

Bachelor thesis

What is the effect of income inequality on happiness?

A cross section of the period between 1981 and 2014 from 43 countries around the world



Name: Julia Reis

Student number: 410080

Supervisor: Dr. L.D.S. Hering

Date: 31-07-2017

Abstract

In this bachelor thesis, the relationship between income inequality and self-reported life satisfaction will be discovered. Using individual happiness data from the World Values Survey and data on income inequality (Gini index) at the country level, an OLS regression with both country and year fixed effects is employed to test this relationship in a sample of 43 countries around the world during the period 1981-2014. Regressions are also run by region to discover any differences between these regions. The results show that at the aggregate level, there is no significant relationship between income inequality and life satisfaction. For Asia and Latin America, the effect of income inequality on happiness is significantly negative. For Africa, the effect of income inequality on happiness is significantly positive.

Contents

- 1. Introduction..... 3
 - 1.1 Research Question 4
- 2. Related Literature..... 5
 - 2.1 Defining happiness 5
 - 2.2 Positive Effects of Happiness..... 5
 - 2.3 Individual Determinants 6
 - 2.4 Country-specific Determinants..... 7
 - 2.5 Income Inequality and Happiness 8
 - 2.6 Relative Deprivation Theory..... 10
 - 2.7 Table of Expected Signs 12
- 3. Methodology and Data..... 13
 - 3.1 Data and sample..... 13
 - 3.2 Methodology 14
 - 3.3 Variables 15
 - 3.3.1 Dependent variable 15
 - 3.3.2 Explanatory variable 15
 - 3.3.3 Control variables 15
 - 3.4 Descriptive Statistics 16
- 4. Results 18
 - 4.1 Results of the Full Sample 18
 - 4.2 Results per Region..... 19
 - 4.3 Results including Income Scales 22
- 5. Conclusion 23
 - 5.1 Conclusion and Discussion 23
 - 5.2 Limitations and Recommendations..... 23
- References..... 25
- Appendices 28
 - Appendix A – Data descriptives..... 28

1. Introduction

Happiness studies are becoming increasingly popular. As Frey described in his book (2008), it is a revolution in economics. According to him, happiness as a measure of subjective well-being fits much better in economic research in comparison with an individual's income. Happiness includes not only money, but also considers the non-material aspects that are important in life. In this way, a much broader facet is being considered. This creates new insights into, for example, the goods and services that people value in life. Therefore, it is very important to find out what the determinants of happiness are.

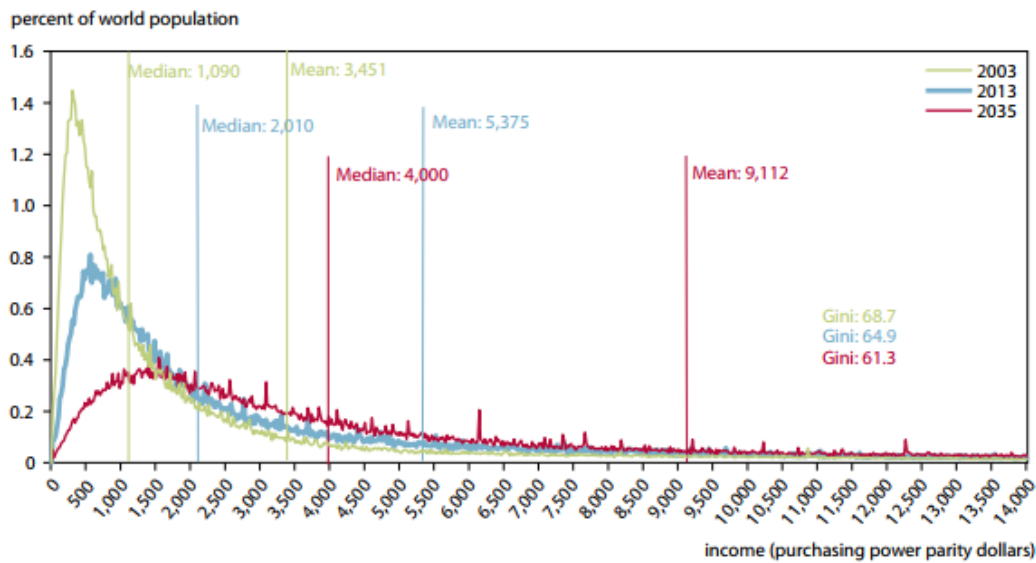
Life satisfaction is a measure of happiness. Prior literature has shown that there is a diversity when it comes to life satisfaction in different countries. For example, Scandinavian countries often score high on life satisfaction (Layard, 2005). Moreover, the results of several studies show that the levels of happiness and life satisfaction are higher in rich countries (Ryan & Deci, 2001). Veenhoven (1991) believes that income can be a deciding factor in self-reported life satisfaction, but income inequality might also play a role.

More and more studies focus on happiness economics and the relationship between inequality and happiness. For example, Alesina, Di Tella & MacCulloch (2004) found a significantly negative relationship between income inequality and self-reported life satisfaction for both North-Americans and Europeans. Several authors also started to consider this link in other parts of the world. Graham & Felton (2006) examined the effect of inequality on individual welfare in Latin America. The results of their study have shown that inequality has a negative effect on happiness.

Hellebrandt & Mauro (2015) made a prediction for the future Gini coefficient of global inequality. They found that the Gini coefficient declined from 68.7 in 2003 to 64.9 in 2013, as illustrated in figure 1. They expect the Gini coefficient to decline further to 61.3 in 2035. It is interesting to examine the connection between income inequality and happiness because if this relationship is negative, life satisfaction in the world may be higher in the future.

Right now, we can see tremendous changes in terms of economic growth and population, especially in emerging-market economies like China and India, but also in African countries. Rapid economic growth is expected in these countries in the coming years. Furthermore, the

Gini coefficient is declining in the world. These factors could have an impact on differences in life satisfaction between countries and regions.



Source: OECD, Consensus Forecasts, IMF/World Bank, edited by Hellebrandt & Mauro (2015).

Figure 1: Prediction of the world Gini Index.

1.1 Research Question

A number of studies have already focused on the relationship between income inequality and happiness. Prior literature mainly consists of studies on Europe and North America. This thesis will broaden this perspective and include 43 countries around the world, including Asia, Africa and Latin America. The research question is:

What is the effect of income inequality on happiness?

In order to answer the research question, the related literature will first be discussed. Prior findings and the main determinants for the effect of income inequality on life satisfaction will be discussed in this section. After describing the related literature, the data and methodology used for the regressions in this thesis will be addressed. Next, the results of the regression models will be analysed. Finally, the conclusion will follow. This section consists of discussion, limitations and recommendations.

2. Related Literature

2.1 Defining happiness

Almost every individual describes being happy as an ultimate goal of life. Besides this intrinsic character of happiness, economists also have important reasons to focus on happiness research. Although the first thought is that explaining happiness is a task for psychologists, it could also be useful in economics. One of the reasons for this is that it is sometimes difficult to conduct economic policies based on national accounts data, for example GDP per capita (Frey & Stutzer, 2002). Therefore, social scientists are focusing on more direct measures of “human experience” (Deaton, 2008).

Indeed, standards of subjective well-being are increasingly used. Each year, various surveys are set out, for example by the World Values Survey. This survey consists of household data and includes questions about the level of happiness and satisfaction with life. Prior literature has shown that self-reported life satisfaction largely corresponds to psychological measures (Alesina, Di Tella, & MacCulloch, 2004) (Layard, 2010). The measure of self-reported life satisfaction will also be used in this thesis. The terms life satisfaction and happiness will both be used, and these can be considered as synonyms.

