STOCKHOLM SCHOOL OF ECONOMICS
Department of Economics
5350 Thesis in Economics
Supervisor: Kelly Ragan

Measuring Welfare

An Alternative to GDP

Birgit Altmann*

May 15, 2013

Abstract:
GDP per capita is generally used to compare welfare across countries and time. However, it faces significant limitations in serving as an appropriate welfare measure. Amongst others, GDP does not account for the distribution of wealth and omits important well-being determinants such as quantity and quality of life. In previous literature a consumption-equivalent model has been developed as an alternative welfare measure containing the factors life expectancy, consumption, leisure and inequality. The model is enhanced in this paper by incorporating the additional factors health and corruption. With this approach, living standards are compared across a broad set of countries both in levels and across time. The results show that for a significant proportion of countries this alternative welfare measurement differs substantially from the traditional GDP evaluation. For instance, life expectancy raises well-being in certain regions such as Western Europe, but considerably reduces welfare in Eastern Europe and Sub-Saharan Africa. In Latin America, inequality within countries is a crucial factor, whereas corruption is most detrimental in Africa. Welfare growth tends to be higher than income growth in the sample due to improvements in longevity, corruption and leisure time.

Keywords: Welfare, well-being, living standards, alternative welfare measurement, GDP, comparative country studies

JEL classification: D60, D63, I31, 057

Date of presentation: May 24, 2013

Examiner: Juanna Joensen

Discussant: Carl Johan von Seth

*40299@student.hhs.se

Acknowledgements

I would like to thank my supervisor Kelly Ragan for her valuable advice and support throughout the entire course of writing this thesis. In addition, I want to thank Örjan Sjöberg for numerous enriching discussions on methodology and content, as well as David Domeij for helpful comments on the model. This thesis was written in cooperation with the Swedish Ministry of Finance, where I would like to thank especially Thomas Eisensee for his valuable input during the early stage of the project. Finally, I would like to express my gratitude to Irene Kögl, Meredith Smith and Peter Liebrich for reviewing my thesis and lingual corrections. All remaining errors are my own.

Contents

List of Figures

List of Tables

List of Abbreviations

BEEPS	Business Environment and Enterprise Performance Survey
CI	composite index
CIC	Center for International Comparisons of Production, Income and Prices
CPI	Corruption Perception Index
C/Y	consumption share
EU	European Union
GDP	Gross Domestic Product
GNH	Gross National Happiness
GPI	Genuine Progress Indicator
HALE	health-adjusted life expectancy
HDI	Human Development Index
ISEW	Index of Sustainable Economic Welfare
MEW	Measure of Economic Welfare
OECD	Organisation for Economic Co-operation and Development
PPP	Purchasing Power Parity
PWT	Penn World Table
SWB	subjective well-being
UNDP	United Nations Development Programme
US	United States
WHO	World Health Organization

1 Introduction

"The time is ripe for our measurement system to shift emphasis from measuring economic production to measuring people's well-being."

– Joseph E. Stiglitz, Amartya Sen and Jean-Paul Fitoussi[1]

"Gross Domestic Product" (GDP) – the total market value of all final goods and services produced in a country in a given year – is considered the core indicator of a country's welfare (van den Bergh 2007). Expectations and information about GDP and its growth have an immense influence on both private sector and policy decisions. In addition, scientists, journalists and politicians use GDP to evaluate a country's performance over time and relative to other countries. Finally, GDP serves as a tool for the public to judge the effectiveness of the current government and thus can significantly impact elections in democratic states.

But is GDP actually an appropriate measure of a country's welfare?[2] Many scientists have doubted GDP's informative value regarding a nation's well-being. Simon Kuznet, who was assigned in the 1930s to develop estimates of the US national income, alerted the Congress in his first report that "the welfare of a nation can [...] scarcely be inferred from a measurement of national income" (Cobb, Halstead and Rowe 1995, p.68). Arthur Melvin Okun, economist and former chairmen of the US Council of Economic Advisers, argues even more vividly regarding national accounts: "The beauty of [the present] practice is that no sensible person could seriously mistake [GDP] for a measure of total social welfare" (Okun 1971, p.132-3). With respect to the specific shortcomings of using GDP as a welfare measure, commonly raised criticism includes the following:[3] First, GDP does not account for income distribution. Living standards are most commonly defined in GDP per capita. However, this emphasizes average income and ignores possible underlying inequalities within a country. Second, GDP ignores unpaid domestic labor. When an institution or person is paid to look after a child it raises GDP. If, however, a person decides to look after his child him- or herself it is not captured by national account statistics even though exactly the same work is involved. More generally, GDP only covers formal market activities and completely neglects the informal market.

[1] (Stiglitz, Sen and Fitoussi 2009, p.12).

[2] The expressions "(social) welfare" and "living standards" are used interchangeably throughout this paper even though it is recognized that depending on definitions some differences may exist. See Section 2.1 for a clarification on how welfare is understood in this paper, it's relation to "well-being" and also for a distinction between welfare and happiness.

[3] See for example Anderson (1991), Stiglitz, Sen and Fitoussi (2009) or van den Bergh (2007). With respect to GDP's failure to account for income distribution also see Sen (1976). The list of criticism is not intended to be exhaustive but to give a general overview of the most commonly mentioned shortcomings. For more detail see the aforementioned authors.

This is especially crucial for less developed countries where a huge proportion of economic activities take place in an informal setting. Third, GDP omits environmental externalities. Water or air pollution caused by economic activities is not considered by national accounts. However if financial investments are undertaken to reduce pollution they increase GDP. In addition, the depletion of natural non-renewable resources does not enter in national accounts calculations. Fourth, GDP informs exclusively about material living standards ignoring many other factors which also impact well-being such as leisure, life expectancy, health, political freedom, crime, or risk of unemployment. In conclusion, GDP does not serve as an appropriate index to guide policy decisions aimed at improving people's general well-being.

In addition, a proper measure of welfare has been identified as one of the important steps towards a sustainable economy. Jackson (2009) describes thoroughly how the increasing scarcity of natural resources as well as the effects of human activities on the environment calls for significant changes of policies. One of his essential recommendations for policy makers is a redefinition of welfare that goes beyond GDP and instead provides a more precise description of human well-being.
Politicians have also recognized the need for an alternative measure of welfare in recent years. David Cameron, current Prime Minister of the United Kingdom, stated in 2006: "It's time we admitted that there's more to life than money, and it's time we focused not just on GDP but on GWB – general wellbeing" (Bache and Reardon 2013, p.8). Former President of the French Republic, Nicholas Sarkozy, went a step further and formed in 2008 the Commission on the Measurement of Economic Performance and Social Progress. Under the direction of Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi, the Commission identified shortcomings of GDP as a welfare measure, discussed sustainability issues and provided guidelines for possible alternative measures (Stiglitz, Sen and Fitoussi 2009).

Consequently, attempts have been made to find a reliable alternative to GDP. However, thus far no welfare measure that is commonly agreed upon has been established. Some of the difficulties with measuring well-being that have not been adequately encompassed by a single method are the following: Firstly, the challenge of appointing the appropriate weights if "soft factors" such as health or institutional quality are incorporated in a welfare measure; secondly, the possibility of using the measure to compare welfare across countries and time; thirdly, to actually incorporate all of the factors that are considered to be most important for people's well-being.[4]

This paper builds on previous literature to develop a welfare measure that attempts to overcome the aforementioned difficulties and thus provides a more precise measurement of people's well-being. As a starting point serves the consumption-equivalent model developed by Jones and Klenow

[4] See Section 2.2 for more detail.

(2010), which includes the factors life expectancy, consumption, leisure and inequality. This approach is further enhanced by adding the factors health and corruption. The six factors are incorporated into a single summary statistic for a country's welfare. Simultaneously, the model allows relating welfare differences to the individual factors. With this approach, welfare is compared across countries for the year 2007 and across time for the period 2000-2007.

The analysis finds a median absolute deviation of 88% between welfare and income levels in 2007. Life expectancy is the major contributor to this difference followed by corruption and inequality. The Scandinavian countries, Norway and Sweden, attain the highest welfare in the sample. On a regional perspective, Western Europe reaches the highest living standards. In Eastern Europe, well-being is lowered by low life expectancy and corruption. Inequality within societies is a crucial factor in Latin America, whereas different welfare patterns can be observed in Asia. Africa is the region with the biggest discrepancy between income and welfare resulting from the very low life expectancy observed in many African countries.
Regarding the analysis across time, welfare growth rates are on average 3% higher than income growth rates. Again, life expectancy contributes significantly to this finding followed by improvements in corruption and leisure time.

The remainder of the paper is structured as follows. Section 2.1 illustrates how welfare is understood in this context and which factors impact peoples' well-being. Section 2.2 provides an overview of previous approaches developed to measure welfare other than solely using GDP. Section 2.3 summarizes the literature overview with a statement of purpose for this paper. Next, Section 3 explains the applied consumption-equivalent model. Section 4 describes the data sources used for the computations. The results are discussed in Section 5 along with a robustness check and an exploration into the limitations of the applied approach. Finally, Section 6 concludes.

2 Literature Review

2.1 Which Factors Determine Welfare?

In order to derive a meaningful measure of welfare, it is at first necessary to address what it *is* that one seeks to measure, that is, what is welfare? As Greve (2008) describes in detail, there exists no clear or commonly agreed definition of welfare. To the contrary, the understanding of the term "welfare" differs immensely across and even within disciplines. In order to arrive at an explanation on how welfare is understood in this paper, it may be helpful to clarify how welfare should *not* be interpreted within this context: welfare is not understood as aggregate happiness of people, where happiness has the meaning of *psychological* well-being. Subjective well-being (SWB) surveys demonstrate that partner/spouse and family relationships have a far greater influence on personal happiness than any other factor (Jackson 2009). However, as the welfare measure developed in this paper is intended to provide useful guidance for policy decisions, it is essential that this measure contain factors that actually can be influenced by policy makers. It could be argued, for example, that government programs aiming at childcare and general working conditions such as working hours or laws regarding gender equality have an influence on the *quality* of intimate or family relationships. However, interpersonal relationships remain largely determined by the characters of the respective individuals as opposed to the government in the relevant country.
Welfare is thus, contrary to aggregate happiness, understood in this paper as follows:

> Welfare refers to the prevailing *living conditions* in a country (or region) that influence the well-being of its people.

In this sense the understanding of welfare follows in broad terms the idea of the "capability approach" developed by Amartya Sen (1985, 1992), as it tries to reflect the possibilities – which Sen describes as capabilities – for individuals to live a "good" life. However, it is important to note that due to difficulties in measuring opportunities it is rather the actual achievements – denominated as "functionings" by Sen – of individuals with respect to different living conditions that are measured by the model developed in this paper. Yet, Fleurbaey (2009) regards this procedure as a legitimate practical application of Sen's approach. With respect to "well-being", Sen's definition is adopted: "The well-being of a person can be seen in terms of the quality (the 'well-ness', as it were) of the person's being" (Sen 1992, p.39).

Since the afore given definition is rather general, it is necessary to assess which living conditions or factors actually contribute to a person's well-being. However, neither Sen's capability approach nor any other theory has – to the knowledge of the author – concisely identified the specific factors that

determine well-being. Therefore, the following list was compiled. It contains living conditions for which empirical evidence has demonstrated their importance for well-being. To the estimation of the author, these factors – either together or in various combinations – conceivably cover most of the dimensions of well-being.

Consumption

Across the relevant literature, material living standard is considered to be a crucial aspect of well-being (Stiglitz, Sen and Fitoussi 2009). However, it is less clear whether material living standard should be measured by income or consumption. The distinction could be of little practical importance if income can serve as a reasonable proxy for consumption. However, as Slesnick (1993, p.2) argues, "decades of research stimulated by [Milton Friedman's] permanent income hypothesis have shown that income is a poor proxy for consumption." Hence, a decision in favor of one measure needs to be made. Meyer and Sullivan (2003, p.33) stress that – particularly for poor countries – material well-being should be measured by consumption rather than income, since "consumption captures permanent income, reflects the insurance value of government programs and credit markets, better accommodates illegal activity and price changes, and is more likely to reflect private and government transfers." A similar argument is presented by Headey, Muffels and Wooden (2004). They note that in some countries more than half of the households demonstrated consumption expenditures that exceeded their earnings.[5] They contribute this observation to people's intention to smooth their consumption over time in anticipation of higher future income and conclude that therefore, "consumption expenditure is the most valid measure of current living standards" (Headey, Muffels and Wooden 2004, p.2). Given that the sample of countries analyzed in this paper contains firstly, a substantial amount of countries with low per capita income, and secondly, numerous countries with a consumption share of above 100%,[6] it seems most appropriate to measure material living standards with consumption expenditures.

Leisure

Starting with Gary Becker's theory of the allocation of time (Becker 1965), it has become common practice in labor economics to assume that individuals face a trade-off decision between on the one hand work, which enables them to consume and thus leads to material well-being, and on the other hand leisure. The general belief is that individuals with more leisure attain a higher level of utility given a certain amount of consumption; or put in different words: given a certain level of consumption individuals who work less than others are better off. Given the increasingly common discussions regarding "work-life-balance" particularly in highly developed countries and considering

[5] The countries they analyze are Australia, Great Britain, Germany, Hungary and The Netherlands.

[6] Namely Liberia, Lesotho, Tajikistan, Sao Tome and Principe, Moldova, Kyrgyzstan, Togo and Haiti; consumption share reported by the Penn World Table 7.1 (CIC 2012).

that individuals sacrifice a substantial amount of income to increase their leisure time in many parts of the world, the assumption that the amount of leisure time has a positive effect on well-being seems plausible.

Life Expectancy

It is obvious that individuals can only enjoy a "good" life if they are actually *alive*. Hence, the prevailing life expectancy in a country is the crucial component for the duration of well-being. According to Llavador, Roemer and Silvestre (2012, p.6) "[l]ife expectancy is recognized as a major factor in human welfare. As societies become wealthier, extending life becomes increasingly valuable." The latter statement is supported by Hall and Jones (2007). The authors argue that the rising share of total economic resources spent on health in order to extend life is an observation which backs the following assumption: As people acquire a higher income and thus reach a higher consumption level, the marginal utility of consumption declines rapidly. Health spending aimed to extend life allows individuals to receive additional periods of utility. The marginal utility of life extension on the other hand does not decrease.

Health

For determining how well off individuals are during their life, not only the quantity of life as measured by life expectancy is crucial, but also the quality of life given by the various experienced health statuses during one's lifetime. SWB surveys show that personal health status has a crucial impact on subjective well-being (Fleche, Smith and Sorsa 2011, Jackson 2009). This finding is supported by the amount of money people are willing to pay on their personal health. According to Hall and Jones (2007), the share of total resources spent on health care amounted to more than 15% in the United States in 2000. Additionally, the authors estimate that "a sixty-five year old would give up 82 percent of her consumption […] to have the health status of a 20 year old" (Hall and Jones 2007, p. 63). Furthermore, Nordhaus (2003, p.39) finds that if given the choice to "forgo either the health improvements over the last half-century or the non-health improvements," most people would either choose health improvements or have great difficulty choosing. Thus, the prevailing disease burden is an important condition for people's well-being.

Inequality

The Stiglitz report states: "If inequality increases enough relative to the increase in average per capita GDP, most people can be worse off even though average income is increasing" (Stiglitz, Sen and Fitoussi 2009, p.8). Thus, only looking at average numbers with respect to different living conditions can lead to false conclusions regarding the well-being of a huge proportion or even the majority of the population within a country. Cordoba and Verdier (2008, p.1) argue that the "main lotteries individuals face during their lifetime are their place of birth and their parents." They analyze

how much consumption growth a newborn would sacrifice to avoid these lotteries, that is, to be born in a world without inequality, and find that he may well be willing to sacrifice a large fraction, if not all. In addition, prevailing inequality appears to negatively influence average happiness of a country's citizens. Alesina, Di Tella and MacCulloch (2004) obtain this result for Europe and the US after controlling for individual income, a large set of personal characteristics, year and country. Graham and Felton (2004), who use a broader definition of inequality, which goes beyond the distribution of income, find even stronger detrimental effects of inequality on happiness in Latin America. Hence, several reasons support the inclusion of prevailing inequality for determining welfare.

Institutional Quality / Governance[7]

Extensive research demonstrates that institutional quality influences economic development and growth (Acemoglu, Johnson and Robinson 2001, 2005, Keefer and Knack 1997, Rodrik, Subramanian and Trebbi 2004). As such, a measure of institutional quality can give insights into the possible future well-being of a country's population especially with respect to income or consumption. This relationship is stressed by Kaufmann (2005, p.42): "[…] the evidence points to the causality being in the direction of better governance leading to higher economic growth. A number of emerging economies, including the Baltic States, Botswana, Chile and Slovenia, have shown that it is possible to reach high standards of governance without yet having joined the ranks of wealthy nations." However, institutional quality or governance do not only impact future welfare, but also influence significantly current well-being. This is shown in numerous empirical studies, amongst others by Bjørnskov, Dreher and Fisher (2010), Helliwell and Huang (2008), Hudson (2006), and Ott (2010, 2011).

One specific aspect of institutional quality is the prevailing level of corruption. Welsch (2008) illustrates that corruption affects well-being in two ways: Firstly, in an indirect way by lowering GDP and secondly, in a direct non-material way. The latter could include additional time and effort to attain public services or psychological costs such as dissatisfaction about unjust procedures.

