Veronika Machová

Happiness and Income

Bachelor thesis

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Author: Veronika Machová
Supervisor: Doc. Ing. Tomáš Cahlík, CSc.

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Abstract

This thesis examines relationships between average national subjective well-being and three economic factors—income (expressed as gross domestic product [GDP] per capita), unemployment, and economic freedom—applying fixed effects, random effects, and correlated random effects methods on panel data for countries worldwide, which are divided into three groups based on their level of development. Two measures of subjective well-being—feeling of happiness, and life satisfaction—are used, and the outputs are then compared for both. The results indicate that all three factors have a significant impact on subjective well-being, and GDP per capita seems to be the strongest determinant thereof. Moreover, the findings differ depending on whether life satisfaction or happiness is used as the measure of subjective well-being. The effects of GDP per capita and economic freedom are higher on the former than the latter.
Abstrakt

Tato práce zkoumá vztahy mezi průměrným národním subjektivně vnímaným blahobytém a třemi ekonomickými faktory - příjmem (vyjádřeným jako hrubý domácí produkt [HDP] na obyvatele), nezaměstnaností a ekonomickou svobodou - uplatněním metod fixních efektů (fixed effects), náhodných efektů (random effects) a korelovaných náhodných efektů (correlated random effects) na panelových datech pro země z celého světa, které jsou rozděleny do tří skupin na základě jejich úrovně vývoje. Jsou použita dvě měřítka subjektivně vnímaného blahobytu - pocit štěstí a životní spokojenost - a výstupy jsou poté porovnány. Výsledky ukazují, že všechny tři faktory mají významný dopad na subjektivně vnímaný blahobyt, a zdá se, že HDP na hlavu ho ovlivňuje nejvíce. Závěry se navíc liší v závislosti na tom, které z měřítek je použito. Úrovně HDP a ekonomické svobody mají vyšší vliv na životní spokojenost než na pocit štěstí.

Keywords

happiness, life satisfaction, subjective well-being, income, unemployment, economic freedom

Klíčová slova

štěstí, životní spokojenost, subjektivně vnímaný blahobyt, příjem, nezaměstnanost, ekonomická svoboda
Declaration of Authorship

I hereby proclaim that I wrote my bachelor thesis on my own under the leadership of my supervisor and that the references include all resources and literature I have used.

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Prague, July 28, 2017

Signature
Acknowledgment

I would like to express my gratitude to the thesis supervisor, Doc. Ing. Tomáš Cahlík, CSc., for his time and assistance, and to my parents for their support during my studies.
Bachelor Thesis Proposal

Author Veronika Machová
Supervisor Doc. Ing. Tomáš Cahlík, CSc.
Proposed topic Happiness and Income

Motivation The aim of this thesis is to examine the relationships between average well-being of individuals in a country and three economic factors: national income, unemployment and economic freedom. I will compare the impact of these factors for three groups of countries: advanced, emerging and developing.

I will test the hypothesis that happiness is more influenced by the growth rate of GDP rather than by its actual level. Easterlin (1974) stated that, in the long term, happiness does not increase as a country’s income goes up. On the other hand, Stevenson and Wolfers (2008) find a positive link between the change in happiness and the growth rate of GDP. A study from Pew Research Center (2014) also suggests that the growth rate of GDP does matter and that there is a very significant increase of human happiness in emerging economies.

Unemployment is believed to have a strong negative impact on happiness of individuals (Frey and Stutzer, 2000). In my thesis, I will try to find whether the same is true for the impact of overall unemployment rate of a country on average happiness.

Research Questions

Does economic growth increase human happiness?

Is it true that unemployment has a negative impact on happiness?

Is there a positive link between economic freedom and happiness across countries?

How do these relationships differ for advanced, emerging and developing nations?

Methodology For the analysis, panel data will be used. The data will be collected for large amount of countries from all over the world. These countries will be divided into three groups - developed, emerging and developing. The data on happiness (subjective well-being) will be obtained from the database of World Values Surveys from the World Values Survey Association. The surveys were conducted in an increasing number of countries in six waves between the years 1981 and 2014. The data on
economic freedom will come from the Index of Economic Freedom created by The Heritage Foundation.

**Expected Contribution** Although large number of studies analysing happiness of individuals have already been made, their results differ. The motivation of this thesis is to compare the impact of income, unemployment and economic freedom on happiness in rich as well as poor countries with the use of more recent data. Especially, I would like to find a relationship between growing income and growing happiness in emerging economies. I will compare my results with the results from past studies and analyse the source of discrepancies.

**Outline**

1. Introduction
2. Literature Review and Theoretical Background
3. Dataset and Variables
4. Methodology
5. Analysis
6. Discussion of Results
7. Conclusion

**Core bibliography**


PEW RESEARCH CENTER: People in Emerging Markets Catch Up to Advanced Economies in Life Satisfaction, October 2014


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Introduction

Well-being is something the public seeks to maximize and policy makers attempt to improve. Generally thought to be connected to gross domestic product (GDP), its growth is considered an important goal of economic policy. However, GDP cannot be the only measure of general welfare, as it does not incorporate important social and environmental aspects. Some authors argue that increasing income does not have a substantial effect on raising individual well-being, which is a concept in the economics of happiness known as the Easterlin paradox.

The objective of this thesis is to analyze the relationships between personal well-being and economic factors. The paper examines the effects of GDP, unemployment, and economic freedom on reported subjective well-being and compares the results for two measures thereof: happiness and life satisfaction. Moreover, it explores how the average levels of subjective well-being have changed over time in lower, middle, and higher development countries.

The thesis is structured as follows: Chapter 1 provides a brief review of literature devoted to the topic of happiness in economics. It focuses on the relationships between subjective well-being and three economic factors generally believed to be associated with happiness and life satisfaction—income, unemployment, and economic freedom. Chapter 2 highlights information about our dataset and all the dependent and explanatory variables used in our models. Chapter 3 explains the methodology used. Chapter 4, which contains the analysis itself, explores the data and provides outputs of all the regressions using fixed effects, random effects, and correlated random effects methods. Chapter 5 interprets these results. Finally, the last chapter summarizes our findings and concludes the thesis with policy implications and ideas for future research.
Chapter 1

Literature Review

Economic factors have the largest impact on individual happiness (Pew Research Center 2014). The relationships between happiness and three such variables of interest—national income, unemployment, and economic freedom—have been analyzed in many past studies.

1.1 Happiness and Income

The first empirical study on this topic was conducted by American economist Richard A. Easterlin (1974). He used data from a number of surveys consisting of statements on the subjective well-being of individuals from nineteen countries collected between 1946 and 1970. He established a new concept—now known as the Easterlin paradox—which states that, although those with higher incomes tend to report being happier than those with lower earnings within a country, there is no link between the average self-described level of happiness and national income in international comparisons. Moreover, national time series data have found the same lack of positive association between happiness and income. Easterlin (1974; 1995; 2001) and Diener et al. (1999) have pointed out that, although GDP per capita in the United States has increased since the 1950s, the country’s level of happiness has remained unchanged. This inconsistency has also been noted in longitudinal studies from other countries – such as Japan (Veenhoven et al. 1993) and the United Kingdom (Clark & Oswald 1994).