2.2 Positive Effects of Happiness

A lot of studies have examined the positive effects of happiness on life. Diener & Chan (2011) found a positive relationship between subjective well-being and health in their longitudinal study. The results show that life satisfaction causes better health and longevity. This implies that happy people live longer.

In addition, prior literature has shown that happiness can lead to success. Diener, Lyubomirsky & King (2005) focused on this reverse causal direction in their study. They found that positive affect could lead to success. Furthermore, happy people have distinct adaptive characteristics and they can better deal with emotions, especially with negative emotions.

Happiness can also lead to a positive contribution to the economy. For example, the relationship between job satisfaction and work performance can be examined. Taris & Schreurs (2009) considered this relationship at the organizational level. They found that high levels of job satisfaction lead to more productive organizations, compared with organizations where the level of job satisfaction among the workers is lower. So, the positive relationship

between job satisfaction and job performance can also extend to a better performance of the entire organization. Eventually, this can have a positive impact on the economy as a whole.

2.3 Individual Determinants

In prior literature, many studies focused on the determinants of happiness at the individual level. These can be personal factors such as age and gender. In this section, the individual determinants of happiness discussed in earlier studies will be described.

In recent literature, it appears that there exists a U-shaped relationship between age and happiness. Gerdtham & Johannesson (2001) found a U-shaped relationship from a random sample of 5,000 Swedish individuals. The results of their study show that happiness is lowest in the age-category 45-64 years. The results of the study from a sample of East-Europeans by Hayo & Seifert (2003) also imply a U-shaped relationship, with a minimum level of happiness at 37 years. Blanchflower & Oswald (2008) studied the relationship between age and happiness at the cross-national level. They used data on approximately 500,000 Americans and West Europeans and found a robust U-shape. According to the results of their study, the well-being of an individual is minimal at middle age. For Americans, the happiness level reaches a minimum at the late 30s and early 50s. For Europeans, the happiness level reaches a minimum around the mid 40s.

The effect of gender on happiness has also been examined in prior literature. Wood, Rhodes & Whelan (1989) found that women generally report themselves happier in comparison with men. However, this difference is of a small magnitude. A possible explanation for this difference could be that women can express their emotions more easily. Aldous & Ganey (1999) used happiness data on individuals in the United States. The results of their study confirmed that women are indeed happier than men.

Marital status could also affect the happiness of an individual. For example, it could be that married people are happier or that a divorce has a negative impact on happiness. Coomb's conclusion based on his literature review (1991) is that married men and women are generally happier and less stressed compared to unmarried people. Stack & Eshleman (1998) mainly focused on the relationship between marital status and happiness in 17 different countries and found comparable results. The results of their study show that married people have a significantly higher level of happiness than people who are not married, even after controlling

for sociodemographic variables. In addition, this effect was approximately equal in all 17 countries included in the sample. According to the authors of this paper, being married can positively affect happiness in two ways. First, the financial situation of a married person is often better, which can positively influence happiness. Second, there exists a positive relationship between marriage and perceived health. This can also positively affect the happiness of an individual.

The happiness of an individual can also be influenced by the presence of children. Glenn & McLanahan (1982) found that having children is negatively associated with happiness. According to their study, this relationship holds for the total U.S. population. White & Booth (1986) found similar results in their study. A possible explanation for this negative connection may be that the presence of children has a negative impact on the structure and quality of marriage. Secondly, the presence of children could have a breaking effect on divorce. People then stay together while they are not happy in their relationship.

The relationship between religion and happiness has also been examined in earlier literature. Several studies show that church attendance has a positive effect on self-reported life satisfaction. For example, Argyle (2003) found a small positive effect of church attendance on happiness, although this relationship was especially visible to older people and members of a specific church. The results of a study by Chamberlain & Zika (1988) also show a significant positive relationship between religiosity and self-reported life satisfaction. Lelkes (2006) has linked the relationship between religion and happiness to the financial situation of an individual. The main conclusion of her study is that religious people are less affected in terms of happiness with a change of their financial situation. So, the income of a religious person is less important in relation to self-reported life satisfaction than the income of a non-religious person.

2.4 Country-specific Determinants

There are also several factors that may affect happiness at the country level. These are country-specific variables such as GDP per capita and the inflation rate. In this section, prior literature will be discussed in which the relationship between happiness and country-specific variables has been examined.

Many people think that money makes happy. The richer you are, the happier you are. However, this does not always seem to be the case. This is also called the Easterlin paradox, named after Richard Easterlin. In his study, Easterlin (1974) found that in the long term, money does not make happy. In a later study by Easterlin, McVey, Switek, Sawangfa & Zweig (2010), comparable results were shown. The authors found that in the first 10 years, there exists a positive relationship between income and happiness. After approximately 10 years, the positive relationship between income and happiness no longer exists.

Ball & Chernova (2008) mainly focused on the short-term relationship between income and happiness and found that both relative and absolute income are positively associated with happiness. Moreover, changes in relative income affect happiness more than changes in absolute income. Hagerty & Veenhoven (2003) also concluded that in the short-term money makes happy, but in the long run this effect is getting smaller. In short, these results imply that there are diminishing returns to income (Graham, 2005). Once the basic material needs are met, people are not much happier with a higher income. It is therefore very important to consider the long-term relationship between income and happiness as well.

The relationship between unemployment and happiness has also been discussed in prior literature. Gerlach & Stephan (1996) found that being unemployed lowers overall satisfaction with life. From their sample of Germany, the results of their study show that men 30 to 49 years suffer the most from unemployment, whereas women over the age of 50 are the least dissatisfied when unemployed.

Di Tella, MacCulloch & Oswald (2001) examined the relationship between unemployment, inflation and happiness across 12 European countries and the United States. According to the results, people are happier when unemployment and inflation is low. However, the effect of unemployment on happiness is larger than the effect of inflation on happiness. The trade-off between unemployment and inflation has also been calculated. If the unemployment rate rises by 1 percentage point, this will be offset by a 1.7 percentage point decrease in the inflation rate.

2.5 Income Inequality and Happiness

A number of studies have already been conducted to examine the relationship between income inequality and happiness. In general, it appears that income inequality has a negative

impact on happiness. Previous literature mainly consists of studies on Europe and North America.

Alesina, Di Tella & MacCulloch (2004) examined the effect of income inequality on happiness and made a comparison between Europeans and North-Americans. As already mentioned in the introduction, they found a negative relationship between income inequality and happiness. However, differences between certain groups were visible. In Europe, the poor people were very unhappy about inequality while in America the rich people who were political left oriented were the most dissatisfied about inequality. A possible explanation for this phenomenon is, according to the authors, that American people are accustomed living in a mobile society where it is possible for individuals to move up and down the income ladder. Europeans do not share this perspective; they assume that they live in less mobile societies.

From 2008, the Gini coefficient of North America has risen relative to the Gini coefficient of most European nations and Canada (Klugman, 2009). Therefore, Oishi, Kesebir & Diener (2011) focused on North America in their study. They examined the relationship between income inequality and happiness over a period of 37 years in the United States. The results of their study also show a negative association between income inequality and happiness. Two possible explanations for this negative relationship could be found in psychology. First, income inequality leads to a sense of unfairness, because 'the rich only get richer'. In addition, there is more trust in society when the level of income inequality is low, because income inequality drives people apart. It is remarkable that the negative relationship between income inequality and happiness is mainly present in the lower income groups, as in the study by Alesina, Di Tella & MacCulloch (2004).