Environmental Quality

In general, the effect of environmental quality on well-being that goes beyond health aspects is difficult to measure. However, several authors show with hedonic models, that is, analyzing the relationship of housing prices and environmental quality, that individuals are willing to give up a substantial amount of income to avoid for example air pollution (Boyle and Kiel 2001, Brasington

[7] The definitions for institutional quality and governance tend to be overlapping. See for example Bjørnskov, Dreher and Fischer (2010) for institutional quality and Kaufmann, Kraay and Mastruzzi (2009) for governance. When measured, both include aspects such as rule of law, corruption, government effectiveness or regulatory quality. Thus, within this context, institutional quality and governance are considered as one general living condition that impacts well-being.

and Hite 2005, Leggett and Bockstael 2000). In addition, another string of literature concludes, based on SWB surveys, that local environmental quality has a significant effect on well-being (Luechinger 2010, MacKerron and Mourato 2009, Rehdanz and Maddison 2008, Welsch 2002, 2006, 2007).

Further factors

Relevant literature demonstrates that there are numerous other factors that impact an individual's well-being. These include crime (Hinks 2010, Møller 2005, Powdthavee 2005), gender equality (Klasen 2004), unemployment (Clark and Oswald 1994) and education (Michalos 2008). However, these factors are indirectly captured – at least to some extent – by the aforementioned living conditions: Crime in its dual parts – the physical act as well as the psychological problems caused by it – is accounted for by health status. Gender inequality, which leads to unequal job opportunities or remuneration, is captured by income inequality. A similar argument can be made for unemployment: high rates of unemployment increase the prevailing inequality in a society; psychological stress during unemployment has a negative effect on health. Finally, education entailing higher income is accounted for by material living standards.

2.2 Alternative Approaches to Measure Well-Being

Due to the reasons stated in the introduction, it has been an ongoing quest for researchers to find an alternative to GDP for measuring welfare. Thus, this paper builds upon a large body of literature.[8] The different approaches, which have evolved during the preceding four decades, can roughly be categorized into four types.

The first type of alternative welfare measure is based on accounting adjustments to GDP, that is, it seeks to correct important deficiencies of regular GDP by adding or subtracting partially calculated terms (van den Bergh 2007).[9] This approach was initiated by Nordhaus and Tobin (1972), who introduce a "Measure of Economic Welfare" (MEW) combining consumption, leisure, household work and deducting urban disamenities. The method was further enhanced by Cobb and Daly (1989), who create the "Index of Sustainable Economic Welfare" (ISEW). In comparison to the MEW, the ISEW accounts for the depletion of natural capital and pollution as well as the distribution of income, but does not include the factor leisure. In general, both indices intend to include only consumption related services that directly improve human welfare and omit others such as public defense or rehabilitative expenditures. A policy organization called "Redefining Progress" slightly modified the ISEW and developed the "Genuine Progress Indicator" (GPI). This index also corrects for

[8] For an extensive overview see Fleurbaey (2009), Matthews (2006), Bates (2009) and van den Bergh (2007).
[9] Asheim (1994) and Hartwick (1977, 1990) develop a theoretical basis for this approach. For a more general overview see Aronsson, Johansson and Löfgren (1997) and Asheim (2000). Dasgupta and Mäler (2000) use a similar method to compare welfare across countries and time.

divorces, unemployment, voluntary work and criminality (Talberth, Cobb and Slattery 2007).[10] All of the three indicators, MEW, ISEW and GPI, are criticized by several authors for their prevailing theoretical shortcomings (Atkinson 1995, Neumayer 1999, 2000). In an attempt to create a more scientifically sound theoretical basis, Lawn (2003) uses an income and capital concept by Fisher (1906). However, strong criticism remains, in particular regarding the valuation methods used to construct the aforementioned indices (Dietz and Neumayer 2006, Fleurbaey 2009, Lawn 2005, van den Bergh 2007). In addition, Neumayer (2003) criticizes that an important factor of welfare is not included, namely life expectancy.[11] In more recent years, Boarini, Johansson and d'Ercole (2006) correct GDP separately for disposable income, leisure and inequality for OECD countries. However, they do not construct a single statistic for welfare that allows for a coherent comparison across countries and time.

A second method that has been utilized to determine a country's well-being is the construction of a composite index (CI). The most famous example is the United Nations' "Human Development Index" (HDI) developed in 1990. It combines three factors:[12] standard of living measured by GDP per capita (in Purchasing Power Parity (PPP)), longevity measured by life expectancy at birth, and knowledge measured by adult literacy rate combined with primary, secondary, and tertiary gross enrolment ratios (UNDP 2005).[13] Other examples are the indices of Miringoff and Miringoff (1999), Osberg and Sharpe (2002), and van de Kerk and Manuel (2008). However, all of these indicators face two major problems. Firstly, using a CI as a guideline for policies might not lead to actually improving the well-being of the people. Engineer and King (2012) analyze the implications of maximizing the HDI using a standard growth model and find that the optimal policy would ask for a minimum level of consumption. Secondly, the construction of a CI lacks a theoretical basis.[14] The selection of the components as well as their assigned weights carries an element of arbitrariness (van den Bergh 2007). Sen (2000, p.21), who has contributed to the development of the HDI, argues that the proper assignments of weights "is ultimately a matter of social choice," which should stem from an "enlightened public discussion." In order to overcome the absence of a theoretical foundation,

[10] Furthermore, Lawn and Sanders (1999) build upon the ISEW and GPI to create the "Sustainable Net Benefit Index". They suggest replacing GDP by two separate benefit and cost accounts.

[11] Another critique is raised by Gasparatos, El-Haram and Horner (2008) concerning the possibility of applying these indicators on a smaller scale system (for example regions within a country) given the fact of limited data availability.

[12] Previously the HDI was calculated as the unweighted average of these three factors. In 2010 the weighing system was modified. See Ravallion (2011) for details.

[13] Fleurbaey (2009) considers the HDI as an application of the "capability approach" proposed by Amartya Sen. However, since firstly no other application has evolved from this method so far, and secondly it is "primarily […] a framework for thinking rather than a precise method of measurement" (Fleurbaey 2009, p.1030), the capability approach is not considered as one of the major four approaches for welfare measurement in this context.

[14] A thorough discussion of the so-called "Mashup Indices" and their shortcomings is conducted by Ravallion (2010).

Dowrick, Dunlop and Quiggin (2003) propose a theory based on revealed preference axioms for the use of CIs. However, Fleurbaey (2009, p.1056) criticizes their method as he argues that "it appears difficult to connect it to a standard notion of social welfare," and that it "is hardly applicable on a large scale." Hence, the lack of a theoretical basis for CIs remains.

A third string of literature aims to determine national well-being through subjective indicators.[15] The general basis for this approach are surveys in which people are asked to rate their overall happiness or satisfaction in life, that is, an evaluation of subjective well-being (SWB). However, numerous problems exist with using SWB indices for comparing welfare across countries and time. First, in the long run SWB seems to be relatively immune to objective circumstances. After a major life event, both positive and negative, individuals' life satisfaction returns relatively quickly to a usual level of happiness due to an astonishing ability to adapt (Fleurbaey 2009). Second, people might respond to SWB surveys in a socially appropriate way. If gratitude or fortitude is a desirable value in one's cultural surrounding, answers might be significantly biased (Diener 2000, Bates 2009). Third, the evaluation of individuals' SWB is influenced by their prevailing mood at the time of the survey (Schwarz and Strack 1999). Fourth, answers could be further biased if individuals assume that the results of the survey are used to judge their government's performance (Bates 2009).[16] Still, the search for a "Gross National Happiness" (GNH) index based on SWB has been popular in recent decades. The best-known example is the King of Bhutan, who claims that the maximization of GNH is the principal guideline for his policies (Matthews 2006). In 2008, the Centre of Bhutan Studies developed a GNH index by comparing individuals' evaluation of their satisfaction in nine different dimensions with a certain sufficiency cut-off.[17] Even though Bates considers this approach as an "impressive contribution to measurement of human well-being" (Bates 2009, p.12), serious shortcomings remain. As with the CIs, it is questionable whether the equal weighing of the parameters appropriately reflects the actual contributions of the various factors to overall well-being. Additionally, the set of sufficiency levels are based solely on subjective judgment and it is uncertain whether a consensus regarding these values could be obtained across countries. Furthermore, an increase of the achieved level above the sufficiency cut-off by a large part of the population would not reflect in a higher GNH (Bates 2009).

[15] For an overview see Diener (2000) as well as Kahneman and Krueger (2006).

[16] For further problems concerning the evaluation of SWB see the previously mentioned authors (Fleurbaey 2009, Diener 2000, Bates 2009, Schwarz and Strack 1999).

[17] Namely: psychological well-being, health, time use, education, cultural diversity, good governance, community vitality, ecological diversity and living standards. For more details on the underlying computations see Braun (2009).

Despite limitations regarding applicability to compare welfare across countries and time, SWB surveys can be a valuable source to determine which factors actually contribute to people's well-being. This will be further discussed below.

Given the shortcomings of the three previously mentioned methods, a slowly increasing body of literature aims to measure welfare in a way that is explicitly grounded in economic theory. As this is the approach taken in this paper, the following paragraph will not only give an overview of work conducted hitherto, but also describe how the methods used in this paper differ from previous methods.

Becker, Philipson and Soares (2005) compute equivalent growth rates by combining income and life expectancy into a full income measure based on a utility function. They find that the increase in life expectancy significantly reduced welfare inequalities across countries after World War II. However, their analysis focuses exclusively on trends and does not allow for a comparison of well-being in different countries at a certain point in time. In addition to this, they only incorporate two factors – income and life-expectancy – whereas this paper considers actual consumption instead of income and also includes inequality, morbidity, leisure and corruption. Fleurbaey and Gaulier (2009) compare living standards of 24 OECD countries by calculating an equivalent variation of income that incorporates the following non-monetary components: labor, risk of unemployment, healthy life expectancy, household demography and inequalities. The approach taken in this paper differs not only methodologically, but also considers consumption rather than income, includes life expectancy and morbidity as separate factors, corrects for different corruption levels and analyses a much broader set of countries. Another relevant piece of work based on economic theory is the paper of Basu et al. (2012). The authors argue, "to a first order, welfare is summarized by total factor productivity and by the capital stock per capita" (Basu, et al. 2012, p.2). Using these two variables they compare welfare across countries and time. However, unlike this paper their analysis does not allow the relation of welfare differences or changes to certain factors. Thus, it is of little practical use both for policy makers and to inform the public.

The calculations of welfare indices conducted in this paper build upon a method developed by Jones and Klenow (2010). In their analysis, the authors compute consumption equivalents to compare welfare across countries and time. The factors, which they account for in determining welfare, are consumption, leisure, inequality and life expectancy. This paper goes beyond their work by acknowledging the fact that *institutional quality* and *health status* are further important determinants of one's well-being and thus incorporating them in the welfare measure.

2.3 Statement of Purpose

Summarizing the important conclusions that can be drawn from this literature review, the welfare measure developed below aims to achieve the following: It will avoid arbitrary weighing of different living conditions by basing the calculations on a utility function and thus overcoming the shortcomings of CIs. The measure will therefore not be based on SWB surveys and hence ensure a coherent comparison across countries and time. Moreover, it will account – at least to a certain extent – for the aspects that have been identified as being most important to individual's well-being and thus go beyond previous approaches based on economic theory. Regarding the specific factors, it will directly include consumption, leisure, life expectancy, health as well as inequality. Institutional quality is extremely difficult to measure and to compare across countries. Therefore, the factor that will be incorporated is corruption as the Corruption Perception Index (CPI) provided by Transparency International allows for a spatial comparison.[18] It should be noted that the prevailing level of corruption only captures a small part of institutional quality, however its use as a proxy for the latter is in line with previous works (Bjørnskov, Dreher and Fischer 2010, Ott 2010, Wagener 2004). Due to a lack of precise knowledge about the utility that individuals derive from environmental quality, it will only be accounted for indirectly through health.

[18] However, the CPI faces limitations with respect to comparison across time. This is further discussed in Section 4.

3 The Consumption-Equivalent Model

The general approach of the welfare measure applied in this paper follows a method introduced by Lucas (1987) and translated to a welfare measure by Jones and Klenow (2010). Lucas calculated the proportion of consumption by which a representative individual would need to be compensated in order to be indifferent between living in a world with business cycles compared to a world in which all variability of consumption is eliminated.

This method is transferred to a welfare measure by Jones and Klenow (2010) as follows: A random person in the US is considered, who – for simplicity – henceforth be referred to as "Lucas".[19] A question is then posed: By how much would Lucas' consumption need to be adjusted in order to make him indifferent to living the next year in the US or for example in Sweden or Mozambique? However, Lucas is under a "veil of ignorance", that is, he faces a lottery regarding his actual living conditions in the other country. He does not know whether he will be rich or poor, healthy or sick, or whether he would actually still be alive at his age in the other country. The proportion of consumption that would make Lucas indifferent to living in Sweden (λ_{Sweden}) or Mozambique ($\lambda_{Mozambique}$) instead of the US is the consumption-equivalent welfare of the standard of living.

Regarding the model description below, the approach of Jones and Klenow (2010) for incorporating the factors life expectancy, consumption, leisure and inequality is followed. The addition of the factors health and corruption is conducted by the author.

3.1 The Underlying Utility Function

It is assumed that Lucas would spend one year in Mozambique instead of the US. The following section derives Lucas' expected utility accounting for the living conditions in Mozambique.

Consumption and Leisure:

Lucas derives utility from consumption and leisure as follows:

$$u(C, l) = \bar{u} + \log C + v\,(l), \tag{1}$$

where C denotes average annual consumption and l is annual hours of leisure or home production.[20] $\bar{u}$ is the intercept of the flow utility calibrated in Section 3.4. Thus, $u(C, l)$ describes Lucas' flow

[19] Jones and Klenow name the fictitious person "Rawls". However, in order to avoid the possible confusion with Rawls' maximum social welfare function, the name "Lucas" was chosen.

[20] It would be preferable if home production were excluded from hours spent on leisure. However, the available macro data does not allow for this distinction. With micro data, it would be possible to more accurately differentiate between working hours and leisure time.

utility in Mozambique. The consequences of choosing other forms of utility specification will be discussed in the robustness section.

Life Expectancy and Health:

The next question is whether Lucas will actually be alive at his age in Mozambique so as to be able to enjoy consumption and leisure. Suppose that Lucas could be assigned any age with equal probability. Furthermore it is assumed that consumption does not vary with age.[21] The probability that Lucas is alive at his age depends on the cumulative mortality rate in Mozambique associated with his assigned age.

Let a denote age and let the maximum age be 100. Now $S(a)$ describes the probability that a person survives to age a given the cross-section of mortality rates. Thus, the probability that Lucas is alive is given by integrating with respect to age

$$p = \int_0^{100} S(a)da \,/100 \; = e \,/\, 100. \tag{2}$$

Here, e is the standard measure of life expectancy at birth. The probability that Lucas is alive and derives utility from consumption and leisure is $p = e \,/\, 100$; the probability Lucas has not reached his assigned age in Mozambique and receives a utility that is normalized to be zero is $1 - p = 1 - e \,/\, 100$. Combining the probabilities of life and death, the expected utility for Lucas is defined as

$$p \cdot u(C, l) + (1 - p) \cdot 0 \; = \; e \cdot u(C, l) \,/\, 100. \tag{3}$$

Since the 100 is a negligible constant, it will be dropped henceforth and expected utility depending on consumption, leisure and life expectancy thus simplifies to

$$V(e, C, l) \; = \; e \cdot u(C, l). \tag{4}$$

As yet, only mortality has been taken into account; however Lucas' well-being is also dependent upon whether he will be healthy or sick during his year in Mozambique. Thus, the model will be further developed to incorporate healthy life expectancy, denoted as he. Following Fleurbaey and Gaulier (2009), Lucas only derives utility from years lived in good health. In a similar fashion as presented above, Lucas' expected utility depending on consumption, leisure and *healthy* life expectancy can be calculated as

$$V(he, C, l) \; = he \cdot u(C, l). \tag{5}$$

The difference between life expectancy and healthy life expectancy is $e - he = m$, where m denotes morbidity. Hence, m represents years that are lost due to ill health. Combining this relationship with

[21] This is a rather significant assumption made due to data limitations on the macro level. Again, this assumption could be eliminated when using micro data.

equation (5) yields an expected utility for Lucas incorporating life expectancy, morbidity, consumption and leisure of

$$V(e, m, C, l) = (e - m) \cdot u(C, l). \tag{6}$$

Inequality:

Consumption has previously been included in the expected utility function as a fixed amount reflecting average annual consumption in Mozambique. Now it will incorporate the fact that Lucas faces a lottery regarding his material living standard. Following Battistin, Blundell and Lewbel (2009) as well as Jones and Klenow (2010), consumption is assumed to be log-normally distributed with an arithmetic mean c and a standard deviation of log consumption σ. In addition, suppose that consumption, mortality and morbidity are uncorrelated. As a result,

$$E[\log C] = \log c - \frac{1}{2}\sigma^2. \tag{7}$$

The uncertainty reduces expected utility through diminishing marginal utility. A similar case could be made for inequality in leisure. However, due to data limitations on the macro level it is not considered here. With micro data an inclusion would be possible.

Combining (1), (6) and (7), Lucas' expected utility in Mozambique taking into account life expectancy, morbidity, consumption, leisure and inequality is

$$V(e, m, c, l, \sigma) = (e - m) \cdot (\bar{u} + \log c + v(l) - \frac{1}{2}\sigma^2). \tag{8}$$

As the disutility from corruption has only been calculated at the margin by previous literature it will be introduced in the following section when the theory for the comparison across countries and time is presented.

