growth is often implicitly assumed to promote the well-being of society and because measures of economic output such as per capita GDP in many contexts are used as proxies for societal well-being, this is an important question to investigate.

Our results show a strong correlation between economic growth and country average self-reported well-being, a connection that is strengthened when income inequality is held constant. The results suggest the influence is driven by the *level* and not the relative change in economic output measured by per capita GDP. Furthermore, we find no support for the link between economic growth and societal well-being to be dependent on the level of income inequality in the country.

The thesis is organised as follows. In the next section, 2, we are going to present previous literature related to this issue. In section 3 we will describe the theory, econometric approach and data used in the thesis. The results are presented in section 4 and in section 5, we will summarise our findings, discuss limitations, policy implications and recommend future research projects.

2 Literature

In the happiness literature, there are a number of survey-based measures that are used as proxies for utility (Benjamin et al., 2012). Happiness, life satisfaction and mental health among many others are all applied to capture individuals' experienced utility or well-being. In some cases, more than one measure is employed to construct a multi-dimensional model for utility (Jayawickreme et al., 2017). As all of these measures are self-reported using survey based methods and since they have been shown to correlated well with each other (Frey and Stutzer, 2002; Howell and Howell, 2008), an umbrella term commonly used is 'Subjective Well-Being'(SWB). According to Diener (2006, p. 400), "subjective well-being is an umbrella term for the different valuations people make regarding their lives, the events happening to them, their bodies and minds, and the circumstances in which they live". While it has been argued that happiness and life satisfaction are conceptually different[1], SWB will be used in this thesis to encompass both, which is custom in the literature (Zagorski et al., 2014).

There are broadly two levels for which SWB measures are being analysed in the literature; individual level (e.g. how does an increase in personal income affect SWB?), and aggregated level, often country level (e.g. how does an increase in national income affect country average SWB?). Making this distinction is important as we will see, since the effects aren't necessarily the same. The impact of individual or household income on SWB is not the focus of this study, but in order for us to credibly explain macro-phenomenon, it is important to connect to the literature on the relationship between SWB and income at micro-level. The discussion in the literature surrounding the influence of absolute vs relative income is also important as a background to why we include income inequality in our analysis both as a control variable and as a potential moderator for the effect of economic growth on SWB.

2.1 Income - Individual level

At individual and/or household level, researchers generally find income to be positively correlated with SWB, but the effect is diminishing with higher income. See e.g. the meta study by Howell and Howell (2008) combining 56 studies including 111 independent samples from 54 countries. Studies using panel data to control for individual fixed effects show the same positive correlation as cross sectional studies (e.g. Clark and Oswald, 2002; Clark et al., 2005). Some of the studies using panel data have been able to establish this to be a causal effect of income on happiness by taking advantage of exogenous variation in income (Clark et al., 2008).

[1] E.g. Okulicz-Kozaryn (2012) argue that life satisfaction refers to cognition while happiness refers to affect. While it is possible to make distinctions between these two measures, this is not common and there is no particular distinction that is used consistently throughout the literature (Zagorski et al., 2014).

Some argue that SWB predominantly is influenced by relative income and not absolute income. This hypothesis is theoretically compelling since happiness is a subjective perception and not an objective phenomenon. However studies looking at factors influencing happiness at individual level have concluded that happiness is not entirely a relative phenomenon that depend on comparison, either it be to the income of others, previous life experiences or an expectation of how-life-should-be (Veenhoven, 1991). Still, having high aspiration or expectations is consistently shown to have a negative effect on SWB (Diener et al., 2013; Dolan et al., 2008).

While absolute income have been found to have a positive effect on SWB, there is no consensus in the literature about the sign (whether positive or negative) of the relative income effect, meaning how a person's SWB is affected by the income levels of others (Brown, 2015). There are theoretical arguments that could justify any sign. As a comparison effect we would expect a negative sign, while as an information effect[2], a positive effect would be expected. In a review of studies on the relative income effect, Brown et al. (2015) suggest the mixed findings on this issue derive from results being sensitive to the definition of the reference group as well at the choice of measurement for SWB (happiness, life satisfaction etc.).

2.2 Economic growth - Country level

Because of the so far ambiguous element of the relative income effect, it is not obvious that increases in income at a macro level (i.e. economic growth) will have the same effect on average SWB in society as an increase in personal income have for the individual. Studies using cross section data for countries consistently find a strong positive correlation between national wealth or income and SWB (Bartolini et al., 2017). To put it simply, wealthier countries are happier countries. Some studies using time series data to look at changes of economic output and SWB over time have suggested that economic growth is not followed by proportional increases in societal happiness (e.g. Easterlin, 1995). This seemingly contradictory finding is referred to as the Easterlin paradox in the literature[3]. In his first study on the issue, Easterlin (1974) looked at time series data for USA two decades following the WWII. In an updated version, Easterlin (1995) included time series for Japan and a number of European countries. Since then, a number of studies using panel data have pushed back, contesting

[2] As the income of others increase, this is a signal about the person's future earnings. Learning about unusually high economic growth in the country is for example by many perceived as good news, even though the relative income of the individual now have decreased. This could be because of the information effect.

[3] It should be noted that in his first publication discussing the income-happiness paradox, Easterlin (1974) describes the paradox as that while income is correlated with happiness within countries, rising societal incomes have no relation with rising SWB. It is later that the paradox have been described instead as the contradicting finding that while richer countries are happier in cross section studies, this link between national income and average SWB is not found in time serie studies (Easterlin, 2010).

Easterlins claim about economic growth not leading to increases in SWB, by presenting evidence of a connection between the two (Clark, 2008; Diener and Biswas-Diener, 2002).

In a more recent study, Easterlin et al. (2010) responds to the critics (e.g. Deaton, 2008; Hagerty and Veenhoven, 2003; Stevenson and Wolfers, 2008) and argues that while there is a positive correlation in the short term, there is no effect in the long run. This fits with findings by others that in the long run, institutional factors and social capital matters more for SWB than GDP growth (Bartolini et al., 2017). This article too have received critique (e.g. Sacks et al., 2010), and as Wolfers (2010, December 13) expresses it: "you should never confuse absence of evidence with evidence of absence." The fact that Easterlin failed to find SWB to increase with economic development is not proof that there is no such connection.

There is furthermore a discussion in the literature whether the relations between these macroeconomic variables and SWB differ by country specific characteristics. A number of studies suggest that the link between economic growth and SWB is stronger in developing and transitioning countries compared to developed countries (Dolan et al., 2008; Kenny, 2005). For example, after the unification, eastern Germany experienced substantial increase in both life satisfaction and real income in the period 1991-2002 (Frijters et al., 2004). The conclusion of a review of this literature by Arthaud-Day and Near (2005) support this argument, that economic growth have stronger effects on SWB in developing countries. Similar differences between developed and developing or transitioning countries are found regarding the relationship between personal income and SWB as well (Clark et al., 2008).

2.3 Income inequality

If relative income is a better predictor of one's happiness than absolute income, it is not surprising that some researchers argue that economic policy should focus on trying to reduce income inequality rather than promoting economic growth (e.g. Oishi and Kesebir, 2015). The suggested explanation for the existence of the easterlin paradox offered by Easterlin (1974), is the importance of the relative income effect[4]. A person's perception about their relative income is not necessarily captured in measures of income inequality if the reference group is not aggregated to national level. Cheung and Lucas (2016) do however find, based on responses from 1,7 million individuals in 2,435 counties in the United States, that higher income inequality is associated with stronger relative income effects.

[4] If relative income is more important than absolute income, this could explain why SWB increase with personal income while economic growth doesn't provide general increases in the population. It does however not explain why wealthier nations are on average happier than poorer ones.

Oishi and Kesebir (2015) argues that the distribution of income is an important factor for happiness in society, showing that the Easterlin paradox can be partly explained by changes in income inequality. They sum up their theory with the words: “Even growth is happy growth, and uneven growth is unhappy growth” (Oishi and Kesebir, 2015, p. 1637). Results from studies looking at the effect of income inequality on SWB have however been mixed, the same way as with the relative income effect (Schneider, 2016).