Dynan & Ravina (2007) compared relative income over a period of 25 years in the United States. The results of their study show that people with a relatively high income feel happier. Moreover, this relationship is much stronger for people with above-average incomes. A possible explanation for this phenomenon could be that an individual's utility is not only dependent on its own income, but also on its income as compared to the neighbour's income. In contrast, standard models of consumption presume that the utility of an individual is based only on the own consumption.

The focus of studies is also expanding to other parts of the world. Graham & Felton (2006) examined the relationship between income inequality and happiness in Latin America. This is the region with the highest inequality in the world. The results of their study show a negative relationship between income inequality and happiness. According to the authors, this can be related to the fact that people see inequality as a signal of persistent unfairness.

The effect of income inequality on happiness is also studied at the micro level. Oshio & Kobayashi (2010) focused on this relationship using micro-data from Japan. According to the results of their study, people who live in an area where the inequality is high report themselves unhappier and they also feel less healthy. The negative relationship between income inequality and happiness is especially visible at people with an unstable place in the labour market. Therefore, uncertainty about work and income does not contribute to happiness. The authors also made a comparison with the study by Alesina, Di Tella & MacCulloch (2004). The case of Japan is very different from that of America and Europe. Happiness of the rich and political neutral people in Japan is especially influenced by more inequality.

Finally, Berg & Veenhoven (2010) found no statistically significant association between income inequality and happiness by using cross-sectional data from 119 different countries. But when controlled for wealth, the results show a slight positive relation. This is mainly the case in Eastern Europe, Asia and Latin America. That is why Berg & Veenhoven even emphasize the positive consequences of income inequality. A possible explanation for the positive relationship is that income distributions match the wishes of the majority of the population. Through politics, the desirable distribution of income can be realized. The results of the study by Berg & Veenhoven (2010) contrast strongly with the above-mentioned literature, where most of the time a negative relation between income inequality and happiness was found.

2.6 Relative Deprivation Theory

Various literature has already shown that the effect of relative income on happiness is greater than the effect of absolute income (Ball & Chernova, 2008) (Dyanan & Ravina, 2007). People compare themselves to the rest of society, which sometimes causes a sense of dissatisfaction when for example the income is lower than others. This is also called the relative deprivation theory, known from social psychology literature. This theory is mainly based on social comparison.

Richard Wilkinson has widely used this theory in his studies. In one of his first books regarding this theory and inequality, he found an association between income inequality and for example life expectancy and mortality rates (Wilkinson, 1996). He explains this correlation using the relative deprivation theory: making social comparisons could play a role in determining people's well-being.

In another study, Wilkinson & Pickett (2006) found a link between income distribution and health. An explanation is that income inequality serves as a measure of the scale of social stratification. This is also called the scale of social class differences. However, the authors emphasize that many studies regarding income inequality consider too small areas. Therefore, it is important to study the effects at the aggregate level. Comparisons of whole societies are necessary to determine the impact of income inequality on several factors (Wilkinson & Pickett, 2007).

In principle, feelings of deprivation are relative to each individual. However, Yitzhaki (1979) found that the average relative deprivation in a society is equal to the Gini coefficient multiplied by the average income. Thus, individual comparison of people in a society is brought to a higher (national) level and income inequality is then associated with relative deprivation theory. Eibner & Evans (2005) have used the measure of Yitzhaki in their study. The results show that high relative deprivation is associated with for example higher probability of death and a higher body mass index.

Relative deprivation theory can be used in both rich and poor nations. It is about the comparison that people make with other people within a country. This could, for example, also be comparisons regarding basic needs in less developed countries.

2.7 Table of Expected Signs

According to the prior literature, the following relationships between the country-specific independent variables and the dependent variable are expected:

Table 1: National variables and expected effects		
Variable	Expected sign	Theoretical justification
Independent variables		
Gini index (income inequality)	-	(Alesina, Di Tella, & MacCulloch, 2004) (Graham & Felton, 2006) (Dynan & Ravina, 2007) (Oishi, Kesebir, & Diener, Income Inequality and Happiness, 2011) (Oshio & Kobayashi, 2010)
GDP per capita	+	(Ball & Chernova, 2008) (Easterlin, McVey, Switek, Sawangfa, & Zweig, 2010) (Hagerty & Veenhoven, 2003), (Easterlin R. , 1974), (Graham, 2005)
Inflation rate	-	(Di Tella, MacCulloch, & Oswald, 2001)
Unemployment rate	-	(Gerlach & Stephan, 1996) (Di Tella, MacCulloch, & Oswald, 2001)
Dependent variable		
Self-reported life satisfaction	n/a	(Alesina, Di Tella, & MacCulloch, 2004) (Layard, 2010)

3. Methodology and Data

3.1 Data and sample

In this study, data from the World Values Survey is used. The World Values Survey is a network of scientists investigating people's beliefs and values patterns. The survey also considers the influence of values at the political and social level. It is the only academic source where both poor and rich countries are included in the survey. From 1981 every five years, a survey is issued in more than 100 countries in which people are for example asked how satisfied they are with their lives. For this thesis, data on the longitudinal level will be used. This data file is the combined file of all the six waves, leading to a large data file of many countries for the period between 1981 and 2014. The data is available at the individual level. Information of each individual who completed the survey is noted, for example age, profession, marital status and gender.

Data from the World Values Survey is combined with data from the World Bank concerning the Gini index for income inequality. The World Bank publishes household survey data from governments and departments of the World Bank in different countries.

The initial dataset of the World Values Survey used in this thesis consists of 101 countries. Because this dataset contains data from different time periods (waves), the averages have been taken from the country-specific variables Gini index, GDP per capita, the inflation rate and the unemployment rate in the same periods. In fact, the survey has taken place in each country at a different time, so it is justified to take the averages of these variables. The data of the World Values Survey and the World Bank are merged using the merge function in Stata. Countries from which only individual happiness data (WVS) or only country-specific data (World Bank) were available have been removed from the dataset. Observations where the Gini index was unavailable have also been removed.

Then, the data is grouped to country code and wave. If data of only one time period (wave) were available in a particular country, they were deleted from the dataset. Finally, every country appears at least two times in the dataset. The aggregate model consists of 43 countries in the period 1981-2014.

In order to compare results from different regions, the countries in the sample have also been divided into the following regions: Asia, Africa, Europe, Oceania, Latin America, North America

and the Middle East. By also looking at the results by region, it is possible to control for cultural differences, for example the views of happiness within a region (Di Tella & MacCulloch, 2006). In this way, a comparison between some regions can also be made. The sample of the regions Oceania and the Middle East contain respectively one and zero countries. Therefore, the regressions of these regions will not be included. Moreover, the regression of the region North America is not included in the results because no information is available regarding the inflation rates for the countries in this region.

3.2 Methodology

The hypothesis that will be tested in this thesis is as follows: *There exists a significantly negative relationship between income inequality and self-reported life satisfaction.* By using data described in the previous section, this hypothesis will be answered. The dependent variable will be self-reported life satisfaction and the predictor variable will be the Gini index.