3.2 Calculating Welfare Across Countries

Now it is assumed that Lucas could be either a random person in the US or a random person in another country, indexed i. By what proportion λ_i^{ev} would Lucas' consumption in the US need to be adjusted in order to make him indifferent between living in the US or country i?[22] Given the derived expected utility from above, the following equations need to be fulfilled:

$$V(he_{us}, \lambda_i^{ev} c_{us}, l_{us}, \sigma_{us}) = V(he_i, c_i, l_i, \sigma_i) \tag{9}$$

$$he_{us}\left(\bar{u} + log\lambda_i^{ev} c_{us} + v(l_{us}) - \frac{1}{2}\sigma_{us}^2\right) = he_i\left(\bar{u} + log c_i + v(l_i) - \frac{1}{2}\sigma_i^2\right). \tag{10}$$

[22] Regarding λ_i^{ev} ,"ev" stands for equivalent variation. See further below for an explanation.

Corruption:

Lucas will be exposed to a specific level of corruption dependent upon the country in which he lives. Welsch (2008) is able to derive the proportion of income a person would need to be compensated by for a certain change in the corruption level so as to be indifferent between both scenarios. So for the welfare measure it is necessary to compare the corruption level between the US and country i, correct the respective proportion of income by the prevailing consumption share in the US and add or subtract it to US consumption:

$$c_{us\_corr\_i} = c_{us} + \ comp \cdot (corruption_i - corruption_{us}), \tag{11}$$

where $corruption_i$ is the corruption level in country i, $corruption_{us}$ the corruption level in the US, $comp$ the proportion of consumption a person needs to be compensated by to be indifferent between $corruption_i$ and $corruption_{us}$, c_{us} the average consumption in the US and $c_{us\_corr\_i}$ the consumption in the US that is corrected for the difference in corruption levels between the US and country i. An intuitive explanation of equation (11) is that consumption streams are valued differently given different levels of corruption. If it were assumed that Mozambique and the US were equal in all characteristics but corruption – with a lower level of corruption in the US – then the US level of consumption would give a lower welfare in Mozambique. This is due to various consequences of corruption such as the necessity to pay bribes, increased waiting time for public services or psychological costs associated with a general climate of illicitness. Therefore, consumption would need to be higher in Mozambique to make Lucas equally well off in both countries.

Dividing $c_{us\_corr\_i}$ over c_{us} gives the "corruption compensation multiplier of consumption", $corr_i$ for each country i

$$\frac{c_{us\_corr\_i}}{c_{us}} = corr_i \quad \text{or} \quad c_{us\_corr\_i} = c_{us} \cdot corr_i. \tag{12}$$

Introducing this relationship in (10) yields

$$he_{us}\left(\bar{u} + log\lambda_i^{ev} c_{us} + logcorr_i + v(l_{us}) - \frac{1}{2}\sigma_{us}^2\right) = he_i\left(\bar{u} + logc_i + v(l_i) - \frac{1}{2}\sigma_i^2\right). \tag{13}$$

Using relationship (6) and solving for $log\lambda_i^{ev}$ gives

$$\begin{aligned} log\lambda_i^{ev} = \quad & \frac{e_i - e_{us}}{he_{us}}\left(\bar{u} + logc_i + v(l_i) - \frac{1}{2}\sigma_i^2\right) && \text{Life expectancy} \\ & - \frac{m_i - m_{us}}{he_{us}}\left(\bar{u} + logc_i + v(l_i) - \frac{1}{2}\sigma_i^2\right) && \text{Morbidity} \\ & + logc_i \ - logc_{us} && \text{Consumption} \\ & - logcorr_i && \text{Corruption} \end{aligned} \tag{14}$$

$$+ v(l_i) - v(l_{us}) \qquad \text{Leisure}$$
$$- \left(\frac{1}{2}\sigma_i^2 - \frac{1}{2}\sigma_{us}^2\right) \qquad \text{Inequality.}$$

This equation provides a decomposition of the effects that influence welfare in country i. The first two terms describe the influence of mortality and morbidity. It is the percentage difference in healthy life expectancy $\frac{he_i - he_{us}}{he_{us}}$ split up into the contribution of life expectancy and morbidity $\frac{he_i - he_{us}}{he_{us}} = \frac{(e_i - m_i) - (e_{us} - m_{us})}{he_{us}} = \frac{(e_i - e_{us}) - (m_i - m_{us})}{he_{us}}$ and weighted by the utility of a year of life in country i. Terms three, four, five and six represent the impact of consumption, corruption, leisure, and inequality.

The consumption-equivalent welfare that was derived above is an *equivalent* variation, that is, what proportion of consumption in the US would make Lucas equally well off living one year in the US instead of living one year in a different country. If the choice is for example between the US and Mozambique, then the latter will provide Lucas with a significantly lower flow utility, meaning that only a small proportion of his US consumption would make him equally well off living in both countries for one year. However, it is also possible to calculate the *compensating* variation, that is, by what proportion Lucas' consumption in Mozambique would need to be increased to also make him indifferent between both countries. In comparison to equation (9), the compensating variation would be captured by

$$V(he_{us}, c_{us}, l_{us}, \sigma_{us}) = V(he_i, c_i/\lambda_i^{cv}, l_i, \sigma_i). \tag{15}$$

This equation can be translated in the same fashion as before to

$$\begin{aligned} log\lambda_i^{cv} = \quad & \frac{e_i - e_{us}}{he_i}\left(\bar{u} + logc_{us} + v(l_{us}) - \frac{1}{2}\sigma_{us}^2\right) && \text{Life expectancy} \\ & - \frac{m_i - m_{us}}{he_i}\left(\bar{u} + logc_{us} + v(l_{us}) - \frac{1}{2}\sigma_{us}^2\right) && \text{Morbidity} \\ & + logc_i - logc_{us} && \text{Consumption} \\ & - \frac{he_{us}}{he_i} logcorr_i && \text{Corruption} \\ & + v(l_i) - v(l_{us}) && \text{Leisure} \\ & - \left(\frac{1}{2}\sigma_i^2 - \frac{1}{2}\sigma_{us}^2\right) && \text{Inequality.} \end{aligned} \tag{16}$$

Comparing (14) and (16), it is evident that the equivalent and compensating variation differ in two points. Firstly, life expectancy and morbidity are now weighted by flow utility in the US. This difference is important in particular for the poorest countries with low flow utility as well as low healthy life expectancy. Using the equivalent variation, the difference in healthy life expectancy impacts the overall welfare only to a minor degree since it is weighted by the low flow utility of the

poor country. In contrast, the compensating variation weights the difference in healthy life expectancy by the high flow utility of the US, thus the impact on overall welfare is significantly higher. Secondly, the necessary correction for the difference in corruption level is now multiplied by US healthy life expectancy relative to country i's healthy life expectancy. Returning to the previous example: Mozambique has a higher corruption level and a lower average healthy life expectancy. Due to the higher corruption level, the consumption level in Mozambique is compared to the augmented consumption in the US which takes into account the relatively lower US corruption level. Since Lucas would enjoy this augmented consumption for a higher number of years, a correction needs to be made in the compensating variation as calculated above.

With respect to the final welfare calculation, standard practice is adopted: Welfare, denoted as λ_i, will be measured taking the geometric average of the equivalent variation λ_i^{ev} and the compensating variation λ_i^{cv}. However, this point will be further elaborated upon in the robustness section.

For a comparison across countries it is also insightful to consider welfare relative to income. For this purpose, let $\tilde{y}_i \equiv y_i / y_{us}$ represent per capita GDP relative to the US. If the log of $\tilde{y}_i$ is subtracted from both sides of equation (14), this yields[23]

$$
\begin{aligned}
log\frac{\lambda_i^{ev}}{\tilde{y}_i} = \quad & \frac{e_i - e_{us}}{he_{us}}\left(\bar{u} + logc_i + v(l_i) - \frac{1}{2}\sigma_i^2\right) && \text{Life expectancy} \\
& - \frac{m_i - m_{us}}{he_{us}}\left(\bar{u} + logc_i + v(l_i) - \frac{1}{2}\sigma_i^2\right) && \text{Morbidity} \\
& + log\frac{c_i}{y_i} - log\frac{c_{us}}{y_{us}} && \text{Consumption} \qquad (17) \\
& - logcorr_i && \text{Corruption} \\
& + v(l_i) - v(l_{us}) && \text{Leisure} \\
& - \left(\frac{1}{2}\sigma_i^2 - \frac{1}{2}\sigma_{us}^2\right) && \text{Inequality.}
\end{aligned}
$$

As a result, the consumption term reflects consumption share in both countries. A higher consumption share in a country will thus lead to higher welfare relative to income, other things being equal.

3.3 Calculating Welfare Across Time

For this further development of the welfare model, it is assumed that Lucas does not face living standards in two different countries but instead living standards in one country but at two different points in time, for example as conducted below for the years 2000 and 2007. That is, Lucas lives in

[23] The same calculation can also be done with equation (16) for the compensating variation. For brevity it is omitted here.

the US in 2007 and the question is by how much his consumption in 2007 would need to be adjusted so as to make him indifferent between living in the US in 2000 and 2007 given the consumption level, leisure, life expectancy, health, corruption and inequality in both years.

To calculate welfare growth rates, the obtained $log\lambda_{us}$ must be divided by the number of periods, that is, $T = 2007 - 2000 = 7$. In general the growth rate g_i for country i is obtained by

$$g_i = -\frac{1}{T}\, log\lambda_i. \tag{18}$$

3.4 Calibration

Thus far it has not been specified the way in which individuals derive utility from leisure. It is standard practice in macroeconomics literature to assume that utility from leisure takes a form that implies a constant Frisch elasticity of labor supply, that is, given a constant marginal utility of consumption, the elasticity of hours worked to the wage rate is constant. Since labor supply is $1 - l$ in the underlying utility function specified above, the following utility function for leisure is derived:

$$v(l) = -\frac{\theta\epsilon}{1+\epsilon}(1-l)^{\frac{1+\epsilon}{\epsilon}}, \tag{19}$$

where θ denotes the utility weight on leisure and ϵ denotes the Frisch elasticity.

Regarding the Frisch elasticity, a commonly accepted value of ϵ has not yet been established. Chetty et al. (2011) suggest a value of 0.75 after reviewing evidence on both the intensive and extensive margins. Hall (2009a, 2009b) recommends a value of 1.9 based upon his model incorporating sticky wages. The Congressional Budget Office applies a value of 0.4 following an extensive literature survey (Reichling and Whalen 2012).[24] For the benchmark calculations below a Frisch elasticity of 1.0 is considered. However, a range of values are tested in the robustness check in Section 5.3.

The utility weight on leisure θ can be derived from the first-order condition for household utility maximization. Generally this is given by

$$\frac{u_l}{u_c} = w(1-\tau), \tag{20}$$

where τ denotes marginal tax rate on labor income and w denotes wage. Taking into account the above mentioned functional form specifications, this translates to

$$\theta = \frac{w(1-\tau)(1-l)^{-1/\epsilon}}{c}. \tag{21}$$

[24] All referenced values refer to the Frisch elasticity for the intensive and extensive margin combined.

According to Jones and Klenow (2010), empirics show that consumption and labor income in the US are both roughly 70% of GDP. Thus consumption is equated to labor income $c = (1 - l) \cdot w$. Combining this with equation (21) yields

$$\theta = w(1 - \tau)(1 - l)^{-\frac{1+\epsilon}{\epsilon}}. \quad (22)$$

Regarding the marginal tax rate for the US, Barro and Redlick (2011) estimate the overall marginal US tax rate for the greater part of the preceding 100 years. The value for the year closest to 2007, $\tau = 0.353$ for 2006, is adopted. Combining this with the leisure rate in the US, $l_{us} = 0.813$ for 2007, gives an applied value of $\theta = 18.576$.

The final parameter requiring calibration is the intercept of the flow utility $\bar{u}$. This parameter impacts the contribution of healthy life expectancy to the overall welfare measure. $\bar{u}$ is chosen such that a 40-year old individual in the US in the year 2007 has a value of remaining life equal to \$5 million (in \$2000).[25] The choice of \$5 million is within the range of values previously recommended or applied in the literature. Mrozek and Taylor (2002) conduct a meta-analysis of over 40 studies and conclude that the appropriate value lies in the range of \$1.6-\$2.6 million. Alternatively, Viscusi and Aldy (2003) suggest a range of \$ 5.5-\$7.6 million following a literature review covering an even greater scope. A more recent study by Kniesner et al. (2012) estimates based upon panel data that the appropriate value lies in the range of \$4-\$10 million. Jones and Klenow (2010) apply a value of \$4 million for their benchmark case in the year 2000. Given the finding of Hammitt, Liu and Liu (2000) that the value of life increases at a rate two to three times that of income, a value of around \$4.8 to \$5.2 million would be implied considering the average growth rate of 1.33% for US income between 2000 and 2007. Hence, adopting a value of \$5 is in accordance with the findings of previous literature. In the robustness check the consequence of adopting different values is analyzed. To calibrate $\bar{u}$ such that the remaining value of life equals \$5 million for a 40-year old in the US, the mortality data from the Human Mortality Database (2009) is used. Further, consumption is normalized to 1 in the year 2007 and the US value of leisure for 2007 is applied. This yields a value for $\bar{u}$ of 5.798.

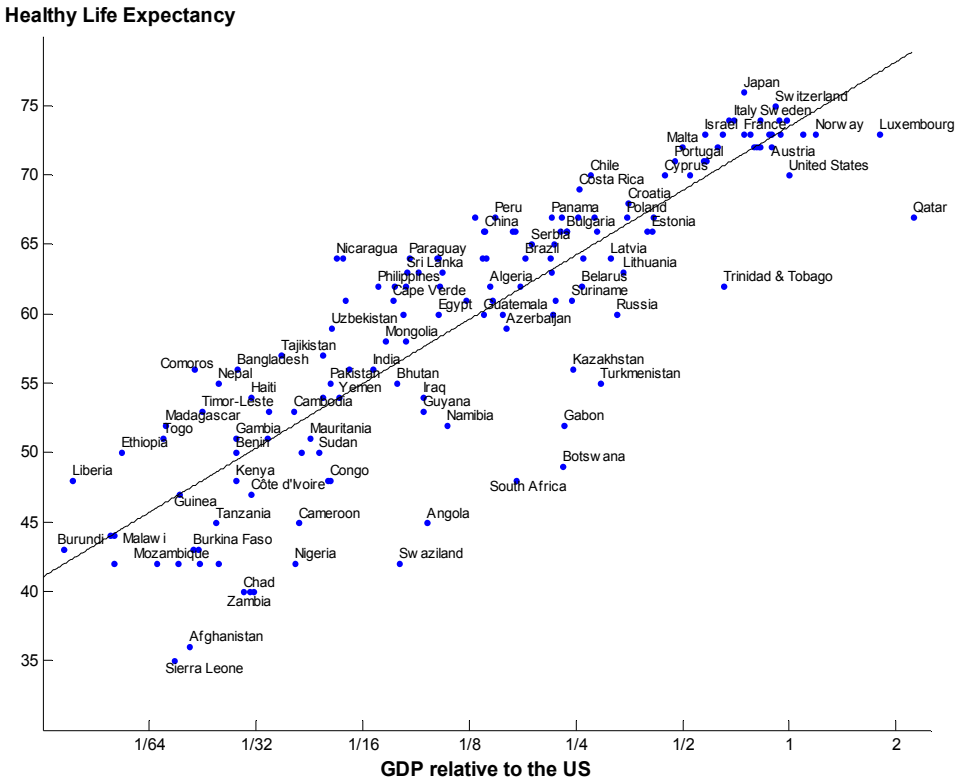
[25] \$2000 have been selected so as to allow comparison of this value to previous literature. Since the data used in this paper is in \$2005, the appropriate conversion has been conducted. All of the following values were reported by the authors in \$2000 excepting Mrozek and Taylor (2002), who state their results in \$1998; thus their values have been converted to \$2000 as well.

4 Data Sources

Life expectancy and healthy life expectancy:

The data for life expectancy for the years 2000 and 2007 is taken from the World Health Organization (WHO), accessed through the UN database (undata 2007a). The source for health-adjusted life expectancy (HALE) for the year 2007 is also the WHO, similarly accessed through the UN database (undata 2007b). For the year 2000, HALE is derived from the statistical annex of the WHO World Health Report 2001 (WHO 2001). Given the two different sources for HALE, the results below should be considered with caution, as some of the changes over the seven-year period appear rather extreme. Mathers et al. (2001) give a detailed overview on the methodology of calculating HALE. In summary, it is based upon the WHO data on mortality and the WHO Global Burden of Disease study, where the latter gives information for the incidence, prevalence and years lived with disability. HALE accounts for 135 major causes influencing health, such as: malnutrition, cancer, AIDS, malaria, depression, Alzheimer, alcohol or drug use disorder, migraines, road traffic accidents, violence and war. As such, it serves well to describe the general health status of a population and can also partially account for other factors that impact well-being.[26]

Figure 1: Healthy Life Expectancy



Note: This plot displays healthy life expectancy in 2007 for the 153 countries of the levels calculation. The line is derived from a regression of healthy life expectancy on income. Correlation between the two is 0.6651. Not all country names are displayed for better readability.

[26] For the summary statistics of the underlying data see Appendix A.