Several papers have criticized Easterlin’s findings, including Stevenson & Wolfers (2008), who have noted robust evidence of a positive relationship between income and subjective well-being in international comparisons, similar to that displayed in both time-series and intra-country data.

While Easterlin’s analysis has focused on the absolute level of GDP, Stevenson and Wolfers have analyzed well-being as a function of log GDP per capita. They have found that individual happiness worldwide increases during periods of economic
growth, except in the United States. In response, Easterlin et al. (2010) have published another paper that confirms the original paradox based on data from 37 countries. They indicate that in the long run, there is no positive correlation. Despite the growth in income, average well-being tends to be stable over time.

The Easterlin paradox is explained by the relative income and rising expectations hypotheses. The former of the two is developed by James Duesenberry (1949). It states that the utility one derives from a given consumption level depends on its comparative position within a reference group rather than its absolute value. Easterlin’s findings suggest that people do indeed care about their relative earnings. Rising expectations cause them to adjust quickly to new circumstances, and as a result, they are never completely satisfied. Stevenson and Wolfers do not refute weaker forms of adaptation but emphasize the importance of absolute income levels.

Pew Research Center (2014) have found a strong relationship between life satisfaction and per capita income, albeit only to some extent. They have discovered a convergence in reported well-being between advanced and emerging economies. Life satisfaction rose significantly between 2007 and 2014 in developing regions but not in the wealthiest countries. Moreover, countries with greater GDP growth have reported the largest increases in subjective well-being.

1.2 Happiness and Unemployment

Unemployment is widely believed to have a strong negative impact on the happiness of individuals (Frey & Stutzer 2000; Pew Research Center 2014). This causation is present even when income level is controlled for, because the loss of a job has much greater impact than a simple dissipation of earnings can account for. According to Oswald (1997, pg. 1821), “most regression results imply that an enormous amount of extra income would be required to compensate people for having no work.” On average, people are happier when unemployment in their country is low. Di Tella, MacCulloch, & Oswald (2001) have noted that job loss has even greater effect on lowering reported well-being than does inflation. In this study, we further examine the impact of a country’s overall unemployment rate on average reported subjective well-being.

1.3 Happiness and Economic Freedom

Veenhoven (2000) has revealed a significant positive relationship between happiness and freedom. Verme (2009) has argued that freedom and control are better determinants of life satisfaction than any other factors, including employment and income. However, Bjørnskov, Dreher, & Fischer (2008) have stated that the link between
freedom or other measures of institutional quality and happiness differs among impoverished and affluent nations. Gropper, Lawson, & Thorne (2011) have explored the connection between economic freedom and happiness in more than 100 countries across the globe and found that freer countries are happier. This effect is more pronounced in poor countries but weakens with increasing national wealth, and in very rich countries, additional economic freedom can actually cause less happiness.
Chapter 2

Characteristics of the Dataset and Key Variables

2.1 Dataset

Various sources of data have been used for the analysis. The micro data (i.e., individual-level data) on subjective well-being are obtained from WVS (2015), an extensive study of human beliefs and values carried out in six waves between 1981 and 2014. Since only a small number of countries were surveyed during the first two, and the relevant data for some other variables in these periods are missing, we have only used information gathered from last four waves (1995-1998, 1999-2004, 2005-2009, and 2010-2014). These data on subjective well-being consist of more than 300,000 observations on respondents from 98 countries or regions worldwide.

Information on GDP and unemployment comes from the World Bank (2017a; 2017b) database, and that on economic freedom from the Index of Economic Freedom created by The Heritage Foundation (2017). After creating mean values of subjective well-being for each country, all the data are combined. Our final aggregate material with a panel structure consists of 211 observations in 98 nations (the cross-sectional dimension) and four waves (the time dimension). We take averages from yearly reports on GDP, unemployment, and economic freedom for each wave. The dataset is an unbalanced panel, since most of the countries are not represented in all four waves.
2.2 Dependent and Explanatory Variables

Happiness and Life Satisfaction

For dependent variables, we consider answers from two survey questions about life satisfaction and feelings of happiness, respectively. We find the former to be more suitable for our analysis. The latter—as a form of emotion at any moment in time—is more unstable and can change daily depending on factors such as the respondent’s mood, the weather, and the day of the week. Life satisfaction is more closely related to one’s level of aspiration. Survey results, however, are often similar regardless of which of the two measures has been used. Several studies have indicated that different concepts of subjective well-being are intimately correlated (Ng 2015). Therefore, we also utilize information about individuals’ feelings of happiness and compare their responses in our analysis.

In-person or telephone interviews ask respondents about their life satisfaction and feelings of happiness, and their answers are recorded. The exact wording of the first question is: “All things considered, how satisfied are you with your life as a whole these days? Using this card, on which 1 means you are “completely dissatisfied” and 10 means you are “completely satisfied” where would you put satisfaction with your life as a whole?” Therefore, respondents choose on a scale from 1 to 10, and the higher number, the more satisfied they are with their life.

The second one inquires: “Taking all things together, would you say you are: (1) very happy, (2) rather happy, (3) not very happy, or (4) not at all happy?” In this case, respondents choose their feeling of happiness on a scale from 1 to 4, and the higher number, the less happy they feel. As we can see, although the questions were posed to the same sample of individuals, we cannot compare the two concepts directly because of the different scales used.

GDP per Capita

To examine the relationship between happiness and income at the national level, we have included GDP per capita among the explanatory variables. This parameter seems to be the best available measure of a country’s wealth. Maximizing GDP is one of the main goals of political leaders. Although the correlation between GDP and national well-being is not perfect, much of the variation in measures of the latter can be attributed to the former, as well as other economic factors such as unemployment rate (Kassenboehmer & Schmidt 2011).

As Stiglitz et al. (2009) have pointed out, GDP is not necessarily an ideal indication of living standards; in many cases, its growth can actually lower the quality of life. For instance, when the government spends more money inefficiently, GDP still
2. Characteristics of the Dataset and Key Variables

rises. Kassenboehmer and Schmidt (2011) have postulated that traffic jams increase GDP through greater consumption of gasoline, but have a negative impact on individual well-being. Another problem is that GDP per capita does not reflect changes in inequality—most people’s earnings can decline even if the average income increases. Moreover, informal sector activities, which can make up a significant portion of some developing economies, are not included in the national GDP.

In this thesis, we use the purchasing power parity (PPP) form of GDP in order to be able to compare the values across nations. We apply two slightly different measures used by the World Bank: PPP GDP per capita in current and constant (2011) international dollars. This unit of currency has the same purchasing power over GDP as the U.S. dollar in the United States. Both these measures are useful for a comparison of GDP between nations and over time, as they reveal each country’s position in terms of per capita ranking. The OECD (2017) recommends using PPP GDP in constant international prices for longitudinal analyses of relative growth performance, and that measured in current international prices for brief comparisons of the per capita value over short periods.