In a meta-analysis looking at studies on this relation, published between 1980 and october of 2017 (39 studies in total), Ngamaba et al. (2017) conclude income inequality in itself only to have a weak link with SWB, which is moderated by the economic development in the country. While the effect of income inequality is negative in developed countries, the effect is positive in developing countries. Similarly, Berg and Veenhoven (2010) writes that after controlling for wealth, within nation inequality has a positive correlation with average SWB in latin america, eastern europe and asia. The negative effect in developed countries can be found especially in western European countries (Delhey and Dragolov, 2013). Rözer and Kraaykamp (2013), looking at data from 190,091 individuals in 85 countries show that income inequality have a positive effect on SWB, but that it is lower when social and institutional trust is high, and when only looking at European countries, the effect is negative.

Without having knowledge about contextual factors, it is difficult to make accurate predictions about the effect of income inequality on SWB. Dolan et al. (2008, p. 108) writes that “[w]hat will be communicated through income inequality is likely to vary according to perceptions of [social] mobility. Where mobility is perceived to be lower, such as Europe and Germany, inequality is found to have a negative impact.” Brown et al. (2015) have pointed to the information effect mentioned in the discussion about relative income to be of greater importance in developing countries while the comparison effect is at work in developed nations. This is important to acknowledge as this thesis concerns the case of European countries.

3 Theory, data and econometric approach

In this section we will first discuss the theory behind using SWB-measures as proxy for *utility,* which is one of the most important concepts in economics when modelling human behaviour. We will also describe the general idea behind why economic growth leads to higher well-being in society (sect. 3.1). This is followed by a presentation of the data used in this thesis (sect. 3.2 to 3.5). In section 3.6, we describe the method used and the econometric model.

3.1 Theoretical framework

In economics, *utility* is an abstract concept to describe in quantifiable terms, the total satisfaction a person gains from a given decision. Utility production functions are assumed not to be the same for all individuals, which is another way of saying that it is assumed people have diverse preferences. This assumption concerns all decision-making, from the mundane and routine to the goals in life that people have. Economists further assume that people make choices to maximise their total utility. If this is correct then we would not expect people to make choices that lead them into situations where they expect to be unhappy, for the simple reason that it is not in their interest to do so. In order to explain such findings, the assumption about rationality of the individual made in traditional economic models can be loosened. The interest of economists in studying the ways people aren't fully rational have increased tremendously in later years in the field of behavioural economics.

Traditionally, economists have viewed the utility of individuals to only be measurable by observing how they behave, since it is impossible to understand exactly how others feel. This is the revealed preference approach to studying behaviour (Di Tella et al., 2003). More recently however, the study of SWB from psychology have entered economics more and more offering a new approach of measuring utility with survey based methods. Brown et al. (2015, p. 47) writes that "the rise of 'happiness economics' began to persuade economists that self-reported measures of well-being could be used as reliable proxies for individual utility."

The idea that economic growth leads to higher well-being in society is a common one. In many cases, both in academia and in the public, the economic output of a country is used as a measure of the overall well-being (Mankiw, 2014). The researchers who have studied this question in the literature, rarely elaborate on the mechanism of this effect in any detail. The key aspect in the idea is that people's perception about their well-being is connected to their living conditions, and as individuals' income increase with the total production of goods and services in the economy, their living conditions rise as well. This is sometimes referred to as the 'livability theory' (e.g. Cheng et al., 2016; Okulicz-Kozaryn, 2012), which Veenhoven and Ehrhardt (1995) calls a common sense theory. As this

theory predicts economic prosperity to influence the level of well-being in a country, we would expect to see a positive link between per capita GDP and average SWB in nations. However due to diminishing marginal utility from money, it is possible that the correlation between SWB and income in wealthy nations is low (Veenhoven and Ehrhardt, 1995).

The theory advertised by Easterlin (1974) and others instead argue that there is no such connection between economic growth and well-being in society because it is the relative and not absolute income that influence people's financial satisfaction and happiness. Subscribing to this belief, Oishi and Kesebir (2015) argue there is reason to distinguish between economic growth that is equally distributed and that which is not, as they suggest that increases in per capita GDP only have a positive effect on country average SWB when it is distributed equally. If this is the case, the income inequality of a country might be a factor that should be included in the analysis, controlled for, in order to get an accurate estimation of how economic growth affects average SWB (when income inequality is held constant), assuming economic growth is not a cause of income inequality (Barro, 2000). In a study looking at the effects of the 2008 financial crisis on country average SWB in European countries, Greve (2012) fails to control for changes in the income distribution is his analysis. If the financial crisis didn't impact all individuals in society equally, using an aggregated measure like GDP per capita as a proxy for the economic shock will fail to capture the actual effect of the crisis. While other researchers have found statistically significant negative effects on SWB from the 2008 financial crisis (e.g., Deaton, 2012; Hussain, 2015), Greve (2012) finds no such effect. If it is the case that there is a moderating effect of income inequality on the relationship between economic growth and SWB, which Oishi and Kesebir (2015) argue, then we expect to find this by including an interaction variable.

3.2 Data sources and data construction

A panel data set with observations on countries over years was created containing SWB (averaged across countries), GDP per capita as well as the Gini coefficient for countries over years. The data on SWB is provided by the European Social Survey (ESS) which is "a large-scale international survey project designed to create a map of social attitudes in Europe to complement economic and demographic survey data."(Burns, 2018, p. 5) This data have been used widely by researchers investigating attitudes, beliefs and behaviour patterns across European countries, especially in happiness research (e.g. Helliwell et al., 2014; Greve, 2012; Piper, 2015).

In face-to-face interviews, respondents are asked (among other things) to report their level of happiness on a 11 point scale (The European Social Survey, 2002)[5]. The question asked is: "Taking all things together, how happy would you say you are?", 0 being "extremely unhappy" and 10 being"extremely happy". The survey also include a question about the respondents life satisfaction, with a similar 11 point scale used. The question is framed: "All things considered, how satisfied are you with your life as a whole nowadays?", 0 being "extremely unsatisfied" and 10 being "extremely satisfied". Both these measures have been retrieved and are used separately as output variables in this thesis.

While happiness and life satisfaction can be argued to be conceptually different, they are both used in the literature interchangeably as measures of utility. The results from our regression models are expected to be independent of the chosen measure of SWB, if instead the results are sensitive to the measure used, those results are regarded less robust. In those cases, we suggest caution should be taken when making interpretations regarding the relations investigated.

The ESS survey has been conducted every second year since 2002, the last survey included in this study was conducted in 2016, meaning we have data from eight rounds. In total 36 countries are included in the dataset, though the countries that are included in the survey differ slightly from year to year[6]. Because of this, our panel data is unbalanced. Having missing data points is however only a problematic issue if the reason for the missing data is correlated with the idiosyncratic errors (i.e. the missing data points are random in respect to the independent variables in our model) (Wooldridge 2014, p 394). Hence no problem of sample bias is expected due to the missing observations.

[5] Both questions have been asked in the same manner throughout all survey rounds (ESS Methodology, n.d.)

[6] There are a set of core countries always included, and additional guest countries involved at varying degree. For more information on which countries are included in each survey round, number of respondents from each country and for each round see Table 4 in the appendix.

The data on individuals for each round was retrieved from the ESS and all observations without valid responses to the two questions on happiness and life satisfaction were excluded[7]. Each individual's answer were then weighted as recommended by the ESS with the design weights provided in each dataset. "The main purpose of the design weights is to correct for the fact that in some countries respondents have different probabilities to be part of the sample due to the sampling design used" (European Social Survey, 2014, p. 1). This approach ensures the estimated averages are representative for each country so as to avoid sample bias. The eight ESS data sets (on individuals) have then been collapsed to create a single panel data set with observations of countries over years with arithmetic means of SWB (mean of happiness and life satisfaction that is).

3.3 SWB-measures: Happiness and Life satisfaction

In Table 4 in the appendix, average country happiness and life satisfaction for all countries are presented, sorted in descending order from highest average happiness to lowest. The top five happiest countries are Denmark, Iceland, Switzerland, Finland and Norway in descending order. The bottom five are Bulgaria, Ukraine, Turkey, Romania and Russia. The list would only differ slightly if ranked based on life satisfaction instead. The average happiness for all respondents is 7,19 and for average life satisfaction 6,85[8].