Income and consumption:

Income and consumption (in PPP) are taken from the Penn World Table (PWT) Version 7.1 (CIC 2012). Since government consumption varies significantly across countries – for example in Sweden education is predominantly provided by the government, whereas in the US it is mostly a private consumption – government consumption is added to private consumption for all countries following Jones and Klenow (2010).[27]

Leisure/Home production:

Regarding leisure, the method of measurement by Jones and Klenow (2010) is also adopted. Time spent in leisure or home production is calculated by the total time endowment minus the time spent in employment. Regarding employment, both the extensive margin (the percentage of the population employed) and the intensive margin (number of hours worked on average) are taken into account. For the extensive margin, two variables from the PWT 7.1 serve as a source: GDP per capita (in PPP) and GDP per worker (in PPP). Their division multiplied by total population gives the number of people engaged in market work, denoted as employment. So as to derive the employment ratio, employment is divided for each country by the total adult population, that is, the population aged 15 and older.[28] The data for the latter is taken from the World Bank database (World Bank 2007). For the intensive margin, a total time endowment of $16 \cdot 365 = 5840$ hours is assumed, that is, sleep is counted neither as work nor leisure. For 50 countries, the average number of hours worked is taken from the Conference Board's Total Economy Database (2011). For the remaining countries, a consistent source for annual hours worked does not exist. Therefore, the US average of 1703 hours for the years 2005-2009 is applied. In summary, leisure rate is calculated as follows:

$$l = 1 - \frac{average\ annual\ hours\ worked}{total\ time\ endowment\ (5840\ hours)} \cdot \frac{employment}{adult\ population}. \tag{23}$$

Inequality:

Regarding the measurement of inequality within countries, this paper faces a significant limitation: inequality is captured by income inequality rather than consumption inequality. The latter would be a more accurate measure for material living standards, as income inequality does not necessarily lead to the same level of consumption inequality (Krueger and Perri 2006). However, unfortunately a consistent source for consumption inequality on the macro level is not existent for the period considered in this paper. Thus, the assumption needs to be made that consumption inequality equals income inequality.

[27] For a graphical illustration of the consumption data as well as the leisure, inequality and corruption data see Appendix B.

[28] Thus, welfare is increased in countries where the population spends more time in higher education. This is due to the fact that students are not part of the working population, resulting in a higher leisure rate for the respective country.

Data for income inequality is taken from the World Bank database (World Bank 2012). It contains Gini indices from the late 1970s onwards at irregular intervals. For the countries in the sample, the closest value from the year 2007 is applied. However, it is worthy of note that for some states the latest entries precede even the year 1997. Eurostat (2011) provides a more complete data set on Gini indices with annual values for European countries. These are adopted as the World Bank source does not contain more recent data for many European states. In general, the values for countries covered by both sources for the same year are very similar. Thus, merging the two sources should not create any discrepancies.

In order to use the inequality data for the calculations, it is necessary to derive the standard deviation of consumption. Aitchison and Brown (1957, p.112) found the following relation between the Gini coefficient G and the standard deviation of log consumption σ:

$$G = 2\Phi\left(\frac{\sigma}{\sqrt{2}}\right) - 1, \tag{24}$$

where $\Phi(\cdot)$ denotes the cumulative distribution function of the standard normal distribution. This equation is solved for σ.

Corruption:

As stated in section 2.1, Welsch (2008) demonstrates that corruption affects well-being indirectly by lowering GDP and directly, amongst other ways, by demanding additional time efforts or causing psychological costs. Given that difference in income between countries is already accounted for, only the results of the direct costs of corruption are considered here. Welsch is able to derive the proportion of income a person would need to be compensated by for a change in the Corruption Perception Index (CPI)[29]

$$\frac{\delta y}{\delta CPI} = 0.322 \cdot \frac{y}{CPI}. \tag{25}$$

For the welfare calculations below, US income and CPI (in 2007) are applied[30]

$$\frac{\delta y_{us}}{\delta CPI_{us}} = 0.322 \cdot \frac{y_{us}}{CPI_{us}} \equiv ycomp. \tag{26}$$

[29] This relationship is derived from the author's results as follows:

$$0.322 = \left(\frac{0.039}{0.121}\right) = \frac{\partial logf \,/\, \partial logCPI}{\partial logf \,/\, \partial logy} = \frac{\partial logy}{\partial logCPI} = \frac{\partial y}{\partial CPI} \cdot \frac{CPI}{y},$$

where f depicts happiness and $\frac{\partial logf \,/\, \partial logCPI}{\partial logf \,/\, \partial logy}$ is the monetized marginal direct welfare effect of corruption (Welsch 2008, p.7,8 and 13). 0.322 is the absolute value of the parameter. The fact that CPI measures absence of corruption is taken into account in equation (28).

[30] In addition, a PPP adjustment was made, as Welsch derives his results using \$2000 whereas the data for income and consumption used in this paper is in \$2005. It also needs to be noted that Welsch obtains the abovementioned parameter with data from around the year 2000. In using his results for the year 2007, the assumption is made that preferences regarding corruption kept unchanged.

Next, this compensating proportion of income $ycomp$ is adjusted for consumption share

$$\frac{\delta c_{us}}{\delta CPI_{us}} = ycomp \cdot \frac{c_{us}}{y_{us}} \equiv comp, \tag{27}$$

where $comp$ – as previously specified in equation (11) – now denotes the proportion of consumption a person in the US needs to be compensated by for a change in CPI. Since CPI actually measures the absence of consumption, equation (11) translates to

$$c_{us\_corr\_i} = c_{us} + comp \cdot (CPI_{us} - CPI_i), \tag{28}$$

CPI values for the years 2000 and 2007 are taken directly from the Transparency International webpage (2012).

Contrary to the concise comparison across countries, the CPI faces limitations regarding its applicability for a comparison across time due to the methodology that was used to construct the index prior to 2013. This needs to be kept in mind when analyzing the welfare growth results in Section 5.2. However starting with data from 2013, this will not further impose a limitation to the here presented approach to calculate welfare growth.

5 Results and Discussion

5.1 Welfare Comparison Across Countries

Based on equation (17) and its compensating variation analogue, welfare was calculated for 153 countries for the year 2007. In the following, the main findings will be discussed with a special focus on welfare in selected regions as well as the influence of the various factors. Table 1 provides summary statistics, Table 2 gives an overview of welfare averages in different regions and Table 3 shows the results for selected countries.[31]

Table 1: Summary Statistics, Welfare 2007

	Welfare	p.c.	Log	Decomposition of Log Ratio					
STATISTIC	(λ)	Income	Ratio	Life Exp.	Morbidity	C/Y	Corruption	Leisure	Inequality
unweighted average	24.40	27.08	-0.921	-0.720	0.018	-0.022	-0.166	-0.020	-0.011
				67.3	7.8	0.828	4.0	0.81	39.8
weighted average	19.85	22.24	-0.866	-0.584	0.007	-0.109	-0.173	-0.023	0.014
				69.1	7.9	0.746	3.8	0.809	38.7
standard deviation	39.85	34.98	0.881	0.771	0.074	0.256	0.114	0.114	0.168
				10.8	1.1	0.2	2.1	0.032	9.6
median absolute deviation			0.879	0.503	0.061	0.126	0.200	0.074	0.108
correlation λ – p.c. GDP : 0.85									

Note: Welfare and per capita (p.c.) income are relative to the US, with the US being normalized to 100. The Log Ratio is the log of the ratio of λ to per capita GDP, and it is the sum of the last six terms (except for standard deviation and median absolute deviation). C/Y is consumption share. The decomposition is calculated based on equation (17) and its compensating variation analogue. The second line for the three first statistics displays the underlying data for life expectancy, years lost to morbidity, consumption share, CPI, leisure rate and Gini coefficient.

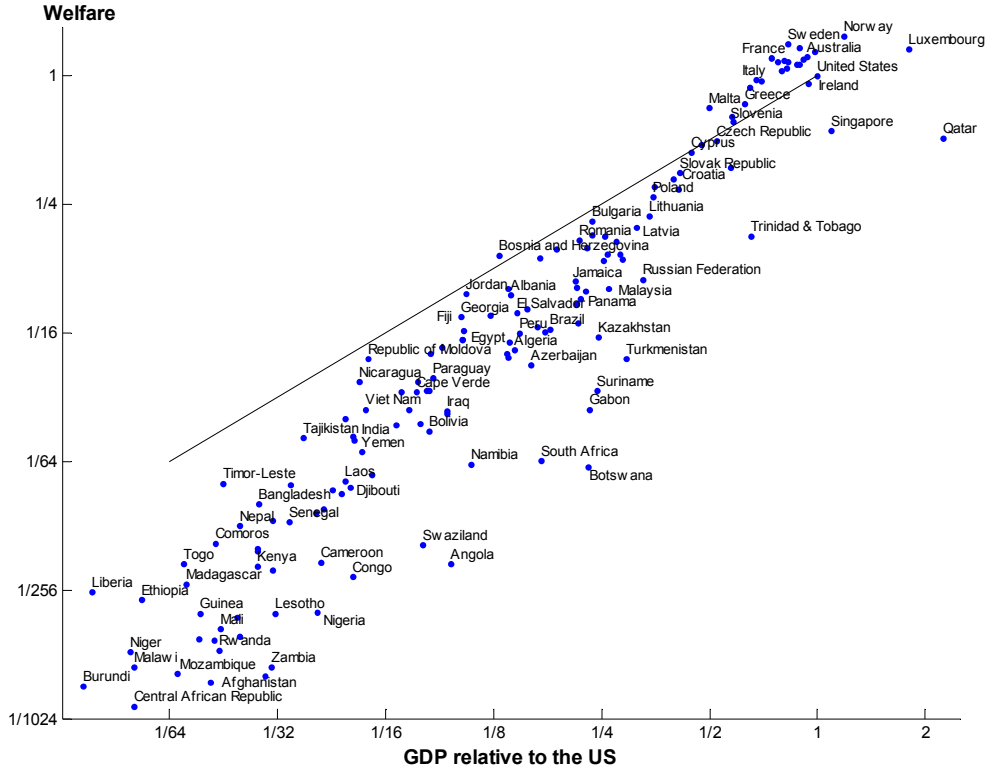
General findings

Looking at the complete sample, the population-weighted average reveals that income on a global level is about 22% of US income, whereas welfare is about 20% of the US level. Only 25 countries have a welfare to income ratio greater than one. This means that healthy life expectancy, corruption, consumption share and inequality lower welfare in the vast majority of the countries. The factor with the most impact among the ones just mentioned is life expectancy, which lowers welfare by almost 60 log points (in the remainder of the paper this will often be referred to as "percent") on a weighted average with a median absolute deviation of 50%. The second crucial factor is corruption with a negative average impact of 17% (median deviation 20%). Given that the US Gini Index almost resembles the average Gini Index of the sample, inequality has a negligible effect on average, but the median deviation of 10% demonstrates its importance. A similar median

[31] For the complete list of country results see Table 14 in Appendix E1.

deviation (13%) characterizes the impact of consumption share. Regarding the low average effect of morbidity and leisure, the results reflect the fact that the data is rather similar across the sample for these factors. However, for some countries they still play a crucial role. For example, the leisure rate increases welfare in Algeria by 18%, but lowers welfare in Singapore by 30%. Morbidity increases Danish welfare by 15% but lowers welfare in Iran and El Salvador by 20%. These significant differences in healthy life expectancy between highly developed countries such as the US and Denmark is in line with recent findings by the US Institute of Medicine (Woolf and Aron 2013).

Figure 2: Welfare and Income in 2007



Note: The line in this graph depicts unity, this is, welfare level equals income level.

The correlation of GDP per capita and the welfare measure applied in this paper is 0.85. Thus, per capita income can serve as a decent welfare indicator on average. Nevertheless, when analyzing individual countries the differences between income and welfare are often substantial: the sample shows a median absolute deviation of 88%. In addition, Figure 2 and 3 give a good indication of a general pattern: whereas some rich countries reach a higher welfare than income rate, it is mostly countries with low income for which the additional factors significantly lower welfare. Thus, welfare differs more across the sample (standard deviation of 39.85%) than income (standard deviation of 34.98%).

Figure 3: Ratio of Welfare to Income, 2007

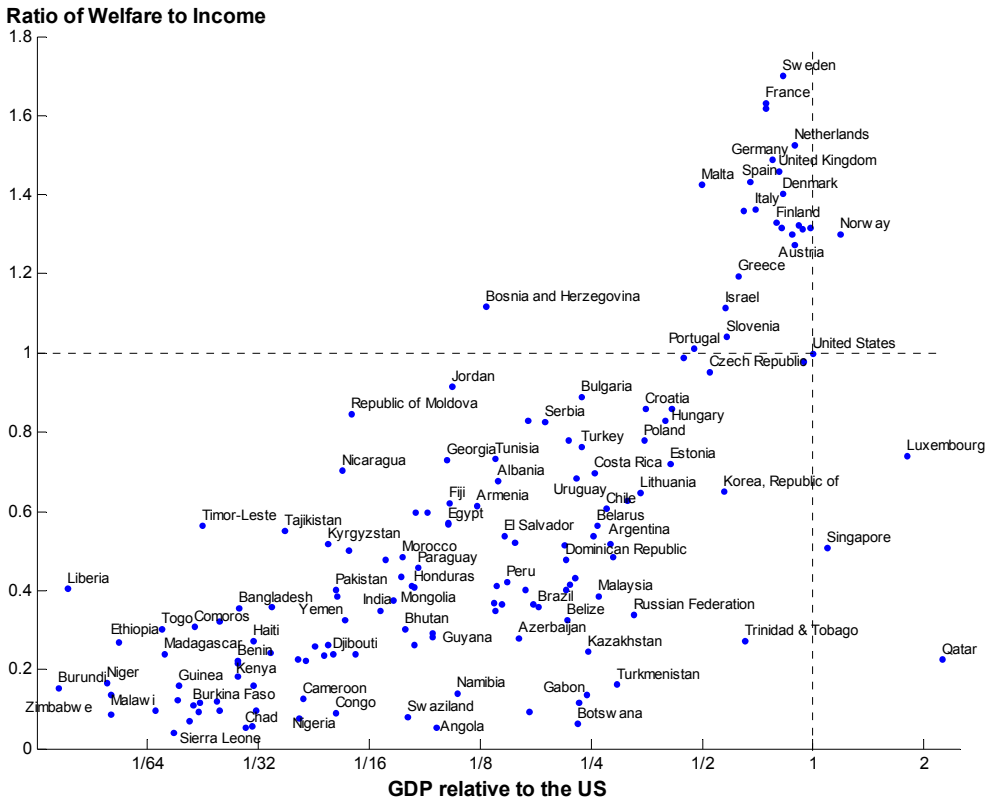
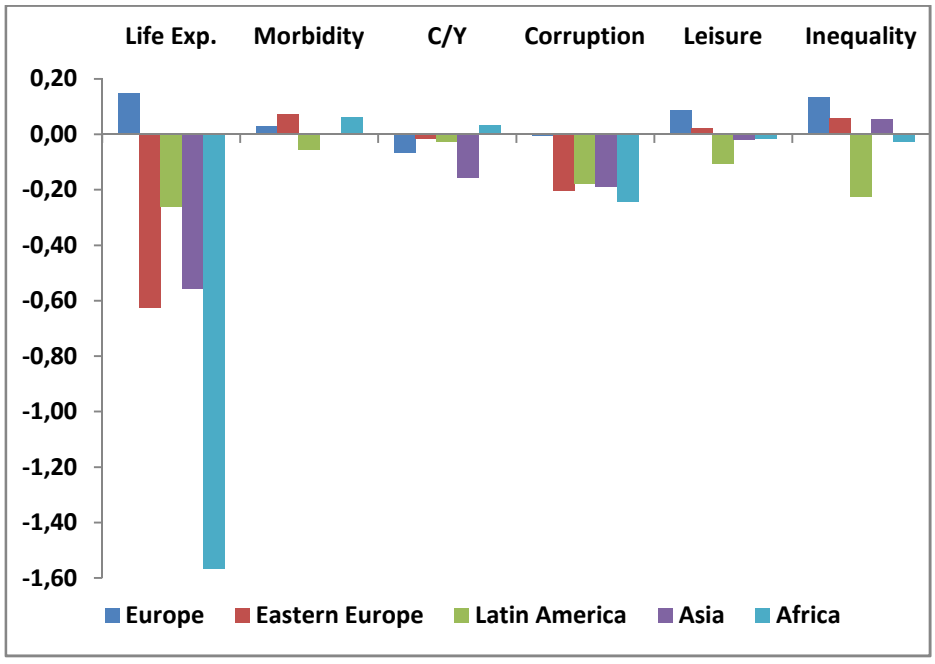


Figure 4 provides a first insight into the importance of various factors for major regions. This will be further analyzed below.

Figure 4: Welfare Determinants in Major Regions, 2007[32]



Note: The vertical axis measures the difference in welfare (in %) caused by the various factors.

[32] For more detailed graphical illustrations of the 2007 Welfare Results, see Appendix D.1.

Western Europe is the region with the highest living standard

Welfare in Western Europe is on average about 20% higher than US welfare even though per capita income in these countries is only around 79% of the US value. Thus, for the group of Western European countries, there exists a positive difference of 42 % between welfare and income. As can be seen in Table 2, this difference is mainly due to higher life expectancy, lower inequality and higher leisure rate, which account for 17, 15 and 12 percentage points respectively. Lower morbidity contributes 4 and lower corruption 3 percentage points. The lower consumption share in Western Europe, which reduces welfare by 10 percentage points, is far outweighed by the other factors.

In fact, all seven countries of the region attain a higher welfare level than the US: The Netherlands 136%, Luxembourg 133%, France 121%, Switzerland 120%, Germany 116%, Austria 114% and Belgium 108%. Luxembourg, with an 80% higher income per capita than the US, reaches a welfare level that is around 30% below its income level due to a significantly smaller consumption share and also a lower leisure rate. Still it ranks as the country with the fourth highest welfare in the data set. France, Netherlands and Germany are among the five countries with the highest welfare to income ratio. This means that a traditional welfare measure based on GDP would – among others in these countries – most underestimate actual well-being.