In GDP comparisons based on current PPP, prices and price structures are allowed to change over time, therefore, the analysis is affected by changes in relative prices between countries and by methodological factors. The advantage of this measurement is that it captures changes in relative volume. In collations based on constant PPP, price structures remain constant with time. This measure reflects shifts in the GDP growth performance of each nation. The disadvantage to this approach is that the assumption of stable relative prices does not hold in reality and may bias the results.

Unemployment

Another explanatory variable in our model is total national unemployment, using a modeled estimate from the International Labour Organization (ILO). This is expressed as a percentage of the labor force that is without work but currently available for, and seeking, employment. The ILO measurements are based mainly on national labor force surveys; this entails several problems. In some sectors, such as agriculture, it can be especially difficult to determine the unemployment rate, which is highly volatile depending on the season. Moreover, the criteria for people considered to be seeking work vary by region. Estimates are therefore harmonized to ensure comparability across countries and time.

Unemployment is a key economic measure and an important policy issue. It is a paradox that low rates thereof can occur in nations with high rates of poverty, while in economically developed countries—especially ones with high welfare benefits—
more people may be jobless, because they can afford to wait for better offers. High levels of unemployment are also often caused by informal sector employment, which is not monitored by the government and therefore difficult to quantify.

**Economic Freedom**

Economic freedom is the right for individuals to undertake financial actions, to control their own labor and private properties. In economically free societies, citizens can choose the use of their property; they can work, invest, trade, and consume any goods and services acquired in any manner they please. Government interventions and coercions are limited only to the extent necessary to protect and maintain liberty itself.

The Heritage Foundation (2017) has measured the economic freedom of 186 countries; this includes 12 forms thereof, divided into four categories:

- Rule of Law (property rights, government integrity, judicial effectiveness)
- Government Size (government spending, tax burden, fiscal health)
- Regulatory Efficiency (business, labor, and monetary freedoms)
- Open Markets (trade, investment, and financial freedoms)

Each of these 12 factors is graded on a scale from 0 to 100, and the total score of a nation is determined by an equally weighted average of these values.

The creators of the Index of Economic Freedom have found a positive relationship between economic freedom and various policy goals, such as: higher per capita incomes and human development, lower poverty rates, healthier societies, longer life expectancies, and less corruption.

**Classification of Countries**

For our analysis, we further divide countries into three categories based on their level of development—lower, middle, and higher development countries. We add a couple of dummy variables for the former two; the third is set as the base group.

The countries are divided according to the system suggested by Lynge Nielsen (2011). He uses an alternative, data-driven methodology in his classification systems, as opposed to organizations such as the UNDP, the World Bank, and the IMF that have not established clear rules. We adopt Nielsen’s trichotomous development taxonomy, using lifetime income as a proxy for development. This is constructed by multiplying two variables—income (GNI/n), and life expectancy. Therefore, it includes not only an economic but also an important social development factor.
Countries are distributed based on their share of world population weights. The categorization of those in our sample is provided in the Appendix in Table 5.1.
Chapter 3

Methodology

The only objective microeconomic approach to the study of happiness, accepted in standard economic theory, is analysis of individual utility through tangible goods and services (Frey & Stutzer 2002). Personal preferences, revealed through choices made, provide all the necessary information to this end. Moreover, social welfare can be measured using this method.

When we account for diverse preferences with regard to happiness among individuals, empirical data analysis provides valuable information on subjective well-being. Frey & Stutzer (2002) have questioned whether utility can be largely derived from observed preferences; they have argued that subjective experience is a valuable source of information, and reported subjective well-being serves as an adequate empirical approximation of utility. The most common methods are surveys and questionnaires on happiness or life satisfaction. This approach is so far the most suitable way of collecting extensive and consistent data for research on this topic in a relatively short time.

Several authors have examined problems associated with this method. First, judgements about life satisfaction and happiness are highly subjective, which casts doubt on the interpersonal comparability and quantification of the data collected. Frey & Stutzer (2002) have demonstrated that results are valid if they are interpreted carefully with limited cardinality. Unlike some authors who assume data on happiness to be strictly ordinal, Kristoffersen et al. (2011) have stated that it can be taken as cardinal as well. Moreover, Ferrer-i Carbonell & Frijters (2004) have concluded that this distinction is not of high importance as it produces only a small difference in the results. Another possible problem is the comparability of the findings across countries; they may be affected by cultural and linguistic factors. To minimize such issues, survey questions and responses should be as general as possible and easily translatable to the maximum number of languages without alterations in meaning. Veenhoven (2012) has discovered that cultural measurement bias does not occur and
we can make fair comparisons of happiness around the world.

The analysis is carried out in the form of panel data regressions. Our first model is an unobserved effects model:

\[ y_{it} = \beta_0 + \beta_1 \text{inc}_{it} + \beta_2 \text{unempl}_{it} + \beta_3 \text{ccfr}_{it} + a_i + u_{it} \]  \hspace{1cm} (3.1)

where \( y \) stands for either average life satisfaction or feelings of happiness in a country, \( \text{inc} \) is the GDP per capita (PPP), \( \text{unempl} \) represents total unemployment, \( \text{ccfr} \) is the economic freedom index, \( i \) stands for the \( i \)-th country, \( t \) signifies \( t \)-th wave (\( t = 3, 4, 5, 6 \)), \( a_i \) is the unobserved effect, and \( u_{it} \) is the idiosyncratic error.

There are two main methods for estimating unobserved effects using panel data models—the fixed effects (FE) and random effects (RE) estimators. While the former allows for a correlation between the explanatory variables and \( a_i \) in any time period, the latter does not. Another difference is that the random effects model can include variables that are constant over time, but the fixed effects estimator removes all of these as well as the unobserved effect.

The fixed effects transformation involves averaging equation (3.1) over time and subtracting this from its original form. We obtain the time-demeaned equation:

\[ y_{it} = \beta_1 \overline{\text{inc}}_{it} + \beta_2 \overline{\text{unempl}}_{it} + \beta_3 \overline{\text{ccfr}}_{it} + \tilde{u}_{it} \]  \hspace{1cm} (3.2)

where \( \overline{\text{inc}}_{it} = \text{inc}_{it} - \overline{\text{inc}}_i \), \( \overline{\text{unempl}}_{it} = \text{unempl}_{it} - \overline{\text{unempl}}_i \), \( \overline{\text{ccfr}}_{it} = \text{ccfr}_{it} - \overline{\text{ccfr}}_i \) and \( \tilde{u}_{it} = u_{it} - \overline{u}_i \).

This equation is then estimated with pooled ordinary least squares (OLS). Under a strict exogeneity assumption on the explanatory variables, the fixed effects estimator is unbiased. The errors \( u_{it} \) should be homoskedastic and serially uncorrelated across time. Since we find the former assumption to be violated, we apply heteroskedasticity-robust standard errors in all the regressions.

As our data set is an unbalanced panel, countries represented in only one period do not affect the fixed effects estimation, because time-demeaning of these observations results in zeros. Apart from that, the estimation is the same as with balanced panels. A problem arises only if the reason that some nations are not represented in all time periods is correlated with the idiosyncratic errors \( u_{it} \). However, this occurs more frequently with data on individuals or firms (Wooldridge 2013).