In Figure 1 and 2, average happiness and life satisfaction for each country is displayed for the years included in the data set. What the graphs show is that there is no obvious trend in SWB visible for the studied countries and time period.

[7] Invalid responses include the categories "refusal", "don't know" and "no answer". This constitute less than 1,15% of the total number of respondents (4'238 out of 370'250 respondents), and the numbers did not differ notably across countries, therefore we expect no bias due to non-response.

[8] This estimate is not adjusted for population sizes of each country, so it cannot be interpreted as the mean for all countries included in the data.

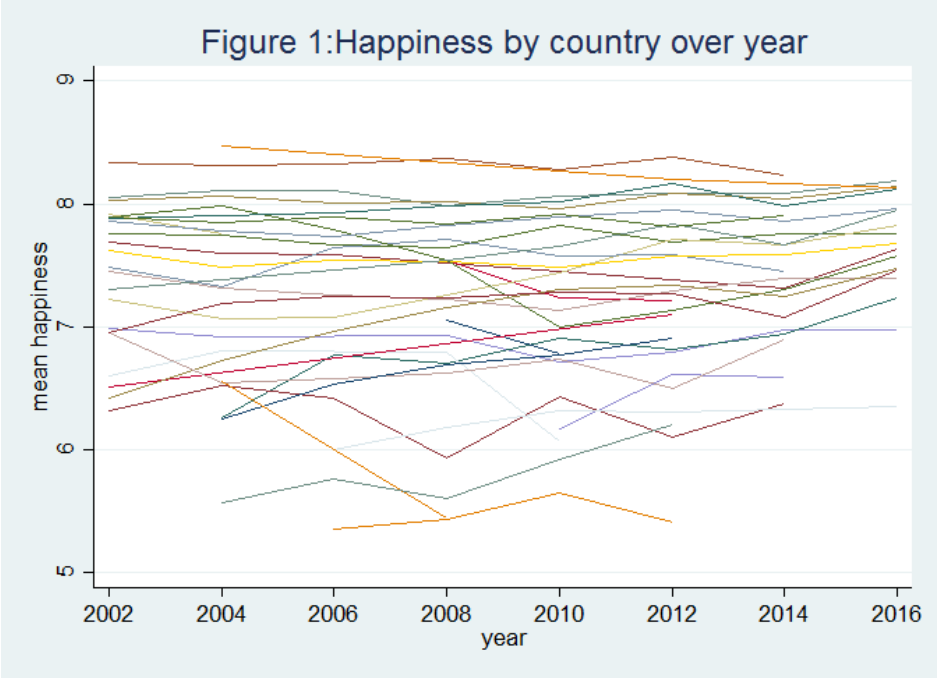

Figure 1: Graph of mean happiness for each country (coloured lines) included in the data set. Responses on happiness range from 0 "extremely unhappy", to 10 "extremely happy". All numbers are adjusted to be representative for each country.

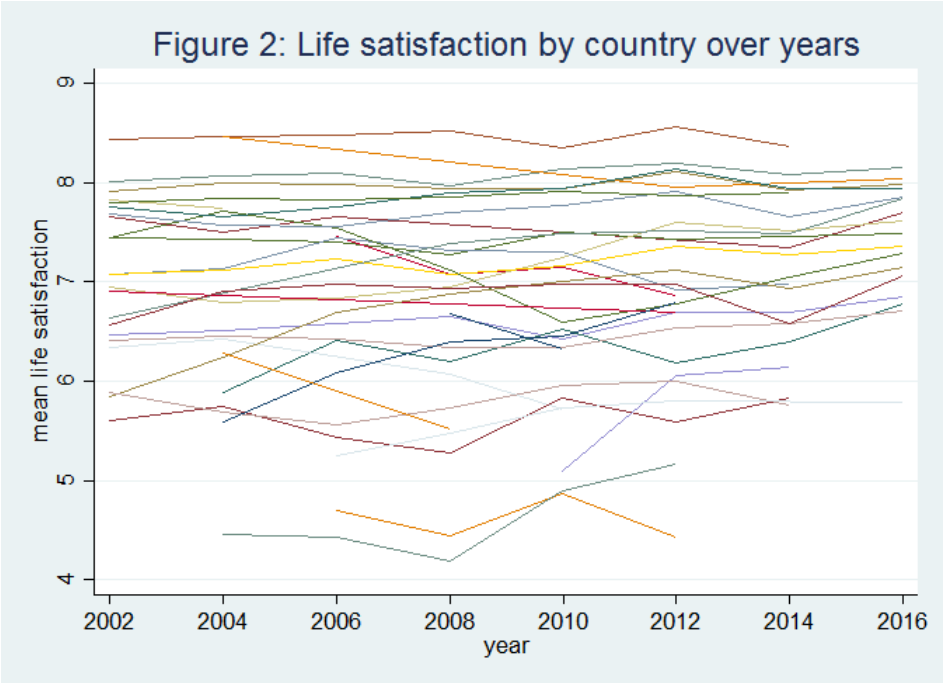

Figure 2: Graph of mean life satisfaction for each country (coloured lines) included in the data set. Responses on life satisfaction range from 0 "extremely unsatisfied", to 10 "extremely satisfied". All numbers are adjusted to be representative for each country.

3.4 Economic growth - GDP per capita

The measure used as a proxy for economic output in a country is gross domestic product (GDP) per capita, gathered from The Organisation for Economic Co-operation and Development (OECD). Gross domestic product (GDP) at market price is the total expenditure on goods and services minus net imports. The GDP is given at current market prices and purchasing power parity (PPP), which makes it comparable between nations (OECD data, n.d.a). Put simply, GDP per capita is the mean income value of people of that nation . In Figure 3, GDP per capita for each country is displayed from 2002 to 2016, showing a clear upward trend. While GDP per capita is a flawed measure, it has a strength in its familiarity since it is a widely used measure of economic output.

3.5 Income inequality - Gini coefficient

The measure used as a proxy for income inequality is the Gini coefficient (sometimes referred to as Gini index or Gini ratio), also gathered from OECD data. The Gini coefficient is a measure of dispersion in the income distribution and it is a commonly used measurement of inequality (Zagorski et al., 2014). The measure ranges from 0 (perfect equality) to 1 (perfect inequality) (OECD data, n.d.b). Perfect equality meaning all households have the same income, and perfect inequality a situation when a single household receive all the income. In Figure 6 in the appendix, the Gini coefficient for all included countries available in the OECD is displayed for the time period 2002-2016.

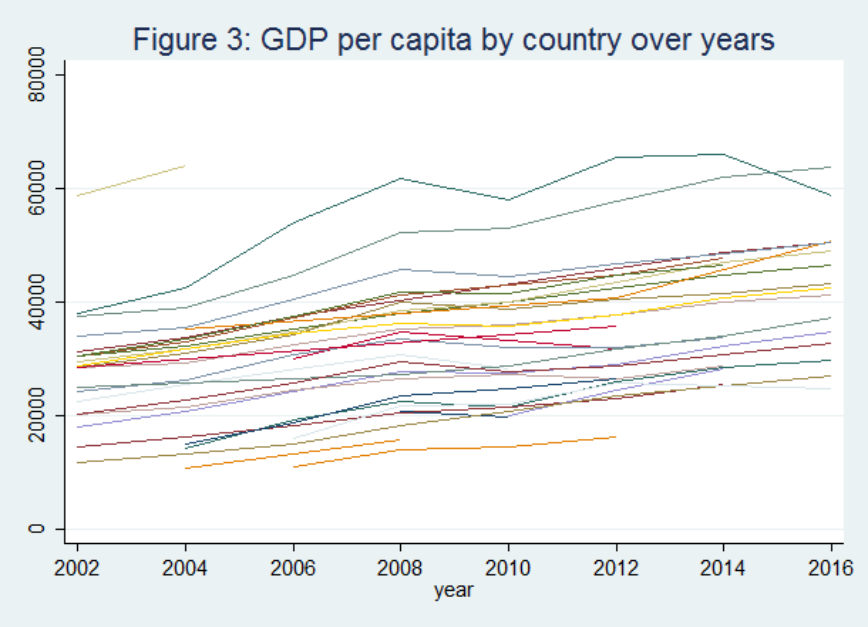

Figure 3: GDP per capita in countries from 2002 to 2016. GDP per capita is measured in USD at current prices and PPPs.