The effect of income inequality on self-reported life satisfaction is examined by a fixed effects model. Both country and year fixed effects will be included in the Ordinary Least Squares regression. The fixed effects model only uses information that varies over time, causing the constant factors to drop out. In this way, the net effect of the independent variables on self-reported life satisfaction can be assessed (Torres-Reyna, 2007). The fixed effects model ensures that country-specific and time-variant features are controlled for.

The equation for the aggregated model in this study is shown below. This model will be used to test the effect of income inequality (*Gini*) on self-reported life satisfaction (*Satisfaction_{i,c,t}*). The subscript *i* distinguishes the individual entities, *c* the different countries and *t* the specific year. The individual control variables added to this model are gender (*Gender*), age (*Age*) and age-squared (*Age²*), marital status (*Maritalstatus*), the importance of religion (*ImportanceofReligion*) and the number of children (*NumberofChildren*). The country-specific control variables added to this model are GDP per capita (*lnGDP*), the unemployment rate (*Unemployment*) and the inflation rate (*Inflation*). The variables *C* and *T* demonstrate the fixed effects for country and time.

$$(1.1) \text{ Satisfaction}_{i,c,t} = \beta_0 + \beta_1 * \text{Gini}_{c,t} + \beta_2 * \text{lnGDP}_{c,t} + \beta_3 * \text{Unemployment}_{c,t} + \beta_4 * \text{Inflation}_{c,t} + \beta_5 * \text{Maritalstatus}_{i,c,t} + \beta_6 * \text{Gender}_{i,c,t} + \beta_7 * \text{Age}_{i,c,t} + \beta_8 * \text{Age}_{i,c,t}^2 + \beta_9 * \text{NumberofChildren}_{i,c,t} + \beta_{10} * \text{ImportanceofReligion}_{i,c,t} + C_c + T_t + \varepsilon_{i,c,t}$$

This model will be used for the aggregate model (model 2). Model 1 only includes the individual control variables. The models for Asia, Africa, Europe and Latin America (models 3, 4, 5 and 6) will contain both individual and country-specific control variables. In model 7, income scales are also added to the regression. For all the regressions in this thesis, a significance level of 5 percent will be used. To ensure the validity of the OLS model and to make sure that heteroskedasticity will not be a problem, a robust regression analysis will be made.

3.3 Variables

3.3.1 Dependent variable

The dependent variable in this study will be self-reported life satisfaction. Self-reported life satisfaction is measured using the following question: “How satisfied are you with your life as a whole these days?” 1 means you are completely dissatisfied and 10 means you are completely satisfied. This is a ten-point scale.

3.3.2 Explanatory variable

The explanatory variable in this study will be the Gini index. This is a measure for income inequality. According to the World Bank, the Gini index measures the distribution of income among individuals or households. The income is compared with a perfectly equal distribution. A Gini index of 0 means that all incomes are equal whereas an index of 100 implies complete income inequality.

3.3.3 Control variables

3.3.3.1 Individual control variables

The individual control variables will be gender, age, marital status, the number of children, the importance of religion and income scales. The data source for the individual variables is the World Values Survey. Gender is a dummy variable that takes the value 1 for males and 2 for females. Both age and age-squared will be added to the regressions. By adding age-squared, the coefficients can be estimated for the approximation for a non-linear function of age. The variable marital status is divided into three categories: in couple (including being married or

living together as married), separated (including being widowed, divorced or separated) and being single or never married. The reference category is being single/never married. The variable number of children shows how many children an individual has. Importance of religion shows the importance of religion to an individual. This is a question on a four-point scale. 1 means that religion is very important and 4 means that religion is not important at all. Finally, the variable income scales is a dummy variable and is divided into ten steps. The World Values Survey indicates the ten income categories for each country. Individuals are asked in what group their household is. This includes all wages, salaries, pensions and other incomes.

3.3.3.1 Country-specific control variables

The country-specific control variables will be GDP per capita, the unemployment rate and the inflation rate. The data source for the country-specific variables is the World Bank. GDP is the total value of all goods produced in the economy. This includes goods produced by both the private sector and the government. GDP per capita is the GDP divided by the population of a country. The natural logarithm of GDP per capita will be added to the regression. This is done to make the distribution more symmetrical and improve the fit of the model. The unemployment rate shows which part of the labour force is unemployed in a country, but only includes those that are job-seeking. The inflation rate is measured computing the change in the overall price level in the economy. This is expressed as an annual percentage change in the costs of a basket of goods.

3.4 Descriptive Statistics

A graphical representation of the data will make it easier to understand the results that will follow in this study. Appendix A, graphs 1 to 4 show the Gini indices for Europe, Asia, Africa and Latin America respectively. The lowest values of income inequality can be found in Europe (graph 1). The Gini index varies from about 20 to 45 in countries in Europe. In South Africa, the Gini index is remarkably high compared with the other countries included in the regressions (graph 3). This country is also known for its high inequality. The Gini index varies from about 55 to 65 in South Africa. In Latin America, income inequality is generally higher than in Europe and Asia (graph 4). The Gini index in Latin America varies between 40 and 60. Furthermore, it is remarkable that income inequality in Peru decreases sharply in the period 1984-1994 (graph 4).

Appendix A, graph 5 shows the average self-reported life satisfaction for Europe, Asia, Africa and Latin America. The average life satisfaction is highest in Latin America (7.52), while the Gini index is quite high compared with the other regions. The average life satisfaction in Europe is the lowest compared with the other regions (6.09).

Table 1 shows the summary statistics of the regression sample for the aggregate model. The combined dataset contains surveys of 43 countries during the period between 1981 and 2014. The regression sample consists of 154,702 observations. The average life satisfaction score is 6.61 and the average Gini index is 41.81.

Table 1: Summary Statistics of the Regression Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Satisfaction	154,702	6.605112	2.445013	1	10
Gini	154,702	41.81412	10.47006	19.49	63.9
Unemployment	154,702	9.583446	6.33526	.6002	34.34325
Inflation	154,702	43.33355	185.6608	.956717	1667.207
lnGDP	154,702	8.446801	1.353264	5.494154	11.03929
incouple	154,702	.6378198	.4806321	0	1
separated	154,702	.1276713	.3337245	0	1
Gender	154,702	1.522223	.4995075	1	2
Age	154,702	41.78695	16.40679	15	99
NumberofCh~n	154,702	1.864656	1.712891	0	8
Importance~n	154,702	1.987234	1.052318	1	4

Table 2 shows the correlations between the independent variables. The correlation between the independent variables is not high, and in all cases no higher than 0.7. This indicates that the correlation between the independent variables is not expected to be a problem for the validity of the results (Farrar & Glauber, 1967).