In the random effects model, we assume that the composite error term \( a_i + u_{it} \) has a positive serial correlation across time. Therefore, generalized least squares method is used to eliminate it. This is done by quasi-demeaning of the original equation—i.e., subtracting only a fraction of the time averages. This formula is then estimated again using pooled OLS as in the fixed effects case. Depending on the size of that fraction—which is determined by variances in \( a_i \) and \( u_{it} \), as well as by the number
of time periods—the random effects estimator is closer to either the fixed effects or the pooled OLS estimator.

When we assume that the unobserved effect is uncorrelated with each explanatory variable in all time periods, the random effects estimator is preferred, as fixed effects would result in inefficient estimators. This is rather an exception, and therefore fixed effects is usually found to be more appropriate for policy analysis using aggregated data because of better estimation of ceteris paribus effects (Wooldridge 2013). If we need to estimate the effect of key explanatory variables that are constant over time, however, we cannot use fixed effects.

In our analysis, we utilize both the fixed and random effects approaches and then apply the Hausman test, which chooses between these two panel data models. It tests for statistically significant differences in the coefficients on the time-varying explanatory variables—income, unemployment, and economic freedom. The underlying concept is that we use random effects—which is preferred due to higher efficiency—unless the Hausman test rejects the null hypothesis \( H_0 \) that \( \text{Cov}(x_{ij}, a_i) = 0 \) (where \( x_{ij} = \text{inc}_i, \text{unmpl}_i, \text{ecfr}_i \)). If \( H_0 \) is rejected, then fixed effects estimates are used, because they are at least consistent under the alternative \( H_1 \). This is summarized in Table 3.1:

<table>
<thead>
<tr>
<th></th>
<th>( H_0 )</th>
<th>( H_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FE estimator</strong></td>
<td>consistent; inefficient</td>
<td>consistent</td>
</tr>
<tr>
<td><strong>RE estimator</strong></td>
<td>consistent; efficient</td>
<td>inconsistent</td>
</tr>
</tbody>
</table>

Our second model is:

\[
y_{it} = \alpha + \beta_1 \text{inc}_{it} + \beta_2 \text{unmpl}_{it} + \beta_3 \text{ecfr}_{it} + \gamma_1 \overline{\text{inc}}_i + \gamma_2 \overline{\text{unmpl}}_i + \gamma_3 \overline{\text{ecfr}}_i + \delta_1 \text{low}_i + \delta_2 \text{mid}_i + r_i + u_{it}
\]

(3.3)

where \( T = 4 \) is the number of time periods, \( \overline{\text{inc}}_i = T^{-1} \sum_{t=3}^6 \text{inc}_{it} \), \( \overline{\text{unmpl}}_i = T^{-1} \sum_{t=3}^6 \text{unmpl}_{it} \), \( \overline{\text{ecfr}}_i = T^{-1} \sum_{t=3}^6 \text{ecfr}_{it} \), \( \text{low} \) and \( \text{mid} \) are dummy variables representing a country’s level of development, \( r_i \) is a time-constant unobserved effect and \( u_{it} \) stands for the idiosyncratic shock. The unobserved effect \( a_i \) is allowed to be correlated with the time averages of the explanatory variables:

\[
a_i = \alpha + \gamma_1 \overline{\text{inc}}_i + \gamma_2 \overline{\text{unmpl}}_i + \gamma_3 \overline{\text{ecfr}}_i + r_i
\]

(3.4)

Since we assume that \( u_i \) is uncorrelated with \( \text{inc}_i, \text{unmpl}_i, \) and \( \text{ecfr}_i \) across all
periods, the time averages of these explanatory variables are also uncorrelated with $u_{it}$.

This model in equation (3.3) is based on the correlated random effects (CRE) approach, which is a combination of the fixed effects and random effects methods. It preserves the fixed effects nature of the analysis and allows us to include time-constant explanatory variables—in our case, the dummy variables *low* and *mid*—and estimate their coefficients. We obtain the correlated random effects coefficients by applying the random effects method to equation (3.3). The beta coefficients on explanatory variables that vary in time are then the same as the estimates from the fixed effects approach (Wooldridge 2013).
Chapter 4

Analysis

4.1 Exploring the Dataset

The first step of our analysis is examining the values present in the dataset. From Figures 4.1 and 4.2, we can see how mean life satisfaction and feelings of happiness have changed with time. Tables 4.1 and 4.2 contain information about the five most important sample percentiles for each wave—minimum, first quartile ($Q_1$), median, third quartile ($Q_3$), and maximum—along with their mean values. The mean level of life satisfaction has risen from 6.297 in the third wave (1995-1998) to 6.840 in the sixth (2010-2014) on a 10-point scale. The mean level of happiness has also changed between these two periods from 2.031 to 1.868 on a decreasing 4-point scale, where 1 represents “very happy” and 2 is “rather happy.” That is a rise in life satisfaction of roughly 0.54 on the 10-point scale and in happiness of approximately 0.16 on the 4-point (which corresponds to a 0.41 increase on a 10-point scale).

We can see that on average, people report higher levels of both measures of subjective well-being with time. This trend since the 1990s may lead to the conclusion that individuals have indeed become happier over time. However, we must keep in mind that our dataset is an unbalanced panel, which means that our sample is different in each wave, and the choice of nations surveyed might be the reason that we observe this rise in reported happiness and life satisfaction.

Figures 4.3 and 4.4 highlight the structure of our unbalanced panel. Each country’s average subjective well-being is displayed for all the waves in which its inhabitants were surveyed. We note that there are many missing values, and very few nations are represented in all four waves. There are also a number of countries that are observed only in one wave.

The following four figures illustrate the correlations between mean levels of life satisfaction and our factors of interest—GDP per capita, unemployment, and eco-
Figure 4.1: Mean life satisfaction

Source: Own Calculations

Figure 4.2: Mean happiness

Source: Own Calculations
Table 4.1: Life satisfaction summary

<table>
<thead>
<tr>
<th>Wave</th>
<th>Min.</th>
<th>$Q_1$</th>
<th>Median</th>
<th>Mean</th>
<th>$Q_3$</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3.725</td>
<td>5.519</td>
<td>6.442</td>
<td>6.297</td>
<td>7.129</td>
<td>8.306</td>
</tr>
<tr>
<td>5</td>
<td>4.462</td>
<td>6.092</td>
<td>7.016</td>
<td>6.777</td>
<td>7.455</td>
<td>8.308</td>
</tr>
<tr>
<td>6</td>
<td>5.007</td>
<td>6.291</td>
<td>6.937</td>
<td>6.840</td>
<td>7.405</td>
<td>8.512</td>
</tr>
</tbody>
</table>

Source: Own Calculations

Table 4.2: Happiness summary

<table>
<thead>
<tr>
<th>Wave</th>
<th>Min.</th>
<th>$Q_1$</th>
<th>Median</th>
<th>Mean</th>
<th>$Q_3$</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1.524</td>
<td>1.776</td>
<td>1.992</td>
<td>2.031</td>
<td>2.250</td>
<td>2.735</td>
</tr>
<tr>
<td>4</td>
<td>1.422</td>
<td>1.724</td>
<td>1.981</td>
<td>1.932</td>
<td>2.088</td>
<td>2.473</td>
</tr>
<tr>
<td>5</td>
<td>1.512</td>
<td>1.746</td>
<td>1.853</td>
<td>1.909</td>
<td>2.054</td>
<td>2.577</td>
</tr>
<tr>
<td>6</td>
<td>1.387</td>
<td>1.696</td>
<td>1.836</td>
<td>1.868</td>
<td>2.012</td>
<td>3.060</td>
</tr>
</tbody>
</table>

Source: Own Calculations

Figure 4.3: Unbalanced panel: Life satisfaction

Source: Own Calculations
nomic freedom. The relationships between these three variables and average national happiness are similar and thus omitted here.