3.6 Identification strategy

The method chosen, fixed effect regression analysis, allow us to control for unobserved but fixed omitted variables. In this study, both country fixed effects and year fixed effects are controlled for. By including a country fixed (time-invariant) effect, we control for variance between countries that are constant over time, such as cultural, institutional, demographic or geographic factors. This is important considering that such between-country factors have been shown to be strongly connected with SWB(Burns, 2018). This is a strength of our study, as this approach for example ensures that potential language and translation problems are avoided. If there are semantic differences in the translations for 'happiness' or 'life satisfaction' across languages, results would be biased if this is not managed. Lolle and Andersen (2016) show that the Danish word for "happy" ("lykkelig") has a stronger meaning than the english term, which risk producing biased results when comparing answers from respondents across languages. Furthermore, by controlling for year-fixed (country-invariant) effects, we control for global shocks that affect all countries equally from one year to the next.

Since the gathered data is ordinal and not on a ratio scale, scepticism can be raised about whether it can be meaningfully averaged in the way we have done (Clark, 2016). This issue has been discussed thoroughly by other researchers who we refer to regarding the validity of this approach (e.g. Frey and Stutzer, 2002; Clark and Oswald, 2002).

In the analysis, we are performing a set of OLS regression models, all following the generalized equation expressed in (1), with different sets of independent variables included, and two different measures of SWB.

$$SWB_{it} = \alpha + \beta \times X_{it} + \lambda_i + \tau_t + \varepsilon_{it} \qquad (1)$$
$$i = 1,\ldots,36, \qquad t = 2002, 2004, \ldots, 2016$$

SWB_{it} is the average level of self-reported well-being in country *i* in the year *t*, X_{it} is the set of explanatory variables used in the regression model. In all regressions, we include a country fixed effect λ_i and a year fixed effect τ_t. Last is the idiosyncratic error ε_{it} which is assumed not to be autocorrelated. A specified model is presented in (2), with GDP per capita and Gini coefficient for country *i* and year *t* are used as regressors.

$$SWB_{it} = \alpha + \beta_1 \times GDP_{it} + \beta_2 \times Gini_{it} + \lambda_i + \tau_t + \varepsilon_{it} \qquad (2)$$

The decision of choosing between a fixed effect and a random effects model comes down to the question of whether or not we believe the country-specific error term λ_i and time-specific error term

τ_t correlate with the independent variable X_{it} used in the model (Gujarati and Porter, 2009, p 606). As per capita GDP is not randomly distributed across countries and time, we will be using a fixed effect model. We assume the homoskedasticity assumption might be violated at baseline, and therefore present our regressions with robust standard errors (Gujarati and Porter, 2009, p. 391). In the case that there is no heteroskedasticity, robust standard errors will yield the same standard errors as conventional OLS.

An advantage with a macro-approach (using aggregated SWB measures as our dependent variable in the model) is that we can assume unobserved heterogeneity at individual level to even out since we have adjusted our sample to ensure it is representative for each country (Welsch, 2006).

4 Results

The results from the fixed effect regression analysis are presented in Table 1 (using happiness as output variable) and Table 2 (with life satisfaction as output variable). Regression models A to M is presented in columns, where coefficients for the independent variables are shown as well as standard errors in parenthesis and the significance level. At the bottom of the table, the number of observations and the overall R squared is presented. A table displaying the degree of correlation between included variables is provided in the appendix, Table 5.

4.1 The effect of economic growth on SWB

Scatter plots of the association between per capita GDP and country average SWB for each observation in our dataset are presented in Figure 4 and 5. The relationship appears non-linear, which motivates using the logarithmized GDP per capita (Rözer and Kraaykamp, 2013). The first regression model (A1 and A2, see Table 1 and 2) include only GDP per capita as independent variable. The regression show a statistically significant (at 1%) positive effect on average SWB. This is the case for both happiness and life satisfaction as dependent variable.

The estimated coefficient of *log(GDPPC)(t)* is interpreted as the change we see in average SWB as GDP per capita change with one percentage divided by 100 (Gujarati and Porter, 2009, p.165). In A1, we see an increase in average happiness by 0,0109 (= 1,09/100) points on the scale going from 0 to 10 as GDP per capita increase by 1 percentage. The magnitude of the effect is very small which is what other studies tend to show as well (Helliwell, 2003). When modelling with *GDP per capita* lagged one year (E1 and E2), the coefficient is still positive and statistically significant (at 5% for happiness and 1% for life satisfaction). Lagged values may be more exogenous in respect to the error term (uncorrelated with the residual), so it is possible that these models provide a more accurate estimation of the effect considering the risk of omitted variable bias.

In models C1 and C2, we control for changes in the income distribution (using non-lagged variables). The results show that the effect of GDP per capita on SWB is still positive and statistically significant (at 1%) when income inequality is held constant. When using lagged values, the effect is still positive and statistically significant (at 1% for happiness, and 10% for life satisfaction).

Whether or not the effect of economic growth on SWB is more accurately estimated by the model which include a control for income inequality or not concerns what assumption we make about the relationship between the two variables. If economic growth is a cause of income inequality, then it

should not be controlled for. This we assume not to be the case[9]. When the Gini coefficient is included as control (C1 and C2) the estimated effect of per capita GDP on SWB increase compared to models A1 and A2. When using lagged values no such reaction appear from including the control.

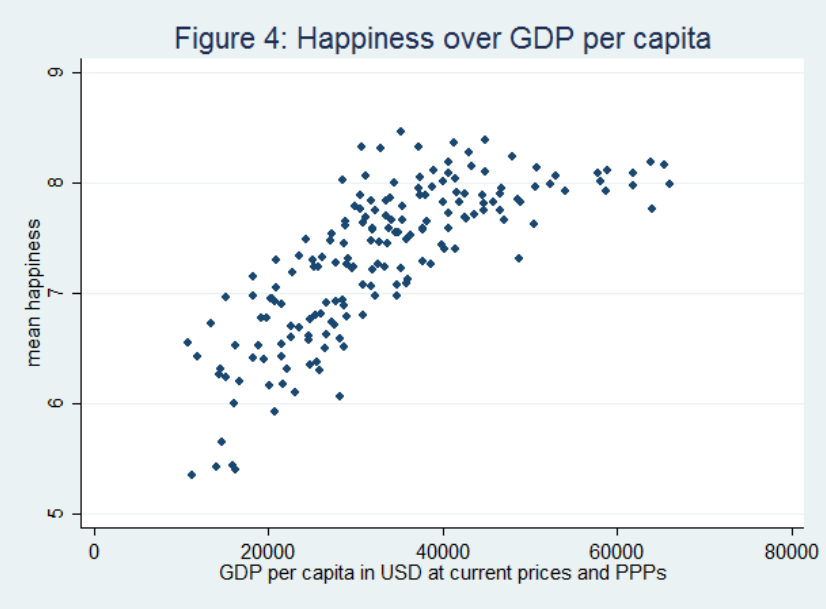

Figure 4: Scatter plot displaying average happiness and GDP per capita of each observation in our data set.

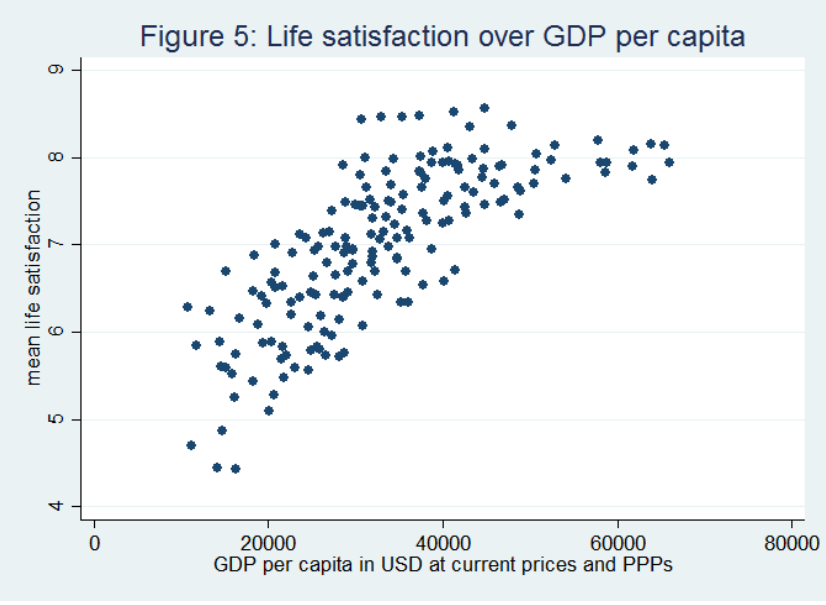

Figure 5: Scatter plot displaying average life satisfaction and GDP per capita of each observation in our data set.