Table 2: Correlations between the Independent Variables

	Gini	lnGDP	Unempl~t	Inflat~n	incouple	separa~d	Gender	Age	Number~n	Import~n	Scaleof~s
Gini	1.0000										
lnGDP	-0.1448	1.0000									
Unemployment	0.3976	-0.0293	1.0000								
Inflation	0.1488	-0.0931	-0.0046	1.0000							
incouple	-0.0781	-0.0300	-0.0531	-0.0016	1.0000						
separated	-0.0557	0.0842	-0.0221	0.0071	-0.5077	1.0000					
Gender	-0.0199	0.0184	-0.0026	0.0004	-0.0351	0.1535	1.0000				
Age	-0.1721	0.1970	-0.0424	-0.0254	0.1908	0.3292	0.0144	1.0000			
NumberofCh~n	0.0593	-0.0675	-0.0200	-0.0046	0.3732	0.1169	0.0518	0.4499	1.0000		
Importance~n	-0.2585	0.2363	-0.1317	0.0065	-0.0114	0.0101	-0.0962	0.0111	-0.1556	1.0000	
ScaleofInc~s	-0.0592	0.0861	-0.0323	-0.0915	0.0705	-0.1337	-0.0509	-0.0967	-0.1132	0.0890	1.0000

4. Results

Table 3: Regression results of the models

Explained Variable: Self-reported Life Satisfaction						
	Model with only individual variables	Aggregate model	Asia	Africa	Europe	Latin America
Model	1	2	3	4	5	6
Country level						
Gini index	-0.0224 (0.0162)	-0.00827 (0.0164)	-4.363*** (0.0714)	0.657*** (0.00664)	-0.0200 (0.0144)	-0.0645** (0.0138)
lnGDP per capita		0.676** (0.222)	7.555*** (0.126)	-17.96*** (0.246)	0.316* (0.175)	-1.023** (0.175)
Unemployment rate		-0.0166 (0.0198)	2.229*** (0.0437)	1.175*** (0.0211)	-0.0258** (0.00796)	-0.00550 (0.0446)
Inflation rate		-4.49e-05 (0.000231)	0.256*** (0.00492)	-1.405*** (0.0193)	0.000598* (0.000230)	0.000599* (0.000313)
Individual level						
In couple	0.391*** (0.0645)	0.392*** (0.0640)	0.0991 (0.110)	0.502 (0.205)	0.443*** (0.0675)	0.283*** (0.0400)
Separated	-0.291*** (0.0617)	-0.294*** (0.0617)	-0.676** (0.150)	-0.160 (0.159)	-0.329*** (0.0512)	-0.145* (0.0476)
Female	-0.00210 (0.0251)	-0.000752 (0.0248)	-0.0186 (0.0365)	0.0549 (0.0422)	0.0363 (0.0501)	-0.0654 (0.0439)
Age	-0.0498*** (0.00593)	-0.0500*** (0.00587)	-0.0509** (0.0149)	-0.0417* (0.00769)	-0.0689*** (0.00630)	-0.0270** (0.00602)
Age2	0.000448*** (5.29e-05)	0.000450*** (5.25e-05)	0.000417** (0.000109)	0.000524* (0.000105)	0.000573*** (5.98e-05)	0.000303** (6.36e-05)
Number of Children	-0.0240 (0.0172)	-0.0237 (0.0172)	0.0194 (0.0270)	-0.110 (0.0445)	-0.0278 (0.0199)	-0.0384** (0.0107)
ImportanceofReligion	-0.139*** (0.0173)	-0.135*** (0.0175)	-0.105 (0.0528)	-0.239** (0.0180)	-0.0839** (0.0248)	-0.171*** (0.0230)
Constant	8.757*** (0.698)	3.000 (2.137)	90.08*** (1.098)	106.3*** (1.475)	5.740*** (1.517)	20.00*** (1.226)
Country & Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	154,702	154,702	25,882	22,663	57,709	35,924
R-squared	0.042	0.045	0.068	0.046	0.090	0.027
Number of countries	43	43	9	4	19	8

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

4.1 Results of the Full Sample

The results of the regression models can be found in table 3. The results of model 1, including all individual control variables, show that the effect of income inequality on self-reported life satisfaction is not significant. This effect remains insignificant when the country-specific

control variables are added to the regression (model 2). Therefore, at the aggregate level, the hypothesis that income inequality has a significantly negative effect on life satisfaction is rejected. These results are against the general findings in prior literature, where most of the time a significantly negative relationship is found between income inequality and life satisfaction. In contrast, Berg & Veenhoven (2010) found an insignificant association between income inequality and life satisfaction in their cross-sectional study, before they controlled for wealth.

At the aggregate level, the impact of GDP per capita on self-reported life satisfaction is significantly positive (model 2), as was expected based on prior literature. The effects of the unemployment rate and the inflation rate are not significant.

If someone is married, this will have a significantly positive effect on life satisfaction, when compared to someone who is single or never married (models 1 and 2). This effect is significantly negative for someone who is separated. Age has a significant effect on life satisfaction. The effect of gender and the number of children on life satisfaction is not significant. Finally, when someone considers religion important, this will have a significantly negative impact on self-reported life satisfaction.

4.2 Results per Region

When the countries are subdivided into the different regions, quite different patterns appear. In Europe (model 5), no significant effect was found between income inequality and self-reported life satisfaction.

In Asia and Latin America (models 3 and 6), the effect of income inequality on self-reported life satisfaction is significantly negative. This means that people report themselves less satisfied when income inequality is high in their country. These results correspond to previous literature. One possible explanation for this negative connection could be that people see inequality as a sign of persistent unfairness (Graham & Felton, 2006). Relative deprivation theory could also be an explanation for the fact that income inequality in a country leads to a lower level of life satisfaction. Social comparisons can cause people to report themselves more dissatisfied when the income inequality is high in a country (Wilkinson, 1996).

In Africa (model 4), the effect of income inequality on self-reported life satisfaction is significantly positive. This is remarkable, because in Africa the Gini index is higher compared

to the other regions (except for Latin America), see Appendix A, graph 3. In the study by Berg & Veenhoven (2010), a possible explanation is given for a positive association between income inequality and life satisfaction. It could be that the desired income distribution is established through politics in Africa. The wishes of the majority of the population are then reflected in the income distribution, which makes people satisfied with the level of income inequality in their country.

It is suspicious that the effect of GDP per capita on self-reported life satisfaction is significantly negative in Africa (model 4). A possible explanation for this negative effect is that the effect of Africa is mainly based on South Africa. This is the only country in this region where data is available from several years. The other three countries in the sample contain data from only one year, which is a cross-section. It is therefore difficult to interpret the results for Africa. In South Africa, the negative impact of GDP per capita on life satisfaction could be explained by the fact that the GDP per capita has risen sharply while life satisfaction has not increased significantly in the same period.

In addition, the results show that the effect of GDP per capita on self-reported life satisfaction is also significantly negative in Latin America (model 6). A possible explanation for this negative relationship could be found in previous literature. In Latin America, income inequality is on average higher in comparison with the other regions, see Appendix A, graph 4, which could explain that an increase in GDP per capita will lead to lower life satisfaction scores. Oishi & Kesebir (2015) found evidence for this negative connection in their study comparing 18 developed countries with 16 Latin American countries. They found that when income inequality is high in a country, economic growth will not always lead to an increase in happiness.

Furthermore, it is suspicious that the effect of the unemployment rate on life satisfaction is significantly positive in Asia and Africa (models 3 and 4), while a negative effect is expected based on prior literature. However, the results of Africa are mainly based on South Africa and the results of Asia are mainly based on Georgia. These are the only two countries in these samples that contain data from multiple years. Therefore, it is difficult to interpret the results of these regions.

At the individual level, the results show in general that the effect of age on life satisfaction is significant in all regions. The effect of gender on life satisfaction is not significant and therefore cannot be interpreted. The signs and significance of the other control variables are different for each region. Therefore, for those variables, no unambiguous conclusions can be drawn.