Figure 4.5 indicates the link between life satisfaction and GDP per capita (PPP), measured in current international dollars, for all four waves. It is positive and highly significant ($p$-value ranges from $0.0058$ to $1.18 \times 10^{-6}$), and $R^2$ from the single linear regression lies between $0.1281$ and $0.3915$. The correlation is strongest and most significant in the third wave and then gradually decreases.

Figure 4.6 provides an identical relationship, with the only difference that GDP is measured in constant 2011 international dollars. The results are similar regardless of which measure is used. In the second case, the link is again the most significant and strongest in the third wave ($p$-value $= 4.88 \times 10^{-6}$, $R^2 = 0.3498$), and then it decreases to $R^2 = 0.1276$ and $p$-value $= 0.0059$. All these results are summarized in Table 4.3.

Figure 4.7 illustrates the negative correlation of life satisfaction with unemployment, which is much weaker and less significant than that with GDP. The value of $R^2$ from the single linear regression ranges from $0.02338$ to $0.00039$; the coefficient is statistically significant at a level of 0.05 only in wave 6, and it exceeds 0.2-significance level during the previous three.

In Figure 4.8, the relationship between life satisfaction and economic freedom is provided. It is positive, strong and highly significant during waves 3, 4, and 5 (the
Figure 4.5: Correlation between life satisfaction and GDP per capita (1)

Source: Own Calculations

Table 4.3: Relationship between life satisfaction and GDP per capita (PPP)

<table>
<thead>
<tr>
<th>Wave</th>
<th>Satisf. $\sim$ GDP (curr.)</th>
<th>Satisf. $\sim$ GDP (const.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$p$-value</td>
<td>$R^2$</td>
</tr>
<tr>
<td>3</td>
<td>$1.18 \times 10^{-6}$</td>
<td>0.3915</td>
</tr>
<tr>
<td>4</td>
<td>$1.98 \times 10^{-5}$</td>
<td>0.3845</td>
</tr>
<tr>
<td>5</td>
<td>$2.50 \times 10^{-5}$</td>
<td>0.2870</td>
</tr>
<tr>
<td>6</td>
<td>0.0058</td>
<td>0.1281</td>
</tr>
</tbody>
</table>

Source: Own Calculations
Figure 4.6: Correlation between life satisfaction and GDP per capita (2)

Source: Own Calculations

*p-value lies between 0.004053 and $5.43 \times 10^{-6}$, and $R^2$ ranges from 0.2106 to 0.4603). Its significance decreases during the sixth wave, but it is still statistically significant at 0.05 level. The $R^2$ value drops to 0.07004. Summaries are provided in Table 4.4.

Table 4.4: Correlations of life satisfaction with unemployment and economic freedom

<table>
<thead>
<tr>
<th></th>
<th>Satisf. $\sim$ unempl.</th>
<th>Satisf. $\sim$ freedom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave</td>
<td>p-value</td>
<td>$R^2$</td>
</tr>
<tr>
<td>3</td>
<td>0.269</td>
<td>0.02485</td>
</tr>
<tr>
<td>4</td>
<td>0.346</td>
<td>0.02338</td>
</tr>
<tr>
<td>5</td>
<td>0.243</td>
<td>0.02561</td>
</tr>
<tr>
<td>6</td>
<td>0.022</td>
<td>0.09039</td>
</tr>
</tbody>
</table>

Source: Own Calculations

Mean levels of subjective well-being across the developmental categories are summarized in Table 4.5. As expected, people in higher development countries are, on average, happiest and most satisfied with their lives, followed by those from nations
4. Analysis

Figure 4.7: Correlation between life satisfaction and unemployment

Source: Own Calculations

Figure 4.8: Correlation between life satisfaction and economic freedom

Source: Own Calculations
in the middle group. The latter, in turn, report higher levels of life satisfaction (but not happiness) than those in lower development nations. The mean level of life satisfaction observed in the first category is around 0.2 to 0.9 points higher than that of the second and 1 to 1.5 point greater than that among the third.

What is more interesting is that, while average life satisfaction in higher development countries does not follow any clear upward (or downward) trend, those of lower and middle development countries have increased by approximately 0.65 and 0.75 points, respectively, between waves 4 and 6. It seems that both latter categories are gradually catching up with the former. As before, however, we must consider the reliability of these results, since our sample in each wave is different.

**Table 4.5:** Mean life satisfaction and happiness levels by classification of country

<table>
<thead>
<tr>
<th>Wave</th>
<th>Life satisfaction</th>
<th>Happiness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower</td>
<td>Middle</td>
</tr>
<tr>
<td>3</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>4</td>
<td>5.668269</td>
<td>6.300064</td>
</tr>
<tr>
<td>5</td>
<td>5.972151</td>
<td>6.993746</td>
</tr>
<tr>
<td>6</td>
<td>6.311883</td>
<td>7.050630</td>
</tr>
</tbody>
</table>

*Source:* Own Calculations

The right side of Table 4.5 indicates the mean happiness levels for these three groups of countries. We can conclude that the results are quite similar, regardless of which measure of subjective well-being is used. Average happiness remains stable over time in higher development nations and increases in lower and middle ones. Between waves 3 and 6, the average level in the latter two groups rose by approximately 0.22 and 0.25, respectively, on a 4-point scale.

The mean level of happiness in higher development countries is around 0.1 to 0.35 higher than that of the other two categories on this 4-point scale, which corresponds to a difference of 0.25 to 0.88 on a 10-point scale. This is in line with the 0.2 to 0.9 point lead in life satisfaction noted for higher development nations over the middle group. However, we discover almost no difference in happiness levels between the lower and middle categories.
4.2 Fixed effects and random effects models

The following part of the thesis analyzes the models mentioned in Chapter 3. The overall output of fixed effects and random effects regressions is provided in the four tables below. In the former two, life satisfaction is the dependent variable, while in the latter two, feelings of happiness is used.

The estimation results in Table 4.6 suggest that reported life satisfaction is, as expected, positively correlated with GDP per capita and economic freedom, and negatively influenced by unemployment. When fixed effects are used, only the unemployment variable is statistically significant at a 5% level (p-value is approximately 0.036). Economic freedom and GDP per capita (PPP, constant) are not significant even at 10% level.

In the random effects case on the other hand, economic freedom and GDP per capita (PPP, constant) are both found to be significant at a 5% level. The former appears to be very significant (p-value = 0.011). Variable unemployment is no longer significant at 5%, but it is at a 10% level.