[9] Developed countries are generally more equal than developing countries, but this do not imply a causal relationship. This conclusion Barro (2000) draws from observing that the major part of the variation in income inequality cannot be explained by the level of economic development.

4.2 The moderating effect of income inequality

The Gini coefficient have a negative but insignificant effect on SWB when used as sole explanatory variable (B1 and B2) when using non-lagged values, it does however have a significant (at 1%) negative lagged effect on SWB (F1 and F2). If it were the case that the effect of economic growth on SWB was moderated by income inequality, then we would be able to observe this expected negative effect as we include an interaction variable. The results show no statistically significant effect in the same time period (D1 and D2), nor when using lagged values (H1 and H2). The estimated coefficient is zero, which indicate an absence of a moderating effect.

4.3 Additional results and remarks

In models I, J, K, L and M, the relative change in GDP per capita and Gini have been used. The results from these models can tell us if SWB is influenced by the *level* in the independent variable or the size of the relative change in it (Di Tella et al., 2003). These values have been calculated with the equations:

$$\Delta GDP(t) = \frac{GDP(t) - GDP(t-1)}{GDP(t-1)} \quad (3)$$

$$\Delta GDP(t-1) = \frac{GDP(t-1) - GDP(t-2)}{GDP(t-2)} \quad (4)$$

$$\Delta Gini(t) = \frac{Gini(t) - Gini(t-1)}{Gini(t-1)} \quad (5)$$

The results show positive, non-significant effects of $\Delta GDP(t)$ and $\Delta GDP(t-1)$ on SWB when we do not control for $\Delta Gini(t)$, (I and J), but significant for $\Delta GDP(t)$ (at 10% for happiness only) when $\Delta Gini(t)$is included as control (L1 and L2). Even though the effect is statistically significant, the reported R^2 suggest this variable have next to no explanatory power on average SWB. We suggest, based on these findings, that it cannot be concluded that increases in per capita GDP produce *temporarily* higher SWB, which would have supported the theory by Easterlin et al. (2010) that GDPPC only have a short-term effect on SWB (Di Tella, 2003).

The regression model using only the $\Delta Gini(t)$ as explanatory variable is however more interesting (K1 and K2), since it suggest there is a *positive* effect on average SWB when the Gini coefficient grows (statistically significant at 10% for happiness and 1% for life satisfaction). The sign of this effect is interesting as it suggest there is a positive temporary effect on SWB of increase in income inequality (results are consistent for both measures of SWB). This is not what we expected based on the theory by Oishi and Kesebir (2015) that unevenly distributed growth have a negative effect on

SWB. In models M1 and M2, we have included an interaction term between the growth of GDPPC and growth of Gini. While earlier regressions of an interaction effect (D and H) have suggested that SWB is not affected by economic growth differently depending on the level of income inequality in the country, this model instead suggest that the *change in* income inequality do have a moderating effect on the link between SWB and economic growth (significant at 5% for happiness only). The sign of this interaction effect is positive as well, indicating that the there is a larger effect of economic growth on SWB when income inequality increases.

It shall be noted that the results for the most part are insensitive to the choice of SWB-measure used as output variable, the estimated effects are generally higher for life satisfaction than happiness. When the regressions give mixed findings depending on SWB-measure we want to emphasize caution in respect to interpretation[10]. Observe also that due to missing data on the Gini coefficients for many countries in the OECD data, we lose more than half of our observations when Gini is included in the model. This raises two possible concerns: First, if the reason for the loss of observations correlate with our dependent variable, estimates can be biased. However, when running regression A and E using only the sample for which the Gini data exist, no notable changes are observed in the results, which suggests that the loss of data is not a problematic issue. Second, a loss of observations may lead to insignificant results, why the absence of statistical significance cannot be regarded as evidence of the absence of an effect. As long as we do not draw conclusions based on non-significance, this is not a concern either.

Observing the reported overall R^2 for each model, *GDP per capita* is the variable with highest explanatory power. Models excluding it generally result in low R^2. The overall R^2 is especially low for models using relative change of variables as regressors (see I, J, K L and M).

[10] This refers especially to the results in models H, L and M, where estimated coefficients are statistically significant only for one of the two measures or that the sign of the effect differ.

Table 1: Happiness

Happiness	A1	B1	C1	D1	E1	F1	G1	H1	I1	J1	K1	L1	M1
log(GDPPC)(t)	1.088***		1.622***	1.507***									
	(0.324)		(0.323)	(0.513)									
Gini(t)		-3.871	-2.084	-2.540									
		(2.699)	(1.297)	(2.072)									
log(GDPPC)xGini(t)				0.000									
				(0.000)									
log(GDPPC)(t-1)					0.807**		0.731***	0.966***					
					(0.354)		(0.212)	(0.305)					
Gini(t-1)						-4.944***	-2.903***	-1.788					
						(1.063)	(0.955)	(1.437)					
log(GDPPC)xGini(t-1)								-0.000					
								(0.000)					
ΔGDPPC(t)									1.326			2.439*	2.106
									(0.845)			(1.394)	(1.242)
ΔGDPPC(t-1)										0.330			
										(0.740)			
ΔGini(t)											1.234*	1.493*	-1.166
											(0.710)	(0.863)	(1.374)
ΔGDPPCxΔGini(t)													35.615**
													(15.330)
Constant	-3.705	8.529***	-8.400**	-7.244	-0.838	8.815***	0.860	-1.538	7.187***	7.239***	7.394***	7.309***	7.314***
	(3.266)	(0.802)	(3.293)	(5.231)	(3.552)	(0.316)	(2.288)	(3.171)	(0.067)	(0.067)	(0.013)	(0.052)	(0.049)
Observations	178	84	84	84	178	83	83	83	178	178	68	68	68
R-squared	0.72	0.14	0.60	0.60	0.71	0.13	0.56	0.52	0.00	0.01	0.02	0.00	0.00
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
year FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Results from regression analysis using happiness as dependent variable. Each column display the coefficients for included variables (robust standard errors in parentheses) for each of the 13 models, output variable on 100 point scale. Significance level is shown with: *** p<0.01, ** p<0.05, * p<0.1

Table 2: Life satisfaction

Life satisfaction	A2	B2	C2	D2	E2	F2	G2	H2	I2	J2	K2	L2	M2
log(GDPPC)(t)	1.589***		2.593***	2.234**									
	(0.406)		(0.691)	(0.962)									
Gini(t)		-4.120	-1.264	-2.688									
		(5.094)	(2.787)	(3.449)									
log(GDPPC)xGini(t)				0.000									
				(0.000)									
log(GDPPC)(t-1)					1.310***		1.301*	0.680					
					(0.429)		(0.713)	(0.777)					
Gini(t-1)						-10.057***	-6.425***	-9.385***					
						(1.737)	(1.448)	(2.414)					
log(GDPPC)xGini(t-1)								0.000					
								(0.000)					
ΔGDPPC(t)									1.092			0.324	0.067
									(0.978)			(1.439)	(1.338)
ΔGDPPC(t-1)										1.022			
										(1.046)			
ΔGini(t)											1.234*	3.626**	1.573
											(0.710)	(1.305)	(2.576)
ΔGDPPCxGini(t)													27.507
													(27.939)
Constant	-9.139**	8.124***	-18.938**	-15.327	-6.259	9.959***	-4.197	2.167	6.811***	6.817***	7.394***	7.024***	7.027***
	(4.074)	(1.523)	(7.499)	(10.087)	(4.289)	(0.519)	(7.321)	(8.001)	(0.080)	(0.090)	(0.013)	(0.056)	(0.054)
Observations	178	84	84	84	178	83	83	83	178	178	68	68	68
R-squared	0.68	0.21	0.58	0.56	0.68	0.18	0.58	0.61	0.00	0.00	0.02	0.03	0.04
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
year FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Results from regression analysis using life satisfaction as dependent variable. Each column display the coefficients for included variables (robust standard errors in parentheses) for each of the 13 models, output variable on 100 point scale. Significance level is shown with: *** p<0.01, ** p<0.05, * p<0.1

5 Conclusions and Discussion

The purpose of this thesis have been to investigate the relationship between economic growth and self-reported well-being in society. We have conducted a fixed effect regression analysis with data for 36 European countries between the years of 2002 to 2016 gathered from the European Social Survey (ESS) and the OECD. The method used allow us to control for country- and year fixed effects. Furthermore, changes in the income distribution have been held constant by including the Gini coefficient as a control variable. The thesis have also examined if income inequality moderates the effect of economic growth on SWB.