Table 4: Regression results including income scales

Explained Variable: Life Satisfaction	
Model	7
Gini index	-0.00105 (0.0174)
lnGDP per capita	0.583** (0.224)
Unemployment rate	-0.0299 (0.0251)
Inflation rate	6.35e-05 (0.000229)
In couple	0.302*** (0.0378)
Separated	-0.195*** (0.0493)
Female	0.0274 (0.0236)
Age	-0.0558*** (0.00544)
Age2	0.000535*** (5.40e-05)
Number of Children	0.0114 (0.0119)
Importance of Religion	-0.163*** (0.0179)
Income scale: Second step	0.262** (0.109)
Income scale: Third step	0.478*** (0.138)
Income scale: Fourth step	0.803*** (0.164)
Income scale: Fifth step	1.009*** (0.178)
Income scale: Sixth step	1.273*** (0.199)
Income scale: Seventh step	1.512*** (0.210)
Income scale: Eighth step	1.714*** (0.219)
Income scale: Ninth step	1.744*** (0.222)

Income scale: Tenth step	1.779*** (0.225)
Constant	2.709 (2.097)
Country & Year Fixed Effects	Yes
Observations	154,702
R-squared	0.094
Number of countries	43
Robust standard errors in parentheses	
*** p<0.001, ** p<0.01, * p<0.05	

4.3 Results including Income Scales

In table 4, the income scales are added to the full sample. The effect of income inequality on self-reported life satisfaction remains insignificant when the income scales are added to the aggregate model. It is remarkable that the income scales do have a significantly positive effect on self-reported life satisfaction (model 7). This effect is increasing as people report that their household is in a higher income scale. This suggests that the income scale thus positively influences life satisfaction, while no significant effect is found for income inequality on life satisfaction in the aggregate models.

5. Conclusion

5.1 Conclusion and Discussion

This thesis examined the effect of income inequality on self-reported life satisfaction in 43 countries. The countries in the sample are also divided into regions, so that a comparison could be made between the regions. The research question is:

What is the effect of income inequality on happiness?

The results of the aggregate models have shown that the effect of income inequality on life satisfaction is not significant. However, at the regional level, the results are quite different. In Asia and Latin America, the effect of income inequality on self-reported life satisfaction is significantly negative. A negative effect of income inequality on life satisfaction could be explained by the fact that people see inequality as a signal of unfairness. By making social comparisons, income inequality could lead to a sense of dissatisfaction.

In Africa, the effect of income inequality on self-reported life satisfaction is significantly positive. A possible explanation for this positive effect could be that the desired income distribution is achieved through politics. In this way, people could be satisfied with the income distribution in their country.

To conclude, the results show inconsistencies regarding the effect of income inequality on life satisfaction. Therefore, there is no clear answer to the research question. In addition, the results of Asia and Africa are difficult to interpret, as these regions both contain only one country where data is available for multiple years.

5.2 Limitations and Recommendations

The results in this thesis should be interpreted with caution. There are some important limitations that should be taken into account. First, the source of individual data for measuring life satisfaction in this study is the World Values Survey. An important and valid criticism of this database is that there is no equal distribution of countries around the world included in the survey. For example, the data of the World Values Survey consists of very few poor African countries and of many countries in Central Asia and Eastern Europe (Deaton, 2008).

In addition, the data on the Gini index, available from the World Bank, is still not available for all countries. The World Bank publishes data, but this data is not accessible for all years and for all countries. This makes valid research on income inequality difficult, especially cross-

national research that includes developing countries, where the data is generally very limited. Therefore, further research could focus on combining multiple standards for income inequality or using an alternative benchmark for the Gini index. An example of an alternative measure for income inequality are the Generalized Entropy Indices (Cowell, 2011).

In this paper, few data were available for some regions included in the dataset. Therefore, these regions have not been addressed in the regional regression analyses. By combining happiness and income inequality data from different databases, more data will be available for the different regions. This would be a promising idea for future research on this subject.

Furthermore, it is difficult to determine whether people living in different countries around the world see satisfaction with life in the same way. Cultural differences can make the concept of life satisfaction very distinctive. It is therefore hard to make a comparison between various levels of life satisfaction at the cross-national level. By looking at the results by region, these cultural differences can partly be taken into account. However, the assumption is then that the culture groups are the same in each region, which is not the case in practice. Future research could focus on the relationship between income inequality and life satisfaction per culture group, so that the view on life satisfaction is the same for every individual.

Finally, life satisfaction remains a measure of subjective well-being. There is a great variation among what individuals mean by happiness and life satisfaction. This perception can be influenced, for example, by optimism and pessimism. For further research, it is important to examine the relationship between income inequality and life satisfaction at the micro-level. By examining this relationship within a country, the differences at the individual level can be studied in a better way. For example, a distinction can also be made between rich and poor populations within a country, to find out what the differences are in the effects of income inequality on life satisfaction.

References

- Aldous, J., & Ganey, R. F. (1999). Family life and the pursuit of happiness: The influence of gender and race. *Journal of Family Issues*, 155-180.
- Alesina, A., Di Tella, R., & MacCulloch, R. (2004). Inequality and happiness: are Europeans and Americans different? *Journal of Public Economics*, 2009-2042.
- Argyle, M. (2003). 18 Causes and Correlated of Happiness. In D. Kahneman, E. Diener, & N. Schwarz, *Well-Being: Foundations of Hedonic Psychology*. Russell Sage Foundation.
- Ball, R., & Chernova, K. (2008). Absolute Income, Relative Income, and Happiness. *Social Indicators Research*, 497-529.
- Berg, M. C., & Veenhoven, R. (2010). Income inequality and happiness in 119 nations. In E. Elgar, *Social Policy and Happiness in Europe* (pp. 174-194). Cheltenham/Aldershot, UK/Northampton, MA, USA: Edward Elgar.
- Blanchflower, D. G., & Oswald, A. J. (2008). Is well-being U-shaped over the life cycle? . *Social science & medicine*, 1733-1749.
- Chamberlain, K., & Zika, S. (1988). Religiosity, Life Meaning and Wellbeing: Some Relationships in a Sample of Women. *Journal for the Scientific Study of Religion*, 411-420.
- Coombs, R. H. (1991). Marital status and personal well-being: A literature review. *Family relations*, 97-102.
- Cowell, F. (2011). *Measuring inequality*. Oxford University Press.
- Deaton, A. (2008). Income, health, and well-being around the world: Evidence from the Gallup World Poll. *Journal of Economic Perspectives*, 53-72.
- Di Tella, R., & MacCulloch, R. (2006). Some uses of happiness data in economics. *The Journal of Economic Perspectives*, 25-46.
- Di Tella, R., MacCulloch, R. J., & Oswald, A. J. (2001). Preferences over Inflation and Unemployment: Evidence from Surveys of Happiness. *The American Economic Review*, 335-341.
- Diener, E., & Chan, M. Y. (2011). Happy People Live Longer: Subjective Well-Being Contributes to Health and Longevity. *Applied Psychology: Health and Well-Being*, 1-43.
- Diener, E., Lyubomirsky, S., & King, L. (2005). The Benefits of Frequent Positive Affect: Does Happiness Lead to Success? . *Psychological Bulletin*, 803-855.
- Dynan, K. E., & Ravina, E. (2007). Increasing Income Inequality, External Habits, and Self-Reported Happiness. *The American Economic Review*, 226-231.
- Easterlin, R. (1974). Does economic growth improve the human lot? Some empirical evidence. *Nations and households in economic growth*, 1-37.
- 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 of the United States of America*, 22463-22468.
- Eibner, C., & Evans, W. N. (2005). Relative Deprivation, Poor Health Habits, and Mortality. *The Journal of Human Resources*, 591-620.