Eliminating the unobserved effect entirely using fixed effects, the influences of GDP per capita and unemployment on life satisfaction are larger than when we use random effects, and that of economic freedom becomes smaller and highly insignificant. To decide which method is more appropriate, we examine the Hausman test results. The p-value equals 0.5427, which is much greater than 0.05, thus we cannot reject the null hypothesis that unique errors are not correlated with the regressors. Therefore, the random effects approach is preferred.

Table 4.6: Summary of FE and RE regression results: Life satisfaction (1)

<table>
<thead>
<tr>
<th></th>
<th>Fixed effects</th>
<th></th>
<th>Random effects</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>p-value</td>
<td>Coefficient</td>
<td>p-value</td>
</tr>
<tr>
<td>Intercept</td>
<td>-</td>
<td>-</td>
<td>5.1022</td>
<td>1.394×10^{-14}</td>
</tr>
<tr>
<td>GDP pc (PPP, curr.)</td>
<td>2.1953×10^{-5}</td>
<td>0.08462</td>
<td>1.6646×10^{-5}</td>
<td>0.01081</td>
</tr>
<tr>
<td>Unemployment</td>
<td>-4.2927×10^{-2}</td>
<td>0.00455</td>
<td>-2.3943×10^{-2}</td>
<td>0.06892</td>
</tr>
<tr>
<td>Economic freedom</td>
<td>1.7816×10^{-2}</td>
<td>0.37092</td>
<td>2.2619×10^{-2}</td>
<td>0.02475</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td>0.15225</td>
<td></td>
<td>0.58569</td>
</tr>
<tr>
<td>Observations</td>
<td>180</td>
<td></td>
<td>180</td>
<td></td>
</tr>
</tbody>
</table>

Source: Own Calculations

We can interpret the RE coefficients directly: controlling for other factors, an
increase of 10,000 international dollars per person is associated with a rise of 0.17 in life satisfaction on a 10-point scale. This growth in GDP corresponds, for example, to the difference in average per capita values during the sixth wave between India and Brazil (a movement from 4,957 to 15,215 international dollars) or Russia and New Zealand (a movement from 23,911 to 34,072). Holding other factors fixed, a 10% rise in unemployment rate is followed by a decline of 0.24 in life satisfaction. In addition, a 10-point increase on the Index of Economic Freedom is associated, ceteris paribus, with a growth in life satisfaction of 0.23. This corresponds, for instance, to the difference in overall average economic freedom indices in the same period between Ukraine (with a score of 46.78) and Egypt (56.74) or between Mexico (67.04) and United States (76.72).

The estimation results of regressions using the same dependent and explanatory variables—except for GDP per capita (PPP), which is now expressed in constant 2011 international dollars—can be seen in Table 4.7. These results, including $R^2$, are similar to those previously obtained with the alternative method of measuring GDP. Regression coefficients and corresponding p-values from the fixed effects approach differ from previous results by a greater margin than do random effects figures. In addition, since the p-value from the Hausman test (0.3018) is again much higher than 0.05, we further examine the random effects results, which are preferred.

**Table 4.7:** Summary of FE and RE regression results: Life satisfaction (2)

<table>
<thead>
<tr>
<th></th>
<th>Fixed effects</th>
<th>Random effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Intercept</td>
<td>-</td>
<td>5.0940</td>
</tr>
<tr>
<td>GDP pc (PPP, const.)</td>
<td>$3.8930×10^{-5}$</td>
<td>$1.7154×10^{-5}$</td>
</tr>
<tr>
<td>Unemployment</td>
<td>$-3.6436×10^{-2}$</td>
<td>$-2.4462×10^{-2}$</td>
</tr>
<tr>
<td>Economic freedom</td>
<td>$1.5750×10^{-2}$</td>
<td>$2.2210×10^{-2}$</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.15621</td>
<td>0.58448</td>
</tr>
<tr>
<td>Observations</td>
<td>180</td>
<td>180</td>
</tr>
</tbody>
</table>

*Source:* Own Calculations

Using random effects, GDP per capita (PPP, constant) is again the most significant variable ($p$-value = 0.012), followed by economic freedom, which is still significant at 5% level. Variable unemployment is significant as well at a 10% level, as in the previous case. The RE coefficients are almost the same as those in Table 4.6. An increase of 10,000 international dollars per person is associated with a rise in life
satisfaction of 0.17, while a 10% growth in unemployment rate is followed by a 0.24-point decrease thereof. In addition, a 10-point increase on the Index of Economic Freedom is associated with a growth of 0.22 in life satisfaction level, controlling for other factors.

Table 4.8 summarizes the result of the fixed and random effects regressions, now with feelings of happiness as the dependent variable. Economic freedom and GDP per capita (PPP, current) are positively correlated with a country’s mean reported level of happiness, while unemployment is again negatively linked. The plus and minus signs differ from those in life satisfaction regressions, because happiness is measured on a decreasing 4-point scale. The $R^2$ is lower when we choose happiness as the dependent variable, especially in the FE case.

Using fixed effects, no variable is statistically significant at a 5% level, and only unemployment is significant at 10% level. When random effects approach is adopted, GDP per capita (PPP, current) appears to be highly significant ($p$-value = 0.006), as is unemployment at a 5% significance level; economic freedom is found to be significant only at 10% level. Regression coefficients are quite similar, regardless of which method is used. We again apply the Hausman test to choose between FE and RE: $p$-value = 0.9537, thus we definitely prefer the results obtained with the random effects.

Table 4.8: Summary of FE and RE regression results: Happiness (1)

<table>
<thead>
<tr>
<th></th>
<th>Fixed effects</th>
<th>Random effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Intercept</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>GDP pc (PPP, curr.)</td>
<td>$-2.9783 \times 10^{-6}$</td>
<td>$-2.5674 \times 10^{-6}$</td>
</tr>
<tr>
<td>Unemployment</td>
<td>$1.2828 \times 10^{-2}$</td>
<td>$1.0258 \times 10^{-2}$</td>
</tr>
<tr>
<td>Economic freedom</td>
<td>$-4.8899 \times 10^{-3}$</td>
<td>$-4.5820 \times 10^{-3}$</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.085987</td>
<td>0.54215</td>
</tr>
<tr>
<td>Observations</td>
<td>182</td>
<td>182</td>
</tr>
</tbody>
</table>

Source: Own Calculations

Now we can interpret the random effects coefficients and compare them with those from the life satisfaction regression. Controlling for other factors, an increase of 10,000 international dollars per person in a country is associated with a rise of 0.026 in happiness on a 4-point scale. This corresponds to a growth of 0.06 on a 10-point scale, which is significantly lower than the effect on life satisfaction (a rise of 0.17). A 10% increase in unemployment rate is followed by a 0.103-point decrease in
happiness, holding other factors fixed. That would be a decline of 0.26 on a 10-point scale, compared to the similar drop of 0.24 in life satisfaction. Additionally, a growth of 10 points on the Index of Economic Freedom is associated, ceteris paribus, with a rise in happiness of 0.046 on a 4-point scale, which corresponds to a change of 0.11 in a 10-point system. This is half of the 0.23-point growth in life satisfaction.