The results reinforce findings from earlier studies that there is a positive correlation between GDP per capita and average SWB in countries (e.g. Diener et al., 2010; Di Tella et al., 2003; Diener et al., 2013). This is valuable knowledge as this means economic output can provide us with information on societal well-being when data on SWB is unavailable. The popular perception that economic growth leads to greater well-being in society is in other words supported by the data. Our findings suggest that it is the level (both current and lagged) and *not* the size of the relative change in per capita GDP that influence SWB. The positive effect of economic growth on societal well-being is therefore suggested not to be only temporary (Di Tella et al., 2003), or that there is adaptation, also referred to as a *habituation effect* (Helliwell, 2003).

The results suggest that there are two separate and opposite effects on SWB from income inequality: a negative lagged effect of the *level* of inequality, and a positive effect of the relative change in inequality on current SWB. The fact that the negative effect of inequality-level is visible in the following time period but not in the present can possibly be explained by the second short-term positive effect. Caution should be taken regarding these effects as it is possible that there are unobserved omitted variables that covary with income inequality on the margin. If this is the case, the effects we have found are not necessarily driven by actual changes in the income distribution but instead caused by omitted variable bias. By using an interaction variable, we analyse if the effect of economic growth on SWB is moderated by income inequality, which have been argued to be the case by Oishi and Kesebir (2015). The data provide no evidence of such a moderating effect, but indicate a moderating effect of the relative change in income inequality: an increase in inequality having a positive influence on the effect of economic growth on SWB.

In this thesis, we utilize data on happiness and life satisfaction from respondents in developed European countries. For this reason, the results may not be fully generalizable as researchers have

suggested that the effect of income inequality on SWB is different depending on cultural factors (e.g. Delhey and Dragolov, 2013; Ngamaba et al., 2017; Oishi and Kesebir, 2015).

Since SWB measures are self-reported, it is to some degree relative, which creates a difficulty when making comparisons across time periods. If today's respondents have higher expectations about what it means to be “extremely happy” (the maximum level on the happiness scale) compared to respondents ten or twenty years ago, the measure may not be appropriate as a proxy for utility. Investigating how to interpret results from these studies we hope researchers will pay more attention to, as this may be a reason why studies like this can find a correlation between economic growth and SWB while studies using more infrequently collected data cannot (e.g. Easterlin, 1974).

It is important to note that while our models assume the direction of causality, this is information that empirical studies of this sort cannot realistically generate since we do not have the historical counterfactual, how happy would these people have been had there not been any economic growth *ceteris paribus*. It is of course possible that the causality goes the other way - that when people get happier, the output in the economy grows as well, or perhaps more plausibly, that some unobserved variable affects them both.

One issue that many studies in the happiness literature fail to discuss, concerns the fact that since people are decision-making agents, the factors studied are rarely exogenously determined. For example, people make choices that influence their future income, high income is often the result of investments done in the past, may it be in education or entrepreneurial endeavors. If people have diverse interests and goals in life, may it be riches, family, art, leisure or any other possible desire or ambition, then we would not expect everyone to make major investments in hopes of high future earnings. In this model of the world consisting of rational utility-maximizing agents, there would be no or only weak correlation between personal income and happiness or life satisfaction. The fact that many studies are able to show statistically significant associations between income and SWB is something researcher need to discuss more thoroughly since this is not necessarily what a rational choice model would predict. In this thesis, looking at the relation between per capita GDP and SWB, it is important to remember that economic growth is not an exogenously determined variable either.

So far, we have only briefly discussed possible omitted variable bias and the decision of not including a bigger set of controls in the regression models. This comes down to the acknowledgement that economic growth is not exogenous to the control factors that are sometimes included in similar studies. Economic growth is the result of factors such as good governance and functioning social and economic institutions e.g. protection of property rights, rule of law and low corruption. The possible policy implications of the results presented in this thesis cannot be formulated as an answer to the

question whether or not to have economic growth. But rather that policy makers who are interested in increasing the well-being of the citizenry can enact policy that promote economic growth in order to do so. If we would have controlled for these governing institutions in our analysis, holding them constant, the ability to draw conclusions about such governmental policy would be eliminated. It is our hope that more research will be done investigating the value of SWB measures in policy evaluation to complement other information sources.

References

Arthaud-Day, M. L., & Near, J. P. (2005). The wealth of nations and the happiness of nations: Why "accounting" matters. *Social Indicators Research*, *74*(3), 511-548.

Barro, R. J. (2000). Inequality and Growth in a Panel of Countries. *Journal of economic growth*, *5*(1), 5-32.

Bartolini, S., Mikucka, M., & Sarracino, F. (2017). Money, trust and happiness in transition countries: evidence from time series. *Social Indicators Research*, *130*(1), 87-106.

Benjamin, D. J., Heffetz, O., Kimball, M. S., & Rees-Jones, A. (2012). What do you think would make you happier? What do you think you would choose?. *American Economic Review*, *102*(5), 2083-2110.

Berg, M.C, Veenhoven, R, 2010. Income inequality and happiness in 119 nations, in: . Edward Elgar: Cheltenham / Aldershot, UK/ Northampton, MA, USA.

Brown, S., Gray, D., & Roberts, J. (2015). The relative income hypothesis: A comparison of methods. *Economics Letters*, *130*, 47-50.

Burns, R. A. (2018).The Utility of Between-Nation Subjective Well Being Comparisons Amongst Nations Within the European Social Survey. *Journal of Happiness Studies*, 1-23.

Cheng, C., Cheung, M. W. L., Montasem, A., & International Network of Well-Being Studies. (2016). Explaining differences in subjective well-being across 33 nations using multilevel models: Universal personality, cultural relativity, and national income. *Journal of personality*, *84*(1), 46-58.

Cheung, F., & Lucas, R. E. (2016). Income inequality is associated with stronger social comparison effects: The effect of relative income on life satisfaction. *Journal of personality and social psychology*, *110*(2), 332.

Choudhary, M. A., Levine, P., McAdam, P., & Welz, P. (2011). The happiness puzzle: analytical aspects of the Easterlin paradox. *Oxford Economic Papers*, *64*(1), 27-42.

Clark, A. E., & Oswald, A. J. (2002). Well-being in panels. *DELTA, mimeo*.

Clark, A., Etilé, F., Postel-Vinay, F., Senik, C., & Van der Straeten, K. (2005). Heterogeneity in Reported Well-Being: Evidence from Twelve European Countries. *The Economic Journal*, *115*(502).

Clark, A. E., Frijters, P., & Shields, M. A. (2008). Relative income, happiness, and utility: An explanation for the Easterlin paradox and other puzzles. *Journal of Economic literature*, *46*(1), 95-144.

Clark, A. E. (2011). Happiness, habits and high rank: Comparisons in economic and social life, Discussion paper series. *Institute for the Study of Labor* (IZA), Bonn.

Cummins, R. A. (2000). Personal income and subjective well-being: A review. *Journal of Happiness Studies*, *1*(2), 133-158.

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.

Deaton, A. (2012). The financial crisis and the well-being of Americans 2011 OEP Hicks Lecture. *Oxford economic papers*, *64*(1), 1-26.