Table 2: Results for Selected Regions, Welfare 2007

	Welfare	p.c.	Log	Decomposition of Log Ratio					
REGION	(λ)	Income	Ratio	Life Exp.	Morbidity	C/Y	Corrupt.	Leisure	Inequality
Western Europe	119.83	79.01	0.416	0.174	0.041	-0.104	0.028	0.124	0.154
Northern Europe	109.19	80.03	0.311	0.098	0.025	-0.030	0.057	0.029	0.132
USA	100.00	100.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Southern Europe	74.84	59.41	0.231	0.150	0.022	-0.045	-0.081	0.074	0.110
Eastern Europe	14.87	29.55	-0.687	-0.624	0.074	-0.016	-0.201	0.021	0.059
Central America	12.23	24.22	-0.683	-0.197	-0.072	0.008	-0.178	-0.094	-0.151
Western Asia	10.27	18.37	-0.582	-0.528	-0.013	-0.034	-0.190	0.123	0.059
Eastern Asia	9.55	20.36	-0.757	-0.190	0.005	-0.309	-0.156	-0.111	0.003
South America	7.47	18.55	-0.910	-0.258	-0.051	-0.055	-0.177	-0.112	-0.257
South-East Asia	4.33	10.21	-0.857	-0.532	-0.010	-0.082	-0.217	-0.057	0.041
Northern Africa	4.26	9.53	-0.806	-0.694	-0.032	-0.085	-0.215	0.136	0.085
Central Asia	4.11	11.83	-1.057	-0.788	-0.053	-0.030	-0.259	-0.011	0.084
South Asia	2.37	6.71	-1.042	-0.909	-0.007	-0.073	-0.207	0.051	0.103
Southern Africa	1.55	16.25	-2.352	-1.797	0.146	-0.020	-0.129	0.078	-0.629
Central Africa	0.47	5.54	-2.472	-1.956	0.076	-0.141	-0.287	-0.072	-0.092
Western Africa	0.39	3.36	-2.144	-1.900	0.072	-0.004	-0.273	0.021	-0.059
Eastern Africa	0.30	1.89	-1.829	-1.641	0.095	0.173	-0.258	-0.205	0.008

Note: See description of Table 1. Regional averages are population-weighted. The regional classification follows the UN geoscheme. See Appendix C for an overview of countries and their allocation to the various regions.

The countries with the highest welfare are situated in Northern Europe

In the analyzed sample, Norway is the country with the highest welfare with 154% of the US level. Its high income level – 119% of US income – is complemented by high life expectancy and low inequality in society along with lower corruption and additional leisure time in comparison to the US. These four factors account for a 26% higher welfare than income level despite a relatively low consumption rate. In general, a similar pattern can be found in Sweden, the country with the second highest welfare. Yet, Sweden is particularly interesting as it is the country with the highest welfare to income ratio. Based on an income of 83% of the US level, the inclusion of the six factors in the welfare model lifts Sweden to 141% of US welfare. This discrepancy is due to the fact that Sweden is the country with the lowest inequality in the sample and among the countries with the highest healthy life expectancy as well as the lowest corruption level.

The relatively lower overall welfare of Northern Europe – 9% above the US level – is caused by the Baltic States: Estonia, Latvia and Lithuania. In addition to low per capita GDP – on average 35% of the US level – welfare in the Baltic States is further decreased by low life expectancy and corruption, resulting in 24% of the US welfare level.

Low life expectancy and corruption significantly lower well-being in Eastern Europe

In Table 2, Eastern Europe is the first region with a negative welfare to income ratio, that is, on average the welfare level is 69% below the income level in the corresponding countries relative to the US. This difference can be vastly attributed to the lower life expectancy in Eastern Europe. However, another important factor is the prevailing corruption in this region, which decreases welfare by around 20 percentage points. A notable observation is the fact that in all Eastern European countries belonging to the European Union (EU) – namely Czech Republic, Slovak Republic, Hungary, Poland, Bulgaria and Romania – the negative difference between welfare and income is below 50%, whereas in countries not belonging to the EU (Belarus, Russia, Ukraine and Moldova) the difference exceeds 50%.

Inequality within societies is a crucial factor for welfare in Latin America

For the group of Latin American countries, GDP per capita is on average only one fifth of the US value. Yet, welfare is even lower at 9% of the US level. The causes for these relatively lower living standards are similar to Eastern Europe: Corruption and – though to a much lesser extent than in Eastern Europe – life expectancy. However in contrast to Eastern Europe, this is accompanied by a generally high inequality within the countries: unequal distribution of income lowers welfare on average by 22%. Within Latin America inequality is strongest in South America. Colombia, Bolivia, Brazil and Ecuador all see their welfare lowered by more than 25% with Colombia almost reaching 40%. In addition to life expectancy, corruption and inequality, it is also the leisure rate that

Table 3: Results for Selected Countries, Welfare 2007

	Welfare	p.c.	Log	Decomposition of Log Ratio					
COUNTRY	(λ)	Income	Ratio	Life Exp.	Morbidity	C/Y	Corruption	Leisure	Inequality
Norway	154.15	118.56	0.262	0.221	0.000	-0.316	0.076	0.085	0.196
				81	8	0.599	8.7	0.84	23.7
Sweden	140.55	82.59	0.532	0.215	0.072	-0.106	0.107	0.045	0.199
				81	7	0.738	9.3	0.827	23.4
Luxembourg	133.15	179.56	-0.299	0.145	0.073	-0.559	0.060	-0.183	0.164
				80	7	0.47	8.4	0.766	27.4
Japan	120.77	74.54	0.483	0.347	0.069	-0.145	0.014	0.010	0.187
				83	7	0.71	7.5	0.816	24.9
Germany	115.75	77.63	0.399	0.144	0.072	-0.117	0.030	0.136	0.135
				80	7	0.73	7.8	0.858	30.4
Finland	105.25	79.14	0.285	0.072	0.072	-0.178	0.114	0.030	0.175
				79	7	0.687	9.4	0.822	26.2
United States	100.00	100.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				78	8	0.821	7.2	0.813	40.8
Spain	96.37	67.26	0.360	0.210	0.070	-0.091	-0.024	0.070	0.125
				81	7	0.75	6.7	0.835	31.3
Singapore	55.54	108.86	-0.673	0.199	0.000	-0.655	0.108	-0.298	-0.027
				81	8	0.427	9.3	0.741	42.5
South Korea	37.14	57.01	-0.428	0.067	0.000	-0.306	-0.099	-0.212	0.122
				79	8	0.605	5.1	0.76	31.6
Chile	16.76	27.53	-0.496	0.000	0.000	-0.198	-0.010	-0.080	-0.208
				78	8	0.674	7	0.791	51.8
Russia	11.07	32.48	-1.076	-0.856	0.143	-0.101	-0.237	0.022	-0.047
				66	6	0.742	2.3	0.82	43.7
Tunisia	10.08	13.74	-0.310	-0.251	0.000	-0.058	-0.143	0.152	-0.009
				74	8	0.775	4.2	0.864	41.4
Iran	9.09	21.89	-0.879	-0.411	-0.205	-0.237	-0.226	0.163	0.037
				72	11	0.648	2.5	0.869	38.3
Brazil	6.50	17.99	-1.018	-0.310	-0.062	-0.038	-0.177	-0.125	-0.306
				73	9	0.79	3.5	0.78	55.9
China	5.70	13.77	-0.882	-0.235	0.000	-0.327	-0.174	-0.119	-0.027
				74	8	0.592	3.5	0.782	42.5
India	2.33	6.68	-1.055	-0.900	0.000	-0.117	-0.190	0.052	0.101
				64	8	0.73	3.5	0.829	33.4
South Africa	1.58	16.97	-2.371	-1.775	0.148	-0.037	-0.122	0.093	-0.677
				54	6	0.791	5.1	0.842	67.4
Ghana	0.94	4.20	-1.501	-1.395	0.066	0.106	-0.193	-0.054	-0.032
				57	7	0.913	3.7	0.798	42.8
Afghanistan	0.14	2.02	-2.638	-3.085	0.171	0.329	-0.351	0.136	0.161
				42	6	1.141	1.8	0.858	27.8
Zimbabwe	0.06	0.73	-2.562	-2.219	0.134	0.273	-0.316	-0.265	-0.170
				45	6	1.078	2.1	0.748	50.1

Note: See description of Table 1.

significantly lowers well-being in some countries. Most notably, this can be observed in Peru. With a leisure rate of 0.76 compared to 0.81 in the US, welfare is reduced by 21%. Other countries in the region with a relatively low leisure rate include Mexico, Brazil, Colombia and Venezuela; around 12% is the negative difference in these countries due to more time spent at work. In general, the lowest

welfare in the region can be found in Haiti (1% of US level); highest welfare is prevalent in Costa Rica and Trinidad and Tobago (18% of US level).

Different patterns to be observed in Asia

Average income in Asia is at 13%, welfare at 5% of the US level. However there exist significant differences within the region. This can already be observed when comparing the different sub-regions. Well-being in Western and Eastern Asia is at around 10%, in South-East, Central and South Asia only between 2% and 4% of the US level. Yet, differences are even more prominent when analyzing on a country level. Japan is the country with by far the highest living standards in Asia – with 121% even considerably above US living standards because of higher life expectancy and lower inequality. On the other end, it is Afghanistan with the lowest welfare. Its 0.1% of US welfare is, in addition to low GDP per capita, vastly due to an extremely low healthy life expectancy: 36 years, the second lowest value in the sample.

In general, several "welfare patterns" can be found in Asia. One of these is a combination of relatively low consumption share and low leisure rate. Qatar is the most striking example for this pattern. Its per capita income is the highest in the sample: 224% of the US level. Yet, with a consumption share of only 0.31 (compared to 0.82 in the US) and a leisure rate of 0.76 (0.81 in the US), welfare is reduced to 51% of US welfare. The same pattern can be seen in Singapore and South Korea. Regarding the former: A consumption share of 0.43 and a leisure rate of 0.74 result in a welfare of 56% in Singapore – in contrast to an income of 109% of the US level. Even though a high investment rate along with a high number of hours worked can cause higher GDP levels in the future, it is thus important to note that less consumption and leisure time lower current welfare.[33] For China, a welfare level of 6% was calculated; the per capita income of 14% is reduced by 88 log points. Decisive factors are – in line with aforementioned countries – low consumption and leisure rate. However in China, this is also accompanied by a relatively low average life expectancy.

Numerous countries in Asia also exhibit a similar pattern as Eastern Europe: Low life expectancy and a high corruption level. This applies, among many others, to Iraq, Armenia, Georgia, Kazakhstan, Syria, Indonesia, Mongolia, Pakistan and Bangladesh.

Tremendous difference between income and welfare in Africa

Africa is not only the region with the lowest welfare in the sample – less than 1% of the US level, but at the same time it is also the region with the biggest negative difference between income and welfare with 176 log points. Thus, Africa is substantially poorer than GDP levels suggest. The main factor, which is responsible for this immense difference, is short life expectancy: on average only 55

[33] Further implications of a high investment rate are discussed in Section 5.3.

years compared to 78 years in the US. To some degree, this depicts the tremendous effect of the AIDS epidemic on the continent (Fortson 2011).
The second major aspect explaining the lower welfare than income ratio is corruption, based on the average Corruption Perception Index of 2.75 for Africa compared to 7.20 in the US.

On a sub-regional level it can be observed that living standards are substantially higher for Northern Africa compared to Sub-Saharan Africa (comprised by Central, Western, Eastern and Southern Africa). This is not only due to higher income but also the relatively higher average life expectancy of 67 years, which is similar to Central and South-East Asia as well as Eastern Europe. In addition, Northern Africans enjoy a high leisure rate – on the sub-regional level the highest in the sample with 0.85. Of the Sub-Saharan regions, well-being is similarly low in all four regions with the small exception of Southern Africa, where income is significantly higher than in the other three sub-regions.

Looking at different countries, several exhibit interesting results. Despite the fact that income is considerably higher in other countries, Tunisia has the highest living standards in Africa caused by comparatively high life expectancy and leisure rate combined with low inequality. On the other end of the spectrum, it is Zimbabwe with the lowest welfare of all countries in the sample due to low income, low life-expectancy, low leisure rate and high corruption. The three African countries Gabon, Botswana and South Africa are economically the most developed countries of the continent with an income of around 20% of US income. Due to the large prevalence of AIDS, however, life expectancy is rather low with only around 57 years. In addition to this, corruption is pervasive and in Botswana and South Africa, the distribution of income is extremely unequal. As a result, welfare in all three countries is only around 2% of the US level.

5.2 Welfare Comparison Across Time

For a set of 87 countries, the welfare development over seven years, from 2000 until 2007, was calculated based on equation (18). This means that instead of analyzing Lucas' expected utility of spending one year either in the US or another country, it is now looked at his expected utility from living in the same country either in 2000 or in 2007. Given the unavailability of data for inequality, this factor could not be included. In addition, it needs to be reminded that the data for healthy life expectancy is taken from two different sources. Therefore, the morbidity results should be taken with caution and rather be considered as an indication of the direction of change. An improvement of the data availability for morbidity could solve this problem in the future. In cases where the morbidity changes are rather extreme, they also significantly affect the overall welfare growth. These extreme cases will not be analyzed in detail below. Given this shortcoming of the data, the

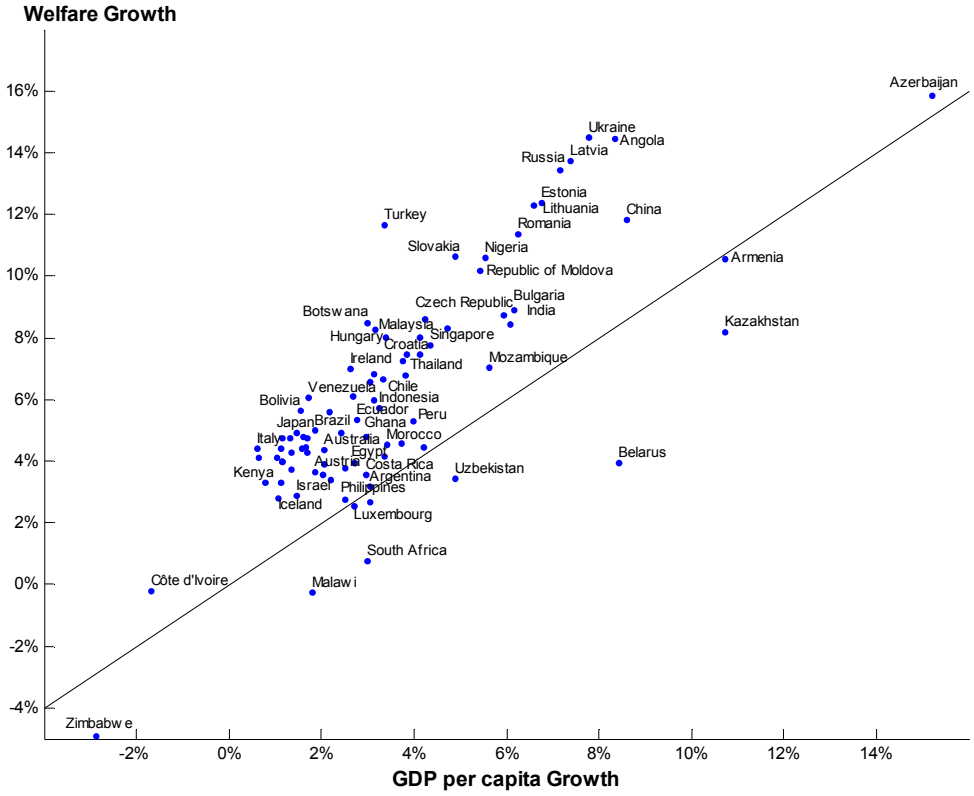
discussion below will thus not be as thorough as it was undertaken for the welfare comparison across countries. Table 4 provides summary statistics, while Table 5 displays results for different regions and Table 6 for selected countries. [34]

Table 4: Summary Statistics, Average Annual Welfare Growth 2000-2007

	Welfare	Income		---------- Decomposition of Difference ----------				
STATISTIC	Growth (λ)	Growth	Difference	Life Exp.	Morbidity	C/Y	Corruption	Leisure
unweighted average	6.14	3.49	2.65	1.457	1.186	-0.032	-0.065	0.102
				68.7; 70.5	9.2; 7.7	0.782; 0.78	4.76; 4.81	0.807; 0.809
weighted average	7.96	4.97	2.99	1.638	0.979	-0.283	0.397	0.264
				67.7; 70	9.1; 7.9	0.744; 0.73	3.7; 4.0	0.802; 0.807
standard deviation	3.56	2.72	2.19	1.158	1.163	1.055	1.173	0.455
				10.5; 10.5	1.5; 1	0.129; 0.134	2.4; 2.4	0.03; 0.032
median absolute deviation			2.88	1.749	0.951	0.493	0.491	0.184
correlation Welfare Growth (λ) – Income Growth (p.c. GDP) : 0.79								

Note: The decomposition relates to the "Difference", that is, the difference between welfare growth rates and income growth rates (column one and two).