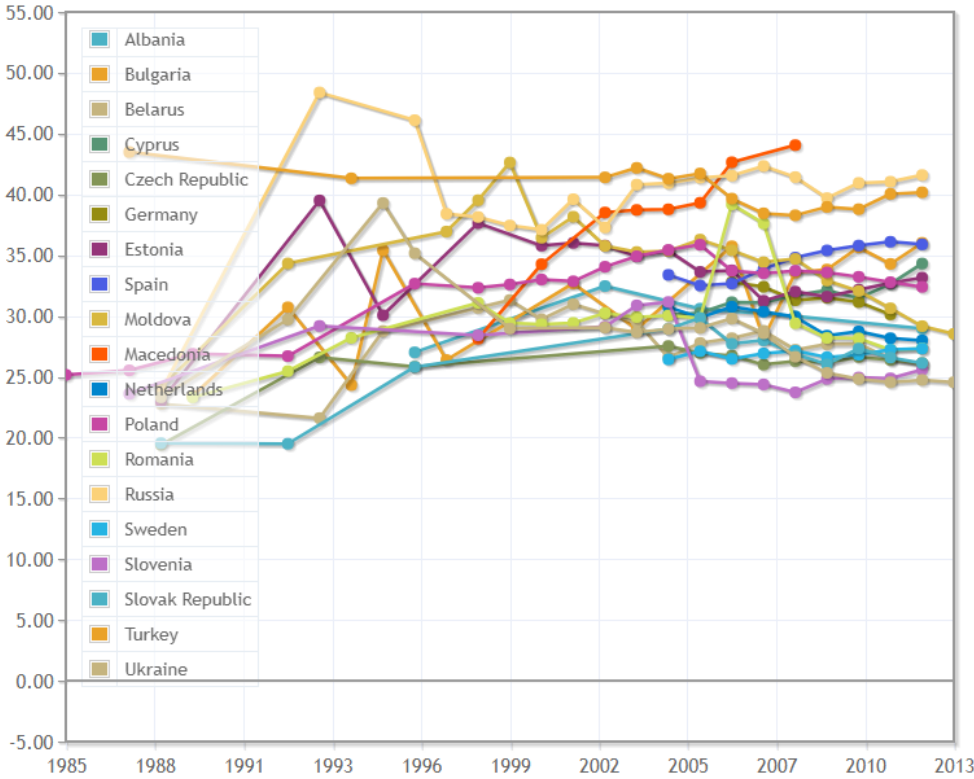
- Farrar, D. E., & Glauber, R. R. (1967). Multicollinearity in Regression Analysis: The Problem Revisited. *The Review of Economics and Statistics*, 92-107.
- Frey, B. (2008). *Happiness: A revolution in economics*. Zurich: MIT Press Books.
- Frey, B. S., & Stutzer, A. (2002). What Can Economists Learn from Happiness Research? *Journal of Economic Literature*, 402-435.
- Gerdtham, U.-G., & Johannesson, M. (2001). The relationship between happiness, health, and socio-economic factors: results based on Swedish microdata. *Journal of Socio-Economics*, 553-557.
- Gerlach, K., & Stephan, G. (1996). A paper on unhappiness and unemployment in Germany. *Economic Letters*, 325-330.
- GINI Index (World Bank estimate)*. (2017, Juli 10). Retrieved from www.indexmundi.com: <https://www.indexmundi.com/facts/indicators/SI.POV.GINI/rankings>
- Glenn, N. D., & Mclanahan, S. (1982). Children and Marital Happiness: A Further Specification of the Relationship. *Journal of Marriage and the Family*, 63-72.
- Graham. (2005). Insights on development from the economics of happiness. *The World Bank Research Observer*, 201-231.
- Graham, C., & Felton, A. (2006). Inequality and happiness: Insights from Latin America. *Journal of Economic Inequality*, 107-122.
- Hagerty, M. R., & Veenhoven, R. (2003). Wealth and Happiness Revisited - Growing National Income Does Go with Greater Happiness. *Social Indicators Research*, 1-27.
- Hayo, B., & Seifert, W. (2003). Subjective economic well-being in Eastern Europe. *Journal of Economic Psychology*, 329-348.
- Hellebrandt, T., & Mauro, P. (2015). *The Future of Worldwide Income Distribution*. Peterson Institute for International Economics Working Paper No. 15-7.
- Klugman, J. (2009). *United Nations Development Programme*.
- Layard, R. (2005). *Happiness: Lessons from a new science*. New York: The Penguin Press.
- Layard, R. (2010). Measuring subjective well-being. *Science*, 534-535.
- Lelkes, O. (2006). Tasting freedom: Happiness, religion and economic transition. *Journal of Economic Behavior & Organization*, 173-194.
- Oishi, S., & Kesebir, S. (2015). Income Inequality Explains Why Economic Growth Does Not Always Translate to an Increase in Happiness. *Psychological Science*, 1630-1638.
- Oishi, S., Kesebir, S., & Diener, E. (2011). Income Inequality and Happiness. *Psychological Science*, 1095-1100.
- Oshio, T., & Kobayashi, M. (2010). Income inequality, perceived happiness, and self-rated health: Evidence from nationwide surveys in Japan. *Social Science & Medicine*, 1358-1366.
- Ryan, M., & Deci, A. (2001). On happiness and human potentials: a review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, 144-166.

- Stack, S., & Eshleman, J. R. (1998). Marital Status and Happiness: A 17-Nation Study. *Journal of Marriage and Family*, 527-536.
- Taris, T. W., & Schreurs, P. J. (2009). Well-being and organizational performance: An organizational-level test of the happy-productive worker hypothesis. *Work & Stress*, 120-136.
- Torres-Reyna, O. (2007). *Panel data analysis fixed and random effects using Stata (v. 4.2)*. Princeton University: Data & Statistical Services.
- Veenhoven, R. (1991). Is happiness relative? *Social Indicators Research*, 1-34.
- White, L. K., & Edwards, J. N. (1986). Children and marital happiness: Why the negative correlation? *Journal of Family Issues*, 131-147.
- Wilkinson, R. (1996). *Unhealthy societies: The afflictions of inequality*. London: Routledge.
- Wilkinson, R., & Pickett, K. (2006). Income inequality and population health: A review and explanation of the evidence. *Social Science & Medicine*, 1768-1784.
- Wilkinson, R., & Pickett, K. (2007). The problems of relative deprivation: Why some societies do better than others. *Social Science & Medicine*, 1965-1978.
- Wood, W., Rhodes, N., & Whelan, M. (1989). Sex differences in positive well-being: A consideration of emotional style and marital status. *Psychological Bulletin*, 249-264.
- Yitzhaki, S. (1979). Relative Deprivation and the Gini Coefficient. *The Quarterly Journal of Economics*, 321-324.