Table 4.9 displays the results with the other measure of GDP per capita (PPP)—expressed in constant 2011 international dollars; other explanatory variables and the dependent variable (happiness) remain the same as in Table 4.8. R-squared is almost the same in both tables. The fixed effects regression coefficients and corresponding p-values are slightly different from those in the previous regression. However, since the Hausman test again confirms that the RE approach is more appropriate (p-value of the test equals 0.8474), we are interested in its corresponding coefficients and p-values. They resemble those from the earlier estimates using current international dollars. Unemployment and GDP per capita (PPP, constant) are again significant at a 5% level, as is economic freedom at 10% significance level. Moreover, the interpretation of the regression coefficients is, after rounding, identical to the previous case.

Table 4.9: Summary of FE and RE regression results: Happiness (2)

<table>
<thead>
<tr>
<th></th>
<th>Fixed effects</th>
<th>Random effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>p-value</td>
</tr>
<tr>
<td>Intercept</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>GDP pc (PPP, constant)</td>
<td>-5.4870×10⁻⁶</td>
<td>0.1971</td>
</tr>
<tr>
<td>Unemployment</td>
<td>1.1841×10⁻²</td>
<td>0.1083</td>
</tr>
<tr>
<td>Economic freedom</td>
<td>-4.5598×10⁻³</td>
<td>0.3259</td>
</tr>
<tr>
<td>R²</td>
<td>0.0884</td>
<td>0.54127</td>
</tr>
<tr>
<td>Observations</td>
<td>182</td>
<td>182</td>
</tr>
</tbody>
</table>

Source: Own Calculations

4.3 Correlated random effects model

The summary of regression coefficients with corresponding p-values from the correlated random effects model can be seen in the two tables below. Adding the time averages (which control for the correlation between the unobserved effect and time-varying explanatory variables) and using random effects is equivalent to subtracting
the time averages and using pooled OLS. Moreover, it allows us to include classification variables, which are constant.

Table 4.10 illustrates the results of the first two CRE regressions, with both life satisfaction and happiness as dependent variables. The GDP per capita (PPP) is measured here in current international dollars. As expected, even after we added the dummy variables classification: lower and classification: middle, the regression coefficients on GDP per capita (PPP), unemployment, and economic freedom factors are almost equal to the FE ones from Tables 4.6 (life satisfaction) and 4.8 (happiness).

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Life satisfaction</th>
<th>Happiness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>p-value</td>
</tr>
<tr>
<td>Intercept</td>
<td>5.1777</td>
<td>2.864×10^{-5}</td>
</tr>
<tr>
<td>GDP pc (PPP, curr.)</td>
<td>2.1499×10^{-5}</td>
<td>0.124569</td>
</tr>
<tr>
<td>Unemployment</td>
<td>-4.2965×10^{-2}</td>
<td>0.006581</td>
</tr>
<tr>
<td>Economic freedom</td>
<td>1.7544×10^{-2}</td>
<td>0.409837</td>
</tr>
<tr>
<td>Classification: lower</td>
<td>-6.0389×10^{-1}</td>
<td>0.213209</td>
</tr>
<tr>
<td>Classification: middle</td>
<td>-1.7515×10^{-1}</td>
<td>0.487549</td>
</tr>
<tr>
<td>Avg. of GDP pc</td>
<td>-1.7845×10^{-5}</td>
<td>0.208987</td>
</tr>
<tr>
<td>Avg. of unempl.</td>
<td>3.0434×10^{-2}</td>
<td>0.278913</td>
</tr>
<tr>
<td>Avg. of ec. freedom</td>
<td>1.0611×10^{-2}</td>
<td>0.694616</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.54662</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>164</td>
<td></td>
</tr>
</tbody>
</table>

Source: Own Calculations

In the life satisfaction column, it can be seen that variables GDP per capita (PPP, current) and economic freedom are positively associated with the measure, but they are not statistically significant even at a 10% level. The coefficient on the former variable implies that an increase of 10,000 international dollars per person is associated with a growth of 0.21 in life satisfaction on a 10-point scale. An increase of 10 points on the Index of Economic Freedom corresponds to a rise in life satisfaction of 0.18, ceteris paribus. Unemployment is again significantly and negatively linked to life satisfaction. Controlling for other factors, a 10% increase in unemployment rate translates into a 0.18-point decline in life satisfaction.

The happiness column reveals that none of the three time-varying variables is
significant at a 5% level, although unemployment is at least at 10% significance level. An increase of 10,000 international dollars per person is associated with a growth in happiness of only 0.027 on a 4-point scale, or 0.07 on a 10-point scale. A 10% rise in unemployment translates into a 0.129-point decline in happiness (or 0.32 on the 10-point scale). Additionally, an increase of 10 points on the Index of Economic Freedom is associated with a growth of 0.048 in happiness (or 0.12 on the 10-point scale), ceteris paribus.

Variables that determine a country’s level of development—classification: lower and classification: middle—do not appear to be significant in either of these two regressions. Controlling for other factors (including GDP), higher development nations are estimated to report a 0.6- and 0.18-point greater level of life satisfaction than lower and middle development countries, respectively. In the happiness regression, the corresponding p-values are so large that it makes no sense to interpret the coefficients.

Table 4.11 outlines the results of the next two CRE regressions, in which GDP per capita (PPP) is measured in constant 2011 international dollars. As before, the coefficients of the GDP per capita (PPP), unemployment, and economic freedom parameters are almost equal to those in the fixed effects case from Tables 4.7 (life satisfaction) and 4.9 (happiness).

As seen in Table 4.11, variables GDP per capita (PPP, constant) and economic freedom are positively associated with life satisfaction, but are again not statistically significant even at a 10% level. The coefficient on GDP per capita means that an increase of 10,000 international dollars per person is associated with a growth of 0.38 in life satisfaction on a 10-point scale. A rise of 10 points on the Index of Economic Freedom is associated with a growth of 0.16 in the dependent variable, ceteris paribus. Unemployment is significant at a 5% level and negatively correlated with life satisfaction. A 10% increase in unemployment rate translates into a 0.16-point decrease in life satisfaction, all other factors being constant.

In the happiness column, none of the variables is significant even at a 10% level. A raise of 10,000 international dollars per person is associated with an increase of 0.051 in happiness on a 4-point scale, or 0.13 in a 10-point system. A 10% growth in unemployment rate is followed by a 0.121-point decrease in the same measure (or 0.3 on a 10-point scale). Additionally, an increase of 10 points on the Index of Economic Freedom leads to a rise of 0.045 in happiness (or 0.11 in the 10-point system), ceteris paribus.

The factors classification: lower and classification: middle do not appear to be significant in either of the two regressions. Controlling for other factors, higher development countries are estimated to report a 0.7- and 0.24-point greater level of life satisfaction than the lower and middle groups, respectively. In the happiness
regression, the coefficients are again extremely insignificant.