Figure 5: Average Annual Welfare and Income Growth Rates, 2000-2007



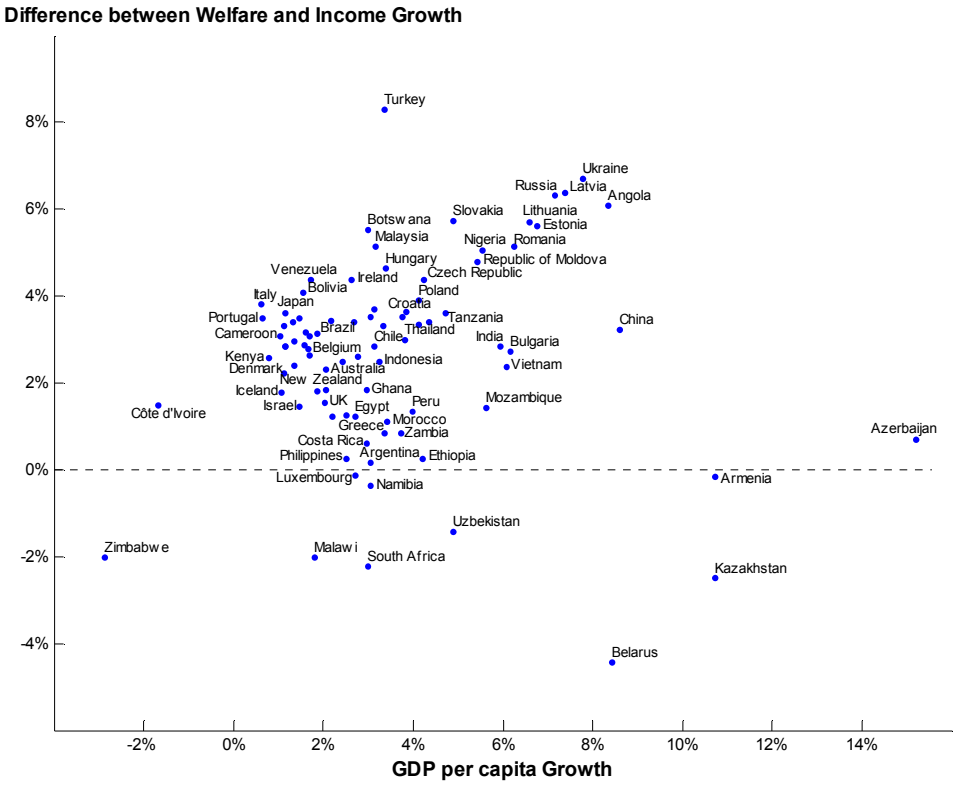
Note: The line in this graph depicts unity, this is, welfare growth rate equals income growth rate.

[34] For the complete list of country results see Table 15 in Appendix E2.

General findings

Overall, the addition of the five factors reveals a higher average annual welfare growth for the included countries than income growth. Figure 5 and 6 illustrate this relation. Whereas the income growth rate is around 5% on weighted average, welfare growth rate is almost 3% higher. The rise in life expectancy from 68 years to 70 years in the sample raises welfare for these countries by a weighted average of 1.6 % annually. In addition, lower corruption levels as well as additional leisure time causes a growth of welfare of 0.4% and 0.3% on average during the seven-year period. Another positive impulse can be ascribed to a lower level of morbidity. The single factor decreasing welfare in the observed period is consumption share, responsible for a negative growth rate of 0.3% on weighted average. Correlation of welfare and income growth rates is 0.79, but the median average deviation is considerably high with 2.9%.

Figure 6: Difference between Average Annual Welfare and Income Growth, 2000-2007



Comparing various regions[35]

Increases in life expectancy were especially crucial for Asia, Latin America and Europe.[36] In these regions a welfare growth rate of around 2% can be attributed to citizens living more years than before. With respect to corruption, effects differ across regions. Asia and Eastern Europe benefitted substantially from lowering their corruption levels. On average, countries of these regions saw their welfare rise by more than 0.6% annually due to a less corrupt environment. On the other hand,

[35] A more general classification of regions was chosen for the following analysis given the smaller sample size.
[36] In this section "Europe" refers to Western, Northern and Southern Europe, but not Eastern Europe.

countries of both Latin and North America experienced an aggravation of corruption over the seven-year period, which translates for them into a negative welfare growth rate of 0.4%.

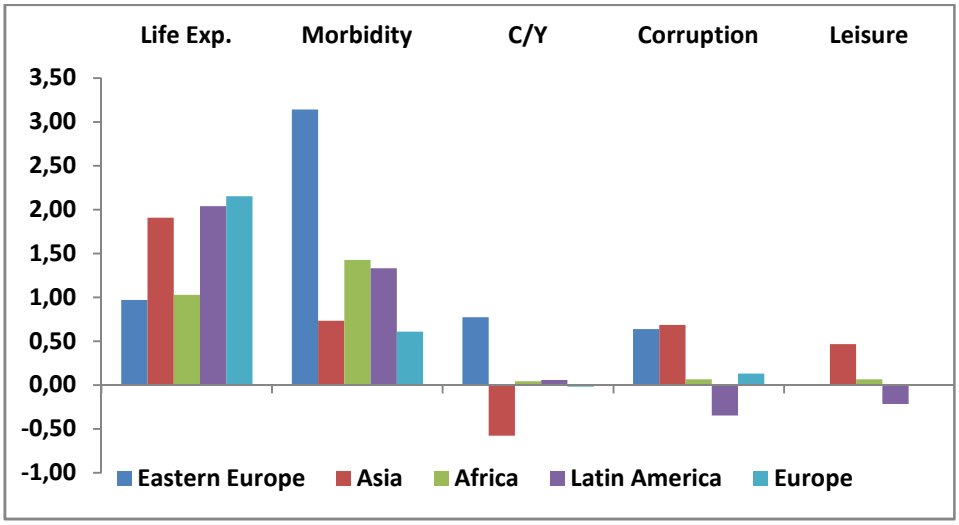
In addition to longer life expectancy and lower rates of corruption, Asian countries also profited from a higher leisure rate, contributing another 0.5% to the average annual welfare growth rate. The positive impacts of life expectancy, morbidity, corruption and leisure rate for Asia are partially offset by a lower consumption share, decreasing welfare growth by 0.6%. Still, welfare growth in this region averaged more than 8% annually between 2000 and 2007 – about 3% higher than the income growth rate. Regarding consumption share, the other regions apart from Asia predominantly benefitted from changes in this factor (with the exception of Europe where consumption share stayed almost exactly the same). The highest impact of a rising consumption share was experienced by Eastern European countries, where the welfare growth rate is augmented by almost 0.8%.

Table 5: Results for Selected Regions, Annual Average Welfare Growth 2000-2007

	Welfare	Income		---------- Decomposition of Difference ----------				
REGION	Growth (λ)	Growth	Difference	Life Exp.	Morbidity	C/Y	Corruption	Leisure
Eastern Europe	11.81	6.28	5.54	0.971	3.142	0.776	0.638	0.008
Asia	8.12	4.90	3.22	1.908	0.733	-0.576	0.686	0.468
Africa	5.53	2.89	2.63	1.029	1.425	0.045	0.067	0.065
Latin America	4.80	1.93	2.87	2.039	1.333	0.058	-0.346	-0.217
Europe	4.35	1.47	2.88	2.154	0.608	-0.017	0.132	0.007
North America	4,34	1,36	2,98	1,221	1,535	0,433	-0,418	0,207
Oceania	4.31	2.06	2.25	2.009	-0.169	0.251	0.146	0.015

Note: See description of Table 4. Regional averages are population-weighted. See Appendix C for information regarding which countries of the sample form part of regional averages.

Figure 7: Determinants for Welfare Growth in Major Regions, 2000-2007[37]



Note: The vertical axis measures the difference in welfare growth (in %) caused by the various factors.

[37] For more detailed graphical illustrations of the 2000-2007 Welfare Growth Results, see Appendix D.2.

Results for selected countries

In the sample, the highest welfare gain between 2000 and 2007 is obtained by Azerbaijan. Even though its annual 15.9% of welfare growth is similar to the growth rate for income (15.2%), the decomposition of the former still provides some interesting insights: The rise of per capita GDP during these seven years was accompanied by a significant drop of the consumption share. By itself, this would have substantially lowered the overall increase in welfare. However, it was offset by the other four factors: during the period of rapid economic growth, Azerbaijan also experienced important improvements with respect to life expectancy, morbidity, corruption as well as leisure. Thus, welfare grew even more than income.

One of the countries with the greatest positive difference between the evolution of welfare and income (6.1%) is Angola. In addition to the rise in GDP per capita, this African country also saw notable positive changes with respect to the other five factors, especially life expectancy. With the exception of consumption share, a similar argument can be made for the two major Asian economies, China and India.

Yet, there are countries where well-being rose less than income. An example is Kazakhstan: a higher corruption level and a decline in consumption share both reduce welfare by about 2% annually. This is partially balanced by more leisure time and higher life expectancy as well as a lower level of morbidity. Nevertheless, welfare growth for Kazakhstan is significantly lower than income growth with a negative difference of 2.5%.

European countries, such as Norway, Italy, France, Belgium, Germany or Denmark, obtained a GDP per capita growth of just around 0.6-1.6% at the beginning of the century. However, in line with the general finding, higher life expectancy boosts welfare growth by 2.0-3.0% for these six nations.

Even though most African countries in the sample also experienced higher growth of welfare than income, there are some notable exceptions, namely Namibia, South Africa, Malawi and Zimbabwe. In the case of South Africa, a major drop in life expectancy decreases welfare by more than 4% annually. For the other three countries, the reduction is mainly caused by higher levels of corruption and reduced leisure time.

Table 6: Results for Selected Countries, Average Annual Welfare Growth 2000-2007

	Welfare	Income		---------- Decomposition of Difference ----------				
COUNTRY	Growth (λ)	Growth	Difference	Life Exp.	Morbidity	C/Y	Corruption	Leisure
Azerbaijan	15.88	15.18	0.70	2.899 64; 68	0.630 9.9; 9	-4.419 0.746; 0.548	1.393 1.5; 2.1	0.197 0.811; 0.814
Angola	14.45	8.34	6.10	3.239 49; 53	1.137 9.4; 8	0.148 0.559; 0.564	1.119 1.7; 2.2	0.462 0.789; 0.797
China	11.84	8.61	3.24	1.836 71; 74	0.502 8.8; 8	-0.265 0.603; 0.592	0.574 3.1; 3.5	0.590 0.772; 0.782
Romania	11.39	6.24	5.15	1.696 71; 73	0.095 8.1; 8	1.363 0.839; 0.923	1.067 2.9; 3.7	0.925 0.803; 0.821
Bulgaria	8.90	6.17	2.73	0.882 72; 73	0.645 7.7; 7	0.619 0.883; 0.922	0.730 3.5; 4.1	-0.142 0.852; 0.848
India	8.76	5.92	2.84	2.023 61; 64	0.867 9.3; 8	-1.323 0.801; 0.73	0.989 2.8; 3.5	0.284 0.823; 0.829
Botswana	8.50	2.98	5.52	4.908 51; 56	0.182 7.2; 7	0.994 0.44; 0.472	-0.581 6; 5.4	0.021 0.778; 0.778
Kazakhstan	8.21	10.71	-2.49	0.908 63; 64	0.826 8.9; 8	-2.022 0.773; 0.671	-2.383 3; 2.1	0.179 0.792; 0.796
South Korea	7.45	4.11	3.35	2.647 76; 79	0.344 8.4; 8	-0.478 0.625; 0.605	1.064 4; 5.1	-0.230 0.764; 0.76
Indonesia	5.75	3.24	2.51	1.324 66; 68	-0.014 8; 8	-0.164 0.764; 0.755	1.277 1.7; 2.3	0.092 0.802; 0.803
Norway	4.79	1.61	3.18	2.109 79; 81	0.022 8; 8	1.194 0.551; 0.599	-0.237 9.1; 8.7	0.092 0.838; 0.84
Japan	4.77	1.14	3.63	1.903 81; 83	0.316 7.3; 7	0.118 0.704; 0.71	0.732 6.4; 7.5	0.563 0.805; 0.816
Ethiopia	4.47	4.21	0.26	1.167 53; 57	0.387 8.3; 7	0.742 0.979; 1.031	-1.818 3.2; 2.4	-0.220 0.757; 0.754
Italy	4.44	0.62	3.82	3.009 79; 82	0.000 8; 8	0.127 0.734; 0.74	0.579 4.6; 5.2	0.107 0.846; 0.849
Australia	4.39	2.06	2.33	2.019 80; 82	-0.132 7.9; 8	0.226 0.702; 0.713	0.178 8.3; 8.6	0.037 0.807; 0.808
Germany	4.00	1.15	2.85	2.086 78; 80	1.082 8; 7	-0.532 0.758; 0.73	0.131 7.6; 7.8	0.087 0.856; 0.858
Mexico	4.00	1.14	2.86	1.733 74; 76	0.345 9.4; 9	0.640 0.762; 0.797	0.290 3.3; 3.5	-0.146 0.782; 0.779
Sweden	3.77	2.51	1.26	1.013 80; 81	1.237 8.2; 7	-0.818 0.782; 0.738	-0.055 9.4; 9.3	-0.116 0.829; 0.827
Namibia	2.68	3.05	-0.37	1.749 57; 59	0.117 7.1; 7	-0.476 0.786; 0.76	-1.063 5.4; 4.5	-0.698 0.832; 0.817
South Africa	0.77	2.99	-2.22	-4.231 58; 54	1.694 7.6; 6	0.337 0.772; 0.791	0.100 5; 5.1	-0.118 0.845; 0.842
Côte d'Ivoire	-0.17	-1.68	1.50	0.620 53; 54	0.853 8.4; 7	1.476 0.767; 0.851	-1.544 2.7; 2.1	0.099 0.804; 0.806
Malawi	-0.22	1.81	-2.02	0.961 47; 50	0.182 6.6; 6	0.236 0.92; 0.935	-2.938 4.1; 2.7	-0.463 0.765; 0.758
Zimbabwe	-4.90	-2.88	-2.02	0.248 44; 45	0.207 6.8; 6	1.625 0.962; 1.078	-2.383 3; 2.1	-1.714 0.775; 0.748

Note: See description for Table 4.

5.3 Robustness

As depicted in the model description, the results presented above are derived from taking the geometric average of the equivalent variation λ_i^{ev} and the compensating variation λ_i^{cv}. In addition, the results depend on a number of parameter choices for the utility function as outlined in the calibration section. In the following, the effects of applying the two types of variations as well as choosing different parameter values will be analyzed. For this purpose, Table 7 provides summary statistics for alternative model specifications for both levels and growth rates calculations. Table 8 presents detailed robustness results of welfare levels in 2007 for two countries, Sweden and Ecuador. This specific choice of countries was made in order to illustrate the effects of alternative specifications on both a rather rich and a rather poor country. Similarly, Table 9 displays for these two countries the alternative growth rates results.

Table 7: Summary Statistics, Robustness Check

	------ median absolute deviation ------		# of Countries
ROBUSTNESS CHECK	Levels 2007	Growth 2000-2007	with Negative Flow Utility
Benchmark Case	58.93	2.88	0
Equivalent Variation	44.90	2.79	0
Compensating Variation	64.79	3.04	0
Frisch Elasticity = 0.4	59.32	2.96	0
Frisch Elasticity = 0.75	58.94	2.90	0
Frisch Elasticity = 1.9	58.92	2.87	0
Value of Life = $4 million	51.42	2.24	11
Value of Life = $6 million	64.36	3.74	0
Marginal Tax Rate (US) 0.4	59.00	2.91	0
θ from FOC Germany	59.05	2.86	0
Bribe Tax	51.03	-	0

Note: The first two columns display the median absolute deviation of $\frac{\lambda_i}{\tilde{y}_i}$ from 100% in the levels calculation (not in logs) and $g_\lambda - g_y$ in the growth calculations. The third column shows the number of countries with negative flow utility in the year 2007 according to the levels calculation.

As mentioned above, the choice between the equivalent and the compensating variation influences the impact of two factors on the overall welfare measure: healthy life expectancy and corruption. The impact on the latter, however, is rather small. Even for Ecuador, which has a Corruption Perception Index of 2.1 (compared to 7.2 in the US), the difference is only two percentage points. On the other hand, the gap between the equivalent and compensating variation with respect to healthy life expectancy, that is, life expectancy and morbidity, is more substantial: for Ecuador, the log ratios differ by around 0.20. This discrepancy becomes wider, the poorer the country of the sample. Mozambique may serve as an example: The per capita income in the country only reaches 1.63% of US income. The benchmark calculations reveal an even lower welfare level of 0.16% especially due to the low life expectancy of only 48 years. This result is the geometric average of the equivalent

variation (0.79%) and the compensating variation (0.03%). Ultimately, it becomes a question of the most appropriate way to measure the value of an additional year lived. The equivalent variation measures the value of this year with the flow utility of Mozambique. Given the very low consumption level in this African country, the value of an additional year lived appears quite small – something that can easily be argued against. On the other side, the compensating variation values this year with the flow utility of the US, which causes the US welfare to be more than 3000 times higher than welfare in Mozambique – also a rather extreme result. The standard procedure of taking the geometric average seems an appropriate method to weigh the two extreme forms against each other. Nevertheless, the ethical question of how to value an additional year of life is something that should be further discussed.