Delhey, J., & Dragolov, G. (2013). Why inequality makes Europeans less happy: The role of distrust, status anxiety, and perceived conflict. *European Sociological Review*, *30*(2), 151-165.

Di Tella, R., MacCulloch, R. J., & Oswald, A. J. (2003). The macroeconomics of happiness. *Review of Economics and Statistics*, *85*(4), 809-827.

Diener, E., & Biswas-Diener, R. (2002). Will money increase subjective well-being?. *Social indicators research*, *57*(2), 119-169.

Diener, E. (2006). Guidelines for national indicators of subjective well-being and ill-being. *Journal of happiness studies*, *7*(4), 397-404.

Diener, E., Kahneman, D., Tov, W., & Arora, R. (2010). Income's association with judgments of life versus feelings. International differences in well-being, 3-15.

Diener, E., Tay, L., & Oishi, S. (2013). Rising income and the subjective well-being of nations. *Journal of personality and social psychology*, *104*(2), 267.

Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of economic psychology*, *29*(1), 94-122.

Easterlin, R. A. (1974). Does economic growth improve the human lot? Some empirical evidence. In P. A. David & M. W. Reder (Eds.), *Nations and households in economic growth* (pp. 89 –125). New York, NY: Academic Press

Easterlin, R. A. (1995). Will raising the incomes of all increase the happiness of all?. *Journal of Economic Behavior & Organization*, *27*(1), 35-47.

Easterlin, R. A. (2004). The economics of happiness. *Daedalus*, *133*(2), 26-33.

Easterlin, R. A., McVey, L. A., Switek, M., Sawangfa, O., & Zweig, J. S. (2010). The happiness–income paradox revisited. *Proceedings of the National Academy of Sciences*, *107*(52), 22463-22468.

ESS Methodology. (n.d.). Retrieved May 02, 2018, from http://www.europeansocialsurvey.org/methodology/ess_methodology/source_questionnaire/source_questionnaire_development.html

European Social Survey. (2014). *Weighting European Social Survey Data.* Retrieved May 2, 2018 from https://www.europeansocialsurvey.org/docs/methodology/ESS_weighting_data_1.pdf

Frey, B. S., & Stutzer, A. (2002). What can economists learn from happiness research?. *Journal of Economic literature*, *40*(2), 402-435.

Frijters, P., Haisken-DeNew, J. P., & Shields, M. A. (2004). Money does matter! Evidence from increasing real income and life satisfaction in East Germany following reunification. *American Economic Review*, *94*(3), 730-740.

Greve, B. (2012). The impact of the financial crisis on happiness in affluent European countries. *Journal of Comparative Social Welfare*, *28*(3), 183-193.

Gujarati, D. N., & Porter, D. C. (2009). Basic Econometrics (5th international ed.). *New York: McGraw-Hill*

Hagerty, M. R., & Veenhoven, R. (2003). Wealth and happiness revisited–growing national income does go with greater happiness. *Social indicators research*, *64*(1), 1-27.

Helliwell, J. F. (2003). How's life? Combining individual and national variables to explain subjective well-being. *Economic modelling*, *20*(2), 331-360.

Helliwell, J. F., Huang, H., & Wang, S. (2014). Social capital and well-being in times of crisis. Journal of Happiness Studies, 15(1), 145-162.

Howell, R. T., & Howell, C. J. (2008). The relation of economic status to subjective well-being in developing countries: A meta-analysis. *Psychological bulletin*, *134*(4), 536.

Hussain, M. A. (2015). Predicting Well-Being in Europe? The Effect of the Financial Crisis. *Eastern European Business and Economics Journal*, *1*(2), 2-31.

Jayawickreme, E., Tsukayama, E., & Kashdan, T. B. (2017). Examining the effect of affect on life satisfaction judgments: A within-person perspective. *Journal of Research in Personality*, *68*, 32-37.

Kenny, C. (2005). Does development make you happy? Subjective wellbeing and economic growth in Developing countries. *Social Indicators Research*, *73*(2), 199-219.

Lolle, H. L., & Andersen, J. G. (2016). Measuring happiness and overall life satisfaction: A Danish survey experiment on the impact of language and translation problems. *Journal of Happiness Studies*, *17*(4), 1337-1350.

Mankiw, N. G. (2014). *Principles of macroeconomics*. Cengage Learning. pp. 198

Ngamaba, K. H., Panagioti, M., & Armitage, C. J. (2017). Income inequality and subjective well-being: a systematic review and meta-analysis. *Quality of Life Research*, 1-20.

OECD data, (n.d.a). Gross domestic product (GDP) doi: 10.1787/dc2f7aec-en Retrieved may 2, 2018 from https://data.oecd.org/gdp/gross-domestic-product-gdp.htm

OECD data, (n.d.b). Income inequality (Gini). doi: 10.1787/459aa7f1-en Retrieved may 2, 2018 from https://data.oecd.org/inequality/income-inequality.htm

Oishi, S., & Kesebir, S. (2015). Income inequality explains why economic growth does not always translate to an increase in happiness. *Psychological science*, *26*(10), 1630-1638.

Okulicz-Kozaryn, A. (2012). Income and well-being across European provinces. *Social Indicators Research*, *106*(2), 371-392.

Piper, A. T. (2015). Europe's capital cities and the happiness penalty: an investigation using the European Social Survey. *Social Indicators Research*, *123*(1), 103-126.

Rözer, J., & Kraaykamp, G. (2013). Income inequality and subjective well-being: A cross-national study on the conditional effects of individual and national characteristics. *Social indicators research*, *113*(3), 1009-1023.

Schneider, S. M. (2016). Income inequality and subjective wellbeing: Trends, challenges, and research directions. *Journal of Happiness Studies*, *17*(4), 1719-1739.

Stevenson, B., & Wolfers, J. (2008). *Economic growth and subjective well-being: reassessing the Easterlin paradox* (No. w14282). National Bureau of Economic Research.

The European Social Survey. (2002). *SOURCE QUESTIONNAIRE (Round 1, 2002/3)*(pp. 12, 15). Retrieved from http://www.europeansocialsurvey.org/docs/round1/fieldwork/source/ESS1_source_main_questionnaire.pdf

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

Veenhoven, R., & Ehrhardt, J. (1995). The cross-national pattern of happiness: Test of predictions implied in three theories of happiness. *Social Indicators Research*, *34*(1), 33-68.

Veenhoven, R., & Hagerty, M. (2006). Rising happiness in nations 1946–2004: A reply to Easterlin. *Social indicators research*, *79*(3), 421-436.

Welsch, H. (2006). Environment and happiness: Valuation of air pollution using life satisfaction data. *Ecological economics*, *58*(4), 801-813.

Wolfers, J. (2010, December 13). Debunking the Easterlin Paradox, Again. Retrieved June 02, 2018, from http://freakonomics.com/2010/12/13/debunking-the-easterlin-paradox-again/

Wooldridge, J. M. (2014). *Introduction to Econometrics: Europe, Middle East and Africa Edition*. Cengage Learning. 387-404.

Zagorski, K., Evans, M. D., Kelley, J., & Piotrowska, K. (2014). Does national income inequality affect individuals' quality of life in Europe? Inequality, happiness, finances, and health. *Social Indicators Research*, *117*(3), 1089-1110.