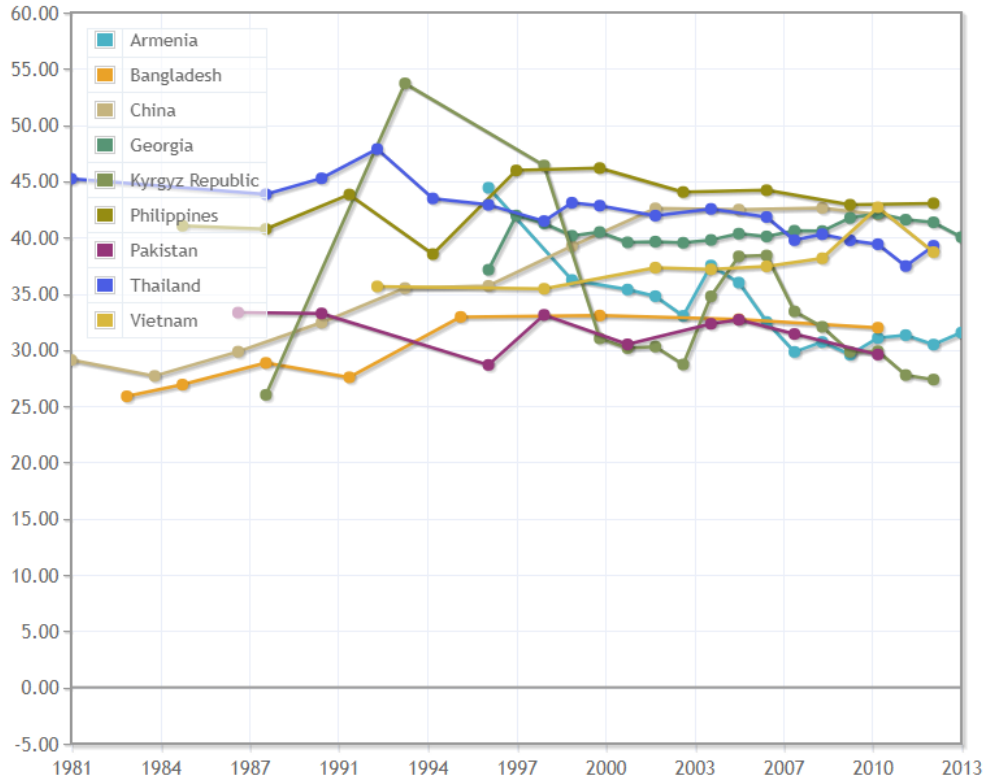
Appendices

Appendix A – Data descriptives

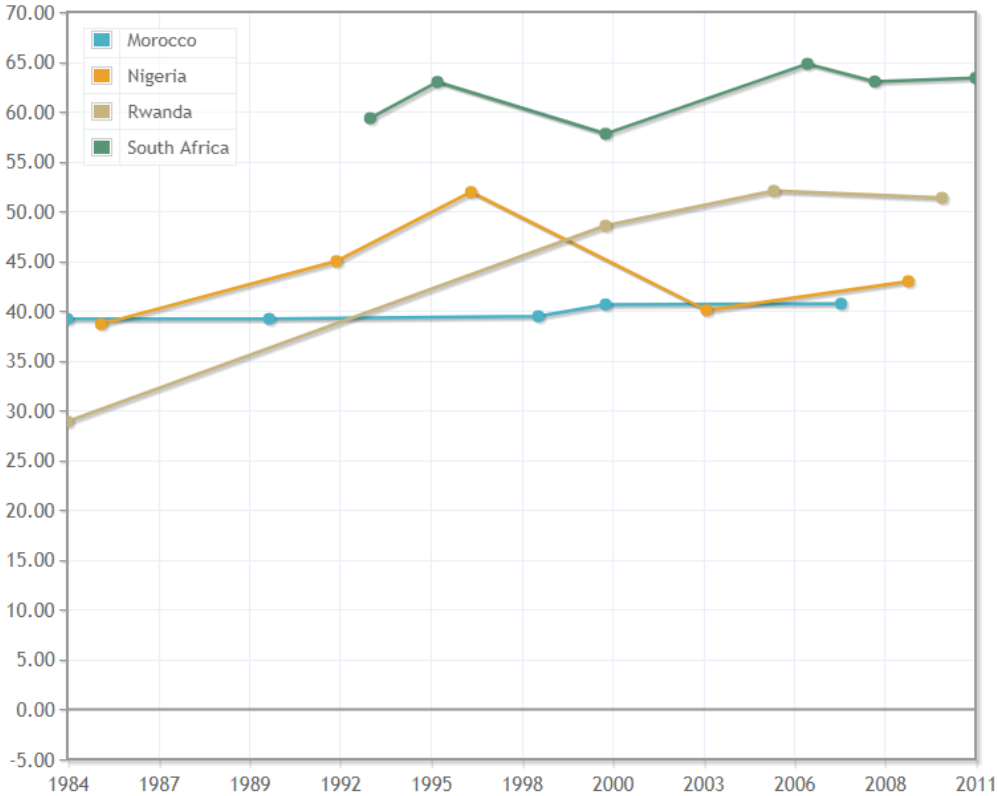
Graph 1: Gini indices for Europe - Source: World Bank, edited by Index Mundi (2017)



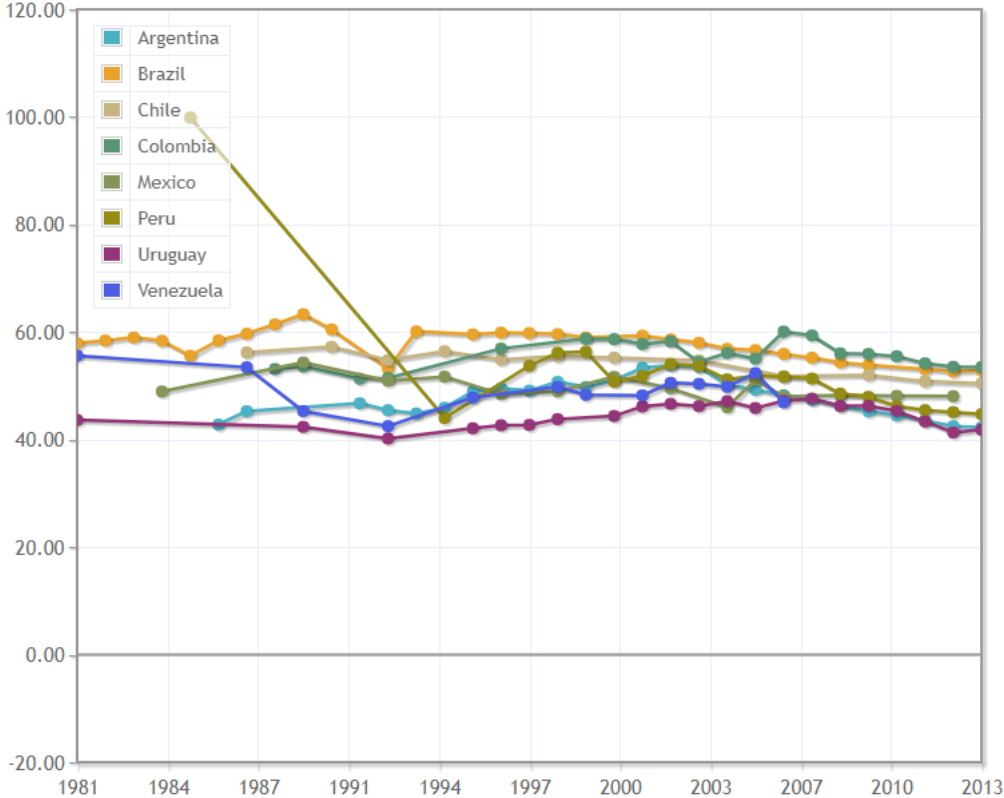
Graph 2: Gini indices for Asia – Source: World Bank, edited by Index Mundi (2017)



Graph 3: Gini indices for Africa – Source: World Bank, edited by Index Mundi (2017)



Graph 4: Gini indices for Latin America – Source: World Bank, edited by Index Mundi (2017)



Graph 5: Average Life Satisfaction per Region