Table 8: Results for Sweden and Ecuador, Robustness Check Welfare 2007

COUNTRY/ VARIATION	Welfare (λ)	Log Ratio	Decomposition of Log Ratio					
			Life Exp.	Morbidity	C/Y	Corrupt.	Leisure	Inequality
Sweden (y = 82.8)								
Benchmark Case	140.55	0.53	0.215	0.072	-0.106	0.107	0.045	0.199
Equivalent Variation	141.88	0.54	0.220	0.073	-0.106	0.110	0.045	0.199
Compensating Variation	139.23	0.52	0.210	0.070	-0.106	0.104	0.045	0.199
Frisch Elasticity = 0.4	140.21	0.53	0.215	0.072	-0.106	0.107	0.042	0.199
Frisch Elasticity = 0.75	140.47	0.53	0.215	0.072	-0.106	0.107	0.044	0.199
Frisch Elasticity = 1.9	140.66	0.53	0.215	0.072	-0.106	0.107	0.046	0.199
Value of Life = $4 million	131.72	0.47	0.166	0.055	-0.106	0.107	0.045	0.199
Value of Life = $6 million	149.96	0.60	0.264	0.088	-0.106	0.107	0.045	0.199
Marginal Tax Rate (US) 0.4	140.08	0.53	0.215	0.072	-0.106	0.107	0.042	0.199
θ from FOC Germany	141.16	0.54	0.215	0.072	-0.106	0.107	0.049	0.199
Bribe Tax	126.23	0.42	0.215	0.072	-0.106	0.000	0.045	0.199
Ecuador (y = 13.6)								
Benchmark Case	5.00	-1.00	-0.302	-0.060	-0.079	-0.237	-0.053	-0.266
Equivalent Variation	5.72	-0.86	-0.199	-0.040	-0.079	-0.226	-0.053	-0.266
Compensating Variation	4.38	-1.13	-0.405	-0.081	-0.079	-0.248	-0.053	-0.266
Frisch Elasticity = 0.4	4.99	-1.00	-0.302	-0.060	-0.079	-0.237	-0.056	-0.266
Frisch Elasticity = 0.75	5.00	-1.00	-0.302	-0.060	-0.079	-0.237	-0.054	-0.266
Frisch Elasticity = 1.9	5.01	-1.00	-0.302	-0.060	-0.079	-0.237	-0.052	-0.266
Value of Life = $4 million	5.56	-0.89	-0.215	-0.043	-0.079	-0.237	-0.053	-0.266
Value of Life = $6 million	4.51	-1.10	-0.390	-0.078	-0.079	-0.237	-0.053	-0.266
Marginal Tax Rate (US) 0.4	5.02	-0.99	-0.302	-0.060	-0.079	-0.237	-0.049	-0.266
θ from FOC Germany	4.98	-1.00	-0.302	-0.060	-0.079	-0.237	-0.058	-0.266
Bribe Tax	6.24	-0.78	-0.302	-0.060	-0.079	-0.015	-0.053	-0.266

Note: See description of Table 1.

Table 9: Results for Sweden and Ecuador, Robustness Check Welfare Growth 2000-2007

COUNTRY/ VARIATION	Welfare Growth (λ)	Difference	Decomposition of Difference				
			Life Exp.	Morbidity	C/Y	Corrupt.	Leisure
Sweden (g_y = 2.51%)							
Benchmark Case	3.772	1.261	1.013	1.237	-0.818	-0.055	-0.116
Equivalent Variation	3.714	1.203	0.987	1.205	-0.818	-0.055	-0.116
Compensating Variation	3.830	1.319	1.039	1.269	-0.818	-0.055	-0.116
Frisch Elasticity = 0.4	3.784	1.273	1.012	1.236	-0.818	-0.055	-0.102
Frisch Elasticity = 0.75	3.775	1.264	1.013	1.237	-0.818	-0.055	-0.112
Frisch Elasticity = 1.9	3.768	1.257	1.013	1.237	-0.818	-0.055	-0.120
Value of Life = $4 million	3.264	0.753	0.784	0.958	-0.818	-0.055	-0.116
Value of Life = $6 million	4.280	1.769	1.242	1.516	-0.818	-0.055	-0.116
Marginal Tax Rate (US) 0.4	3.779	1.268	1.012	1.236	-0.818	-0.055	-0.107
θ from FOC Germany	3.766	1.255	1.014	1.237	-0.818	-0.055	-0.123
Ecuador (g_y = 2.75%)							
Benchmark Case	5.358	2.605	2.266	1.478	0.155	-1.275	-0.020
Equivalent Variation	5.091	2.338	2.104	1.373	0.155	-1.275	-0.020
Compensating Variation	5.626	2.872	2.428	1.584	0.155	-1.275	-0.020
Frisch Elasticity = 0.4	5.353	2.599	2.264	1.477	0.155	-1.275	-0.022
Frisch Elasticity = 0.75	5.357	2.604	2.266	1.478	0.155	-1.275	-0.020
Frisch Elasticity = 1.9	5.360	2.607	2.267	1.479	0.155	-1.275	-0.019
Value of Life = $4 million	4.014	1.260	1.452	0.947	0.155	-1.275	-0.020
Value of Life = $6 million	6.703	3.949	3.080	2.009	0.155	-1.275	-0.020
Marginal Tax Rate (US) 0.4	5.364	2.611	2.269	1.480	0.155	-1.275	-0.018
θ from FOC Germany	5.354	2.600	2.264	1.477	0.155	-1.275	-0.021

Note: See description of Table 4.

With respect to the parameters of the utility function, a variety of alternative choices was tested. Firstly, due to the discrepancy of values applied by the literature for the Frisch elasticity, the results were recalculated for the values of 0.4 (Congressional Budget Office (Reichling and Whalen 2012)), 0.75 (Chetty, et al. 2011) and 1.9 (Hall 2009a, 2009b). As can be seen in Table 7, 8 and 9, this has little effect on the results.

The second robustness check concerns the intercept of the flow utility. In the benchmark case, the intercept was chosen, so that a 40-year old person in the US in the year 2007 has a value of remaining life equal to $5 million. In light of the discussion around the appropriate vale of life, which was outlined above, welfare was calculated for the two alternatives, $4 million and $6 million. With the lower value of $4 million, the importance of healthy life expectancy on overall welfare is lower for all countries. This explains why the median absolute deviation between welfare and income is only 45% instead of 59% in the benchmark case. However, it is important to note that with this

specification 11 countries are ascribed a negative flow utility. This means that living an additional year in one of these countries actually decreases expected utility, or put differently: a shorter life would be better than a longer one. As this is not a reasonable way to model reality, specifications with low values of life need to be taken with caution. On the other hand, with the choice of $6 million, healthy life expectancy gains more influence on the overall welfare level. As a consequence, differences between welfare and income in both levels and growth rates become more prominent.

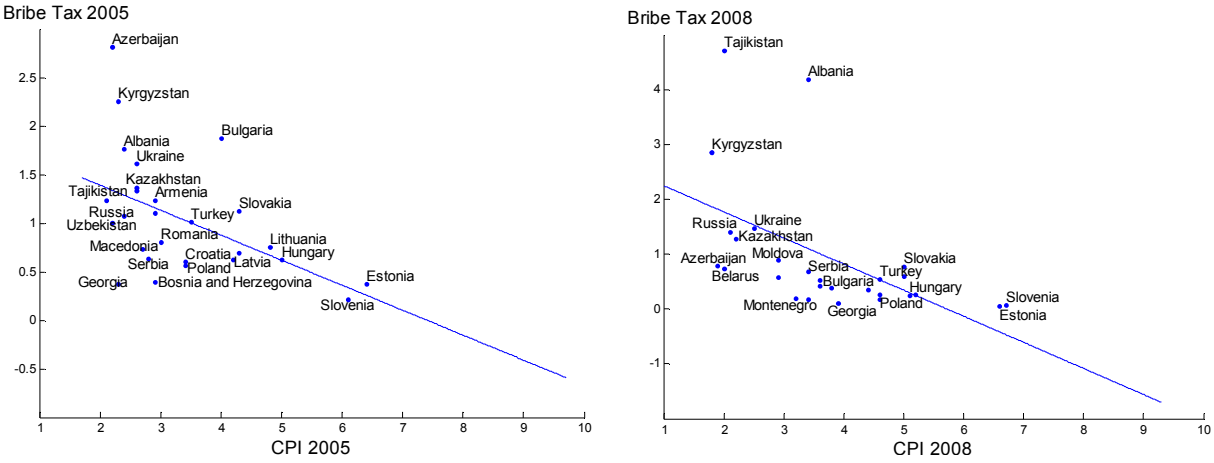
For the marginal tax rate in the benchmark case, 0.353 was chosen following Barro and Redlick (2011). In order to evaluate whether the results are robust to this choice, a higher rate of 0.4 was applied, which is the parameter used by Prescott (2004). As can be seen in Table 7, 8 and 9, this has little effect on the results.

The following line in the robustness tables displays another variation in the weight of leisure in the utility function. In this case, θ was derived from the first-order condition for household utility maximization in Germany, where the leisure choice is generally higher. Thus, $l_{ger} = 0.858$ as well as the Prescott (2004) marginal tax rate for Germany of 0.59 were taken to calculate $\theta = 20.340$ (compared to the benchmark value of $\theta = 18.576$). The details for Sweden and Ecuador reveal the increased effect of leisure, yet again, the overall results are only slightly changed.

It would also be possible to consider a different utility specification regarding the way consumption and leisure enter the utility function. The benchmark case adds the leisure term to the log consumption and an intercept. However, Jones and Klenow (2010) are able to demonstrate that different forms of non-separable preferences do not significantly change the results gained from this type of model.

The final line of the robustness table presents the results of an alternative way to incorporate corruption in the model, that is, based on a bribe tax. For this purpose, data was taken from the Business Environment and Enterprise Performance Survey (BEEPS), a joint initiative of the European Bank for Reconstruction and Development and the World Bank Group (World Bank 2013). The Survey was undertaken in 2005 and 2008 and yielded data from firms across 27 and 29 countries respectively on aspects of their working environments including corruption. Bribe tax is defined by this survey as the percentage of total annual sales paid for informal payments or gifts. These values were regressed on the Corruption Perception Indices of 2005 and 2008, as can be seen in Figure 8:

Figure 8: Bribe Tax vs. CPI, 2005 and 2008



Note: Correlation between Bribe Tax and CPI is -0.4961 and -0.5465 for the years 2005 and 2008 respectively.

For the countries of the sample without the data on bribe tax, the predicted values based on the respective Corruption Perception Index were applied.[38] To calculate welfare levels for 2007, the average of the 2005 and 2008 values was taken, which also served to smooth out noise. The bribe tax was incorporated in the model as follows:

$$he_{us}\left(\bar{u} + log\lambda_i^{ev} c_{us}(1-b_{us}) + v(l_{us}) - \frac{1}{2}\sigma_{us}^2\right) = he_i\left(\bar{u} + log c_i(1-b_i) + v(l_i) - \frac{1}{2}\sigma_i^2\right), \quad (29)$$

which gives

$$\begin{aligned} log\frac{\lambda_i^{ev}}{\tilde{y}_i} = \quad & \frac{e_i - e_{us}}{he_{us}}\left(\bar{u} + log c_i + v(l_i) - \frac{1}{2}\sigma_i^2\right) && \text{Life expectancy} \\ & - \frac{m_i - m_{us}}{he_{us}}\left(\bar{u} + log c_i + v(l_i) - \frac{1}{2}\sigma_i^2\right) && \text{Morbidity} \\ & + log\frac{c_i}{y_i} - log\frac{c_{us}}{y_{us}} && \text{Consumption} \\ & + v(l_i) - v(l_{us}) && \text{Leisure} \\ & - \left(\frac{1}{2}\sigma_i^2 - \frac{1}{2}\sigma_{us}^2\right) && \text{Inequality} \\ & + \log(1-b_{us}) - \log(1-b_i) && \text{Corruption.} \end{aligned} \quad (30)$$

It is clear that this procedure is based on a crucial assumption, namely that the bribe tax for households is similar to the one for firms. Additional research and surveys would be necessary to investigate whether this assumption holds. Furthermore, it is important to stress that this method measures a different outcome of prevailing corruption compared to the method presented above. The benchmark case incorporates multiple costs of corruption including psychological costs or additional time effort. It thus serves well for a proxy to capture the utility from institutional quality.

[38] If the predicted value for the bribe tax was less than zero, a value of zero was assumed.

On the other hand, the bribe tax only captures a direct loss of utility from consumption. This can explain why the results of the bribe tax alternative differ from the benchmark case as displayed in the robustness tables. Corruption now has a lower weight on welfare, decreasing Swedish welfare, increasing Ecuadorian welfare and lowering the median absolute deviation. Since there is no data for bribe taxes in the year 2000, it was not possible to calculate welfare growth rates with this alternative model.

A final note needs to be made regarding the role of the consumption share. A low consumption share at present due to a high investment rate may cause capital accumulation and thus a higher consumption level in the future. If countries are already in their steady states this force is incorporated in the model. Yet, in case of a transition, that is, a rising or falling investment rate, the benchmark case might miss an important point. However, Jones and Klenow (2010) are able to show that transition dynamics to not play a dominant role in this type of model.

5.4 Limitations

The welfare measure presented in this paper faces some important limitations that have to be addressed. The first problem originates directly from using GDP per capita as a base to derive consumption: the impossibility to distinguish between various types of goods consumed. Not every sort of consumption yields the same level of utility. For instance, if in some regions citizens need to spend a significant proportion of their income on medical expenses due to a high disease burden, air pollution or other external factors, they will obtain a lower utility than citizens in other areas that can spend more of their budget on, for example, leisure goods. In addition, there exists a similar problem as with GDP itself: in case of a disastrous event, such as a flooding or a hurricane, high expenditures will be necessary for reparations, which will increase GDP and thus also the level of consumption applied for welfare comparison. Finally, households also benefit from government consumption to varying degrees. Whereas the utility of public money spent on education, infrastructure or social security is quite apparent, it is less clear to what extent citizens benefit from defense expenditures and the direct utility from interest payments on federal debt is arguably zero. Nevertheless, all of these problems could be circumvented if the welfare comparison was undertaken with micro data, which would allow excluding certain types of consumption. Jones and Klenow (2010) demonstrate how the consumption equivalent model can be applied on household survey data. Due to a lack of access, it was not possible to strengthen this paper's results by applying the presented model on appropriate micro data. However, this is a possible starting point for further research.

A second limitation of the presented model is the fact that certain aspects which affect well-being are still not or only indirectly taken into account as it was already partly discussed in Section 2. The benefit from education is only included to the extent that it raises income. However, in so far as people derive utility from education through other channels, such as a higher value of their leisure time (Vila 2000), it is not captured in the presented welfare measure. A similar problem applies to environmental quality. Impacts of pollution on life expectancy and morbidity are incorporated, but the status of the natural environment also affects, for instance, the way people enjoy their recreational activities. Further arguments can be made for the proper inclusion of aspects such as crime, gender inequality and unemployment. Moreover, corruption can only account for institutional quality to some extent and the level of political freedom is completely missing in the calculations above. Another factor that has not been considered is intergenerational altruism. Cordoba (2012), for example, incorporates fertility into a welfare measure with interesting results.

In addition to this, the sustainability of human activities in various countries has not been taken into account. If a country's current consumption depends crucially on an unsustainable depletion of natural resources then it could be argued that the country's welfare is lower compared to the welfare in another state with an equal consumption level but sustainable economic practices.[39] In order to capture the development path of a society it could thus be advisable to work with discounted lifetime utility instead of the flow utility used in this paper. Again, this is a possible extension for future research.

A further issue concerns the difficulty to capture activities in the informal sector. This can affect the appropriate measurement of leisure. In developing countries where a high proportion of the population is engaged in activities outside the formal market, the value of leisure applied in this paper could underestimate their true workload. In addition, informal sector activities distort GDP (Feige and Urban 2008) and thus the consumption level used in the model. Another aspect also concerns industrialized countries: the proper handling of home production. In some countries such as Sweden, childcare is a service that is mainly supplied by the market, whereas in other countries such as Germany a higher proportion of households provide it themselves. Therefore, the German leisure rate could be overestimated. Once more, this problem could be mitigated by appropriate micro data that contains hours spent on activities outside the formal market and on home production.

Moreover, the model uses only one type of utility function and thus does not account for preference heterogeneity across and within countries. An interesting work in this area is by Hakim (2000), who

[39] For instance, Arrow et al. (2004) found that several countries invest too little in human and manufactured capital in order to balance out the depletion of natural resources and follow a sustainable consumption path.

analyzes different preferences of women for their participation in the labor market. Without doubt, heterogeneity in preferences exists due to many factors such as culture, religion or individual predilections. With micro data, an attempt could be made to capture these preference heterogeneities and incorporate them into the welfare model.

6 Conclusion

GDP as a measure of a country's welfare faces significant limitations. Amongst others, it neglects to incorporate income distribution, informal market activities and environmental externalities. Furthermore, it does not account for decisive well-being factors such as life expectancy, health or leisure. A number of attempts have been undertaken to measure welfare in a more precise way. These can be categorized in three methods; namely accounting adjustments to GDP, the construction of composite indices and evaluation based on subjective well-being surveys. However, each of these approaches entails some major shortcomings. The former is criticized for the lack of a sound theoretical basis; composite indices implicate arbitrary weighing of factors, and subjective well-being measures do not allow for appropriate comparisons across countries and time. Hence, to overcome the aforementioned deficits, an increasing body of literature seeks to develop a welfare measure that is explicitly grounded in economic theory. Yet, the challenge faced by this approach is the inclusion of all major factors contributing to well-being.

The aim of this paper is to enhance the current state of research by developing a welfare measure that is based upon economic theory and incorporates the factors life expectancy, health, consumption, corruption, leisure and inequality. In particular, the presented welfare measure utilizes the consumption-equivalent model developed by Jones and Klenow (2010), which is enhanced by adding the two factors health and corruption. At the basis of this model is the following question: by what proportion of his current consumption level must a random individual in the US be compensated so as to be indifferent between living one year in his home country or one year, for example, in Sweden? The model takes into account the different living conditions in the US and Sweden to calculate this proportion, which then serves as an indicator for Swedish welfare. Similarly, a comparison can be conducted across time.

Adopting this approach, welfare was calculated for a sample of 153 countries for the year 2007. The results of a significant proportion of sample countries differ substantially from a traditional GDP evaluation. The median absolute deviation between the two is 88%. Western Europe demonstrates the greatest positive difference between income and welfare. Due to low morbidity, corruption and inequality combined with a high leisure rate and long life expectancy, welfare is in the order of 40% higher than income despite a relatively low consumption share. In Eastern Europe, welfare is considerably reduced by life expectancy and corruption. Inequality has a decisive detrimental impact upon welfare in Latin America, whereas corruption is most critical in Africa. Asian countries exhibit a variety of welfare patterns; one of which is a combination of a relatively low consumption share and a low leisure rate. This significantly lowers welfare in countries such as Singapore, Qatar and South

Korea. In the sample, African countries demonstrate the most significant discrepancy between income and welfare as a result of a very low life expectancy.