Table 4.11: Summary of CRE regression results (2)

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Life satisfaction</th>
<th>Happiness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>p-value</td>
</tr>
<tr>
<td>Intercept</td>
<td>5.2610</td>
<td>3.155×10^{-5}</td>
</tr>
<tr>
<td>GDP pc (PPP, const.)</td>
<td>3.7545×10^{-5}</td>
<td>0.18379</td>
</tr>
<tr>
<td>Unemployment</td>
<td>-3.7314×10^{-2}</td>
<td>0.04303</td>
</tr>
<tr>
<td>Economic freedom</td>
<td>1.5721×10^{-2}</td>
<td>0.48522</td>
</tr>
<tr>
<td>Classification: lower</td>
<td>-6.9637×10^{-1}</td>
<td>0.18934</td>
</tr>
<tr>
<td>Classification: middle</td>
<td>-2.3655×10^{-1}</td>
<td>0.39243</td>
</tr>
<tr>
<td>Avg. of GDP pc</td>
<td>-3.6915×10^{-5}</td>
<td>0.16225</td>
</tr>
<tr>
<td>Avg. of unempl.</td>
<td>2.2835×10^{-2}</td>
<td>0.42400</td>
</tr>
<tr>
<td>Avg. of ec. freedom</td>
<td>1.3025×10^{-2}</td>
<td>0.64837</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td>0.54723</td>
</tr>
</tbody>
</table>

Observations 164 166

Source: Own Calculations
Chapter 5

Discussion of Results

Even though our sample is an unbalanced panel, we have found evidence of rising reported levels of subjective well-being over time. When we divided the countries into three categories, the average life satisfaction and happiness are found to be constantly increasing in lower and middle development nations, but they remained stable in the higher development countries. Moreover, we have observed a convergence in the two measures of subjective well-being between higher and middle development countries. This is in line with the Pew Research Center (2014) analysis, which has discovered gradually closing gap in reported life satisfaction between advanced and emerging economies.

In single linear regressions, we have noted a positive and significant relationship of life satisfaction with GDP per capita and economic freedom present in all four waves in international comparisons. The correlation with unemployment is negative and less significant.

Of the two methods of estimating the unobserved effects panel data model, we consider random effects regressions to have yielded more reliable results based on the outcomes of the Hausman test. The findings suggest that GDP per capita is significant in both life satisfaction and happiness regressions; unemployment is significant in the latter (and only at a 10% significance level in the former), while economic freedom is significant in the former (and only at a 10% level in the latter). The correlated random effects approach yields similar results as fixed effects analyses. Accounting for GDP per capita (PPP), dummy variables indicating the country’s level of development are not significant.

We would like to know which of the three economic factors has the greatest impact on subjective well-being. For this purpose, we analyze the RE regression results from Tables 4.7 (for life satisfaction) and 4.9 (for happiness), where constant international dollars are used to quantify GDP per capita (PPP), as recommended by the OECD for longitudinal analyses. However, we have demonstrated that both measures yield
similar outcomes. We examine the estimated effect on life satisfaction and happiness going from the lower to the upper quantile value of each economic factor. We do not choose extreme values (the minimum and the maximum), because outliers may affect the results.

A movement of GDP per capita (PPP, constant international dollars) from the first quartile value (6,432) to the third (28,846) is associated with a growth in life satisfaction of approximately 0.39 on a 10-point scale and a happiness increase of approximately 0.06 on a 4-point scale (or 0.14 on a 10-point scale). A rise in unemployment rate from the first quartile value (4.94%) to the third (11.29%) results in a 0.16-point decrease in life satisfaction and a 0.07-point decline in happiness (or 0.17 on the same 10-point scale for the former measure). Finally, a movement of economic freedom from the first quartile value (overall score 55.28) to the third (69.74) translates into a 0.32-point increase in life satisfaction and a 0.07-point growth in happiness (or 0.17 on a 10-point scale, for comparison).

It can be seen from the above interpretations that the choice of measure used for evaluating subjective well-being is important. Only unemployment has a similar impact on both; the effect of GDP per capita on life satisfaction is almost tripled, and that of economic freedom is almost doubled when using life satisfaction. Out of the three factors investigated, GDP per capita seems to be the strongest determinant of life satisfaction, followed by economic freedom. All three have a similar impact on happiness.
Conclusion

The main goal of this paper was to analyze the relationships between average subjective well-being in a country and three economic factors—income, unemployment, and economic freedom. Although we have discovered a positive link between mean reported level of happiness or life satisfaction and national income in our longitudinal analysis, we have also noted almost no change in average levels of happiness and life satisfaction in the most developed countries over time. On the other hand, the mean subjective well-being has been constantly increasing in lower and middle development nations, and we have found a convergence in reported life satisfaction and happiness between the middle and higher development countries.

All three economic factors have significant impacts on subjective well-being. As expected, unemployment lowers individual happiness and life satisfaction, and freer nations have citizens who score higher on both measures. We suggest that more attention is paid to the research of economic freedom and its connection to subjective well-being, since it hasn’t been yet examined in detail by many authors.

Although some studies have demonstrated that different concepts of subjective well-being are intimately correlated, we have discovered that the choice of the measure of subjective well-being is of some importance. The outcomes from the random effects model imply that the impacts of GDP per capita and economic freedom are greater when life satisfaction is used as the measure of well-being. This confirms our hypothesis that feeling of happiness is more unstable, and life satisfaction is more suitable for our analysis because it is more closely related to an individual’s aspiration level.

Lastly, we would like to note that the importance of GDP growth is often overemphasized, especially in higher development countries. The GDP concept is so far probably the best measure of prosperity available, but definitely not ideal as it brings many troubles. For example, GDP doesn’t take into account the level of debt a country has. Even though it is certainly correlated with subjective well-being, it is impossible to derive the general welfare only from GDP data, as it can never capture all the features of human life.
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# Appendix

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<th>Classification of countries based on level of development</th>
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<tr>
<td><strong>Lower development countries</strong></td>
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<tr>
<td>Armenia, Azerbaijan, Bangladesh, Burkina Faso, Egypt, Ethiopia, Georgia, Ghana, Guatemala, China, India, Indonesia, Kyrgyzstan, Mali, Moldova, Morocco, Nigeria, Pakistan, Philippines, Rwanda, Tanzania, Uganda, Ukraine, Uzbekistan, Vietnam, Zambia, Zimbabwe</td>
</tr>
<tr>
<td><strong>Middle development countries</strong></td>
</tr>
<tr>
<td>Albania, Algeria, Argentina, Bahrain, Belarus, Bosnia and Herzegovina, Brazil, Bulgaria, Colombia, Croatia, Czech Republic, Dominican Republic, Ecuador, El Salvador, Estonia, Hungary, Chile, Iran, Jordan, Kazakhstan, Latvia, Lebanon, Libya, Lithuania, Macedonia, Malaysia, Mexico, Montenegro, Peru, Poland, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Slovenia, South Africa, South Korea, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay, Venezuela</td>
</tr>
<tr>
<td><strong>Higher development countries</strong></td>
</tr>
<tr>
<td>Australia, Canada, Cyprus, Finland, France, Germany, Israel, Italy, Japan, Kuwait, Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, United Kingdom, United States</td>
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*Source:* Adapted from Nielsen (2011)