Appendix

Table 3: Descriptive statistics of the ESS data set: countries and number of respondents over years

Country	Round 1 [2002]	Round 2 [2004]	Round 3 [2006]	Round 4 [2008]	Round 5 [2010]	Round 6 [2012]	Round 7 [2014]	Round 8 [2016]	(N) number of respondents
Albania						•			1194
Austria	•	•	•				•	•	10595
Belgium	•	•	•	•	•	•	•	•	14295
Bulgaria			•	•	•	•			8163
Croatia				•	•				3092
Cyprus			•	•	•	•			4336
Czech Republic	•	•		•	•	•	•	•	14941
Denmark	•	•	•	•	•	•	•		10763
Estonia		•	•	•	•	•	•	•	13293
Finland	•	•	•	•	•	•	•	•	16168
France	•	•	•	•	•	•	•	•	15022
Germany	•	•	•	•	•	•	•	•	23246
Greece	•	•		•	•				9668
Hungary	•	•	•	•	•	•	•		11376
Iceland		•				•		•	2185
Ireland	•	•	•	•	•	•	•	•	18135
Israel	•			•	•	•	•	•	14559
Italy	•					•			2123
Kosovo						•			1259
Latvia				•					1930
Lithuania					•	•	•		5864
Luxembourg	•	•							3164
Netherlands	•	•	•	•	•	•	•	•	15146
Norway	•	•	•	•	•	•	•	•	13218
Poland	•	•	•	•	•	•	•	•	13864
Portugal	•	•	•	•	•	•	•		13522
Romania				•					2079
Russia			•	•	•	•		•	12206
Slovakia		•	•	•	•	•			8597
Slovenia	•	•	•	•	•	•	•	•	10807

Spain	•	•	•	•	•	•	•		13438
Sweden	•	•	•	•	•	•	•		12785
Switzerland	•	•	•	•	•	•	•	•	13831
Turkey		•		•					4098
Ukraine		•	•	•	•	•			9501
United Kingdom	•	•	•	•	•	•	•	•	17549
total nr of countries	22	25	23	29	27	29	21	17	
(N) total nr of Respondents	41 938	47 080	42 436	55 836	51 794	53 983	39 904	33 041	366012

Table 3, Countries participating in the European Social Survey (ESS) that are included in our data set. • indicate the country took part in the survey round (1 - 8). The last column display the total number of participating respondent for which we have valid data on SWB. At the bottom row, the total number of respondents for each survey round is displayed. Note: The data contain 193 observations in total, this is more than the total number of observations in our regressions, this is either because the GDP per capita data or Gini coefficient data was missing in the OECD database. Four countries are only included in one ESS survey round, these will not affect the regression results since we are using a fixed effect regression method controlling for country specific differences. The numbers of countries and respondents per survey round are shown at the bottom.

Table 4: Average reported happiness and life satisfaction for each country

Country	Happiness	Happiness (SD)	Life Satisfaction	Life Satisfaction (SD)	(N) total nr of respondents
Denmark	8.32	1.44	8.46	1.52	10763
Iceland	8.24	1.89	8.12	1.62	2185
Switzerland	8.08	3.29	8.08	1.70	13831
Finland	8.04	1.41	7.97	1.54	16168
Norway	7.99	1.63	7.87	1.68	13218
Sweden	7.87	1.57	7.86	1.71	12785
Netherlands	7.86	3.91	7.71	1.58	15146
Luxembourg	7.84	5.28	7.79	2.08	3164
Belgium	7.73	1.53	7.43	1.79	14295
Israel	7.66	4.25	7.40	2.26	14559
Austria	7.57	4.20	7.58	2.05	10595
United Kingdom	7.56	4.39	7.21	2.08	17549
Spain	7.55	2.97	7.18	1.98	13438
Ireland	7.50	4.26	7.17	2.11	18135
Cyprus	7.44	3.85	7.13	2.02	4336
Germany	7.41	3.26	7.19	2.19	23246
France	7.31	4.38	6.48	2.44	15022
Slovenia	7.21	1.98	6.87	2.22	10807
Poland	7.06	2.36	6.71	2.40	13864
Croatia	6.91	4.46	6.50	2.36	3092
Czechia	6.90	4.45	6.61	2.14	14941
Estonia	6.81	2.00	6.34	2.25	13293
Italy	6.77	3.05	6.82	2.22	2123
Portugal	6.66	4.88	5.79	2.23	13522
Slovakia	6.65	4.58	6.29	2.33	8597
Greece	6.55	3.94	6.14	2.32	9668
Albania	6.52	7.56	5.74	3.20	1194
Lithuania	6.48	5.72	5.82	2.36	5864
Latvia	6.40	3.30	5.87	2.41	1930
Kosovo	6.39	5.81	6.15	2.69	1259
Hungary	6.29	3.94	5.62	2.47	11376

Russia	6.23	4.41	5.61	2.44	12206
Romania	6.20	3.93	6.16	2.52	2079
Turkey	5.94	3.99	5.86	2.99	4098
Ukraine	5.82	6.20	4.64	2.56	9501
Bulgaria	5.48	3.95	4.61	2.64	8163
Total	7.19	2.04	6.85	2.33	366012

Table 4, Average reported happiness and life satisfaction for each country, and standard deviation and number of respondents (N) for all eight rounds (2002 - 2016). Respondent's answers range from 0 - extremely unhappy, to 10 - extremely happy. Countries are sorted from highest level of average happiness to lowest.

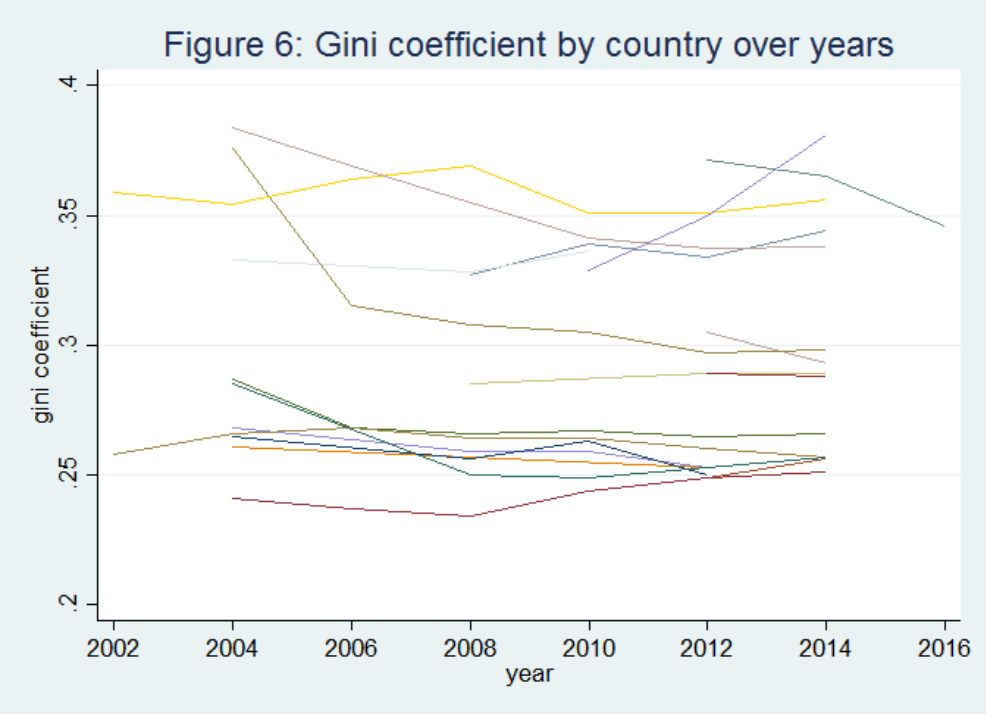

Figure 6: Gini coefficient in studied countries from 2002 to 2016, the Gini coefficient measures income inequality and range from 0 (perfect inequality), to 1 (perfect equality).

Table 5: Correlation of variables

Correlation	happiness	Life satisfaction	logGDPPC (t)	logGDPPC(t-1)	logGDPPCxGini	Gini (t)	Gini (t-1)	Δ GDP (t)	ΔGDP(t-1)	Δ Gini (t)
happiness	*1,00*									
Life satisfaction	*0,96*	*1,00*								
logGDP (t)	*0,70*	*0,69*	1,00							
logGDP(t-1)	*0,69*	*0,68*	1,00	1,00						
logGDPxGini	*0,56*	*0,51*	0,88	0,88	1,00					
Gini (t)	*−0,35*	*−0,45*	−0,30	−0,29	0,18	1,00				
Gini (t-1)	*−0,36*	*−0,46*	−0,32	−0,32	0,15	0,98	1,00			
Δ GDP (t)	*−0,19*	*−0,21*	−0,38	−0,45	−0,40	0,00	0,04	1		
Δ GDP (t-1)	*−0,04*	*0,09*	0,16	0,17	0,19	0,05	−0,15	−0,14	1	
Δ Gini (t)	*−0,04*	*−0,01*	−0,14	−0,15	−0,09	0,11	0,04	0,25	0,29	1