Furthermore, welfare growth rates were calculated for a sample of 87 countries for the inclusive period between 2000 and 2007. The results reveal that welfare growth was on average almost 3% higher than the observed income growth. More than half of this difference can be attributed to a rise in life expectancy. In addition to this, welfare was positively affected by improvements with respect to corruption, leisure and morbidity. The negative change in consumption share was far outweighed by the aforementioned factors. The correlation of welfare and income growth rates was 0.79, but again the median absolute deviation was significant with 2.9%. Moreover, the developments differed notably between the observed regions.

The presented welfare measure still faces some significant limitations. As with GDP, it does not account for informal market activities including home production. Moreover, it does not differentiate between various types of consumer goods. Given that the consumption-equivalent model can be applied to micro data, it would be possible to overcome both these shortcomings by using household survey data.

A further important limitation is the omission of the factor environmental quality. A possible way for its inclusion could be the method applied to corruption in this paper, this is, a differentiated valuation of consumption streams depending on specific levels of environmental quality. Additionally, it could be considered to assign different utilities from leisure to specific levels of pollution. This would be particularly interesting when comparing welfare across regions within a country as pollution differs greatly between urban and rural areas. In addition, a welfare assessment on a smaller scale could take into account national differences with respect to other factors such as life expectancy, leisure time and consumption. Moreover, further research could focus on a more effective inclusion of the factors education, crime, gender equality and risk of unemployment in the presented model.

Policy makers base many decisions on expectations and information relating to GDP despite its established shortcomings in properly depicting a country's welfare. It is hoped that this paper can serve as a source for further research on measuring what *truly* reflects people's well-being.

References

Acemoglu, Daron, Simon Johnson, and James A. Robinson. "Institutions as a Fundamental Cause of Long-run Growth." In *Handbook of Economic Growth*, by Philippe Aghion and Steven N. Durlauf, 385-472. Amsterdam: North Holland, 2005.

Acemoglu, Daron, Simon Johnson, and James A. Robinson. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91, no. 5 (2001): 1369–1401.

Aitchison, John, and James A. C. Brown. *The Lognormal Distribution - With Special Reference to Its Use in Economics.* Cambridge UK: Cambridge University Press, 1957.

Alesina, Alberto, Rafael Di Tella, and Robert MacCulloch. "Inequality and Happiness: are Europeans and Americans Different?" *Journal of Public Economics* 88, no. 9-10 (2004): 2009–2042.

Anderson, Victor. *Alternative Economic Indicators.* London: Routledge, 1991.

Aronsson, Thomas, Per-Olav Johansson, and Karl-Gustaf Löfgren. *Welfare Measurement, Sustainability and Green National Accounting: A Growth Theoretical Approach.* Cheltenham: Edward Elgar, 1997.

Arrow, Kenneth, et al. "Are We Consuming Too Much?" *Journal of Economic Perspectives* 18, no. 3 (2004): 147-172.

Asheim, Geir B. "Green National Accounting: Why and How?" *Environment and Development Economics* 5, no. 1 (2000): 25-48.

Asheim, Geir B. "Net National Product as an Indicator of Sustainability." *Scandinavian Journal of Economics* 96, no. 2 (1994): 257-265.

Atkinson, Giles. *Measuring Sustainable Economic Welfare: A critique of the UK ISEW.* Working Paper GEC 95-08, Norwich and London: Centre for Social and Economic Research on the Global Environment, 1995.

Bache, Ian, and Louise Reardon. "An Idea Whose Time has Come? Explaining the Rise of Well-Being in British Politics." *Political Studies* doi: 10.1111/1467-9248.12001 (2013).

Barro, Robert J., and Charles J. Redlick. "Macroeconomic Effects From Government Purchases and Taxes." *Quarterly Journal of Economics* 126, no. 1 (2011): 51-102.

Basu, Susanto, Luigi Pascali, Fabio Schanterelli, and Luis Serven. *Productivity and the Welfare of Nations.* Working Paper No. 17971, NBER, 2012.

Bates, Winton. "Gross National Happiness." *Asian-Pacific Economic Literature* 23, no. 2 (2009): 1-16.

Battistin, Erich, Richard Blundell, and Arthur Lewbel. "Why Is Consumption More Log Normal than Income? Gibrat's Law Revisited." *Journal of Political Economy* 117, no. 6 (2009): 1140-1154.

Becker, Gary S. "A Theory of the Allocation of Time." *Economic Journal* 75, no. 299 (1965): 493-517.

Becker, Gary S., Thomas J. Philipson, and Rodrigo R. Soares. "The Quantity and Quality of Life and the Evolution of World Inequality." *American Economic Review* 95, no. 1 (2005): 277-291.

Bjørnskov, Christian, Axel Dreher, and Justina A.V. Fischer. "Formal Institutions and Subjective Well-Being: Revisiting the Cross-Country Evidence." *European Journal of Political Economy* 26, no. 4 (2010): 419-430.

Boarini, Romina, Asa Johansson, and Marco Mira d'Ercole. *Alternative Measures of Well-Being.* OECD Social, Employment and Migration Working Papers 33, OECD, Directorate for Employment, Labour and Social Affairs, 2006.

Boyle, Melissa A., and Katherine A. Kiel. "A Survey of House Price Hedonic Studies of the Impact of Environmental Externalities." *Journal of Real Estate Literature* 9, no. 2 (2001): 117-144.

Brasington, David M., and Diane Hite. "Demand for Environmental Quality: a Spatial Hedonic Analysis." *Regional Science and Urban Economics* 35, no. 1 (2005): 57-82.

Braun, Alejandro Adler. "Gross National Happiness in Bhutan: a Living Example of an Alternative Approach to Progress." *Social Impact Research Experience Journal*, 2009. http://repository.upenn.edu/cgi/viewcontent.cgi?article=1003&context=sire (accessed October 19, 2012).

Chetty, Raj, Adam Guren, Day Manoli, and Andrea Weber. "Are Micro and Macro Labor Supply Elasticities Consistent? A Review of Evidence on the Intensive and Extensive Margins." *American Economic Review* 101, no. 3 (2011): 471-475.

CIC. *Penn World Table 7.1.* 2012. https://pwt.sas.upenn.edu/ (accessed November 20, 2012).

Clark, Andrew E., and Andrew J. Oswald. "Unhappiness and Unemployment." *Economic Journal* 104, no. 424 (1994): 648-659.

Cobb, Clifford, Ted Halstead, and Jonathan Rowe. "If the GDP is Up, Why is America Down?" *Atlantic Monthly* 276, no. 4 (1995): 59–78.

Cobb, John B., and Herman E. Daly. *For the Common Good: Redirecting the Economy toward Community, the Environment, and a Sustainable Future.* Boston: Beacon Press, 1989.

Conference Board. *Total Economy Database: Annual Working Hours.* 2011. http://www.conference-board.org/data/economydatabase/ (accessed November 20, 2012).

Cordoba, Juan Carlos. *Children and the Wealth of Nations.* Working Paper No. 12006, Iowa State Universtiy, 2012.

Cordoba, Juan Carlos, and Geneviève Verdier. "Inequality and Growth: Some Welfare Calculations." *Journal of Economic Dynamics and Control* 32, no. 6 (2008): 1812–1829.

Dasgupta, Partha, and Karl-Göran Mäler. "Net National Product, Wealth, and Social Well-Being." *Environment and Development Economics* 5, no. 1 (2000): 69-93.

Diener, Ed. "Subjective Well-being: The Science of Happiness and a Proposal for a National Index." *American Psychologist* 55, no. 1 (2000): 34-43.

Dietz, Simon, and Eric Neumayer. "Some Constructive Criticisms of the Index of Sustainable Economic Welfare." In *Sustainable Development Indicators in Ecological Economics*, by Philip A. Lawn, 186–206. Cheltenham: Edward Elgar, 2006.

Dowrick, Steve, Yvonne Dunlop, and John Quiggin. "Social Indicators and Comparisons of Living Standards." *Journal of Development Economics* 70, no. 2 (2003): 501-529.

Engineer, Merwan, and Ian King. *Maximizing Human Development.* WP 12-30, Rimini: Rimini Centre for Economic Analysis, 2012.

Eurostat. *Gini Coefficient of Equivalised Disposable Income.* 2011. http://epp.eurostat.ec.europa.eu /portal/page/portal/income_social_inclusion_living_conditions/data/main_tables (accessed November 11, 2012).

Feige, Edgar L., and Ivica Urban. "Measuring Underground (Unobserved, Non-observed, Unrecorded) Economies in Transition Countries: Can We Trust GDP?" *Journal of Comparative Economics* 36, no. 2 (2008): 287-306.

Fisher, Irving. *The Nature of Capital and Income.* New York: Macmillan, 1906.

Fleche, Sarah, Conal Smith, and Piritta Sorsa. *Exploring Determinants of Subjective Wellbeing in OECD Countries: Evidence from the World Value Survey.* OECD Economics Department Working Papers, No. 921, OECD Publishing, 2011.

Fleurbaey, Marc. "Beyond GDP: The Quest for a Measure of Social Welfare." *Journal of Economic Literature* 47, no. 4 (2009): 1029-1075.

Fleurbaey, Marc, and Guillaume Gaulier. "International Comparison of Living Standards by Equivalent Income." *Scandinavian Journal of Economics* 111, no. 3 (2009): 597-624.

Fortson, Jane G. "Mortality Risk and Human Capital Investment: The Impact of HIV/AIDS in Sub-Saharan Africa." *Review of Economics and Statistics* 93, no. 1 (2011): 1-15.

Gasparatos, Alexandros, Mohamed El-Haram, and Malcolm Horner. "A Critical Review of Reductionist Approaches for Assessing the Progress Towards Sustainability." *Environmental Impact Assessment Review* 28, no. 4-5 (2008): 286-311.

Graham, Carol, and Andrew Felton. "Inequality and Happiness: Insights from Latin America." *Journal of Economic Inequality* 4, no. 1 (2004): 107-122.

Greve, Bent. "What is Welfare?" *Central European Journal of Public Policy* 2, no. 1 (2008): 50-73.

Hakim, Catherine. *Work-Lifestyle Choices in the 21st Century: Preference Theory.* Oxford: Oxford University Press, 2000.

Hall, Robert E. "By How Much Does GDP Rise if the Government Buys More Output?" *Brookings Papers on Economic Activity* 40, no. 2 (2009a): 183-249.

Hall, Robert E. "Reconciling Cyclical Movements in the Marginal Value of Time and the Marginal Product of Labor." *Journal of Political Economy* 117, no. 2 (2009b): 281-323.

Hall, Robert E., and Charles I. Jones. "The Value of Life and the Rise in Health Spending." *Quarterly Journal of Economics* 102, no. 1 (2007): 39-72.

Hammitt, James K., Jin-Tan Liu, and Jin-Long Liu. *Survival is a Luxury Good: The Increasing Value of a Statistical Life.* Harvard University mimeo, 2000.

Hartwick, John M. "Intergenerational Equity and the Investing of Rents from Exhaustible Resources." *American Economic Review* 67, no. 5 (1977): 972-974.

Hartwick, John M. "Natural Resources, National Accounting and Economic Depreciation." *Journal of Public Economics* 43, no. 3 (1990): 291-304.

Headey, Bruce, Ruud Muffels, and Mark Wooden. *Money Doesn't Buy Happiness.... Or Does It? A Reconsideration Based on the Combined Effects of Wealth, Income and Consumption*. IZA Discussion Paper No. 1218, 2004. http://ssrn.com/abstract=571661 (accessed October 22, 2012).

Helliwell, John F., and Huang Haifang. "How's Your Government? International Evidence Linking Good Government and Well-Being." *British Journal of Political Science* 38, no. 4 (2008): 595-619.

Hinks, Tim. "Crime and Happiness Amongst Heads of Households in Malawi." *Journal of Happiness Studies* 11, no. 4 (2010): 457-476.

Hudson, John. "Institutional Trust and Subjective Well-Being across the EU." *Kyklos* 59, no. 1 (2006): 43-62.

Human Mortality Database. *USA.* 2009. http://www.mortality.org/cgi-bin/hmd/country.php?cntr=USA&level=1 (accessed November 30, 2012).

Jackson, Tim. *Prosperity Without Growth: Economics for a Finite Planet.* London: Earthscan, 2009.

Jones, Charles I., and Peter J. Klenow. *Beyond GDP? Welfare across Countries and Time.* Working Paper No. 16352, NBER, 2010.

Kahnemann, Daniel, and Alan B. Krueger. "Developments in the Measurement of Subjective Well-Being." *Journal of Economic Perspectives* 20, no. 1 (2006): 3-24.

Kaufmann, Daniel. "10 Myths about Governance and Corruption." *Finance and Development* 42, no. 3 (2005): 41-43.

Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. *Governance Matters VIII: Aggregate and Individual Governance Indicators, 1996-2008.* World Bank Policy Research Working Paper No. 4654, World Bank, 2009.

Keefer, Philip, and Stephen Knack. "Why Don't Poor Countries Catch Up? A Cross-National Test of an Institutional Explanation." *Economic Inquiry* 35, no. 3 (1997): 590-602.

Klasen, Stephan. *Gender-Related Indicators of Well-Being.* Discussion paper, No. 102, Universität Göttingen, Ibero-Amerika-Institut für Wirtschaftsforschung, 2004.

Kniesner, Thomas J., W. Kip Viscusi, Christopher Woock, and James P. Ziliak. "The Value of a Statistical Life: Evidence from Panel Data." *Review of Economics and Statistics* 94, no. 1 (2012): 74-87.

Krueger, Dirk, and Fabrizio Perri. "Does Income Inequality Lead to Consumption Inequality? Evidence and Theory." *Review of Economic Studies* 73, no. 1 (2006): 163-193.

Lawn, Philip A. "A Theoretical Foundation to Support the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and other Related Indexes." *Ecological Economics* 44, no. 1 (2003): 105-118.

Lawn, Philip A. "An Assessment of the Valuation Methods Used to Calculate the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and Sustainable Net Benefit Index (SNBI)." *Environment, Development and Sustainability* 7, no. 2 (2005): 185-208.

Lawn, Philip A., and Richard D. Sanders. "Has Australia Surpassed its Optimal Macroeconomic Scale? Finding out with the Aid of 'Benefit' and 'Cost' Accounts and a Sustainable Net Benefit Index." *Ecological Economics* 28, no. 2 (1999): 213-229.

Leggett, Christopher G., and Nancy E. Bockstael. "Evidence of the Effects of Water Quality on Residential Land Prices." *Journal of Environmental Economics and Management* 39, no. 2 (2000): 121-144.

Llavador, Humberto, John E. Roemer, and Joaquim Silvestre. *Should we Sustain? And if so, Sustain what? Consumption or the Quality of Life?* Working Paper Series, #12-22, UC Davis, Department of Economics, 2012.

Lucas, Robert E. *Models of Business Cycles.* New York: Basil Blackwell, 1987.

Luechinger, Simon. "Life Satisfaction and Transboundary Air Pollution." *Economics Letters* 107, no. 1 (2010): 4-6.

MacKerron, George, and Susana Mourato. "Life Satisfaction and Air Quality in London." *Ecological Economics* 68, no. 5 (2009): 1441–1453.

Mathers, Colin D., et al. *Estimates of healthy life expectancy for 191 countries in the year 2000: methods and results.* Global Programme on Evidence for Health Policy Discussion Paper No. 38, WHO, 2001.

Matthews, Erica. *Measuring Well-Being and Societal Progress: a Brief History and the Latest News.* Paper prepared for the joint OECD-JRC workshop, Milan, 2006. http://crell.jrc.ec.europa.eu/Well-being/papers/Matthews_Well-Being%20Measures_Milan_final.pdf (accessed October 19, 2012).

Meyer, Bruce C., and James X. Sullivan. "Measuring the Well-Being of the Poor Using Income and Consumption." *Journal of Human Resources* 38 (2003): 1180-1220.

Michalos, Alex C. "Education, Happiness and Wellbeing." *Social Indicators Research* 87, no. 3 (2008): 347-366.

Miringoff, Marc, and Marque-Luisa Miringoff. *The Social Health of the Nation: How America is Really Doing.* Oxford and New York: Oxford University Press, 1999.

Møller, Valerie. "Resilient or Resigned? Criminal Victimisation and Quality of Life in South Africa." *Social Indicators Research* 72, no. 3 (2005): 263-317.

Mrozek, Janusz R., and Laura O. Taylor. "What Determines the Value of Life? A Meta-Analysis." *Journal of Policy Analysis and Management* 21, no. 2 (2002): 253-270.

Murphy, Kevin M., and Robert H. Topel. "The Value of Health and Longevity." *Journal of Political Economy* 114, no. 5 (2006): 871-904.

Neumayer, Eric. "On the Methodology of ISEW, GPI and Related Measures: some Constructive Suggestions and some Doubt on the 'Threshold' Hypothesis." *Ecological Economics* 34, no. 3 (2000): 347–361.

Neumayer, Eric. "The ISEW - not an Index of Sustainable Economic Welfare." *Social Indicators Research* 48, no. 1 (1999): 77-101.

Neumayer, Eric. *Weak Versus Strong Sustainability: Exploring the Limits of Two Opposing Paradigms.* Second ed. Cheltenham: Edward Elgar, 2003.

Nordhaus, William D. "The Health of Nations: The Contributions of Improved Health to Living Standards." In *Measuring the Gains from Medical Research: An Economic Approach*, by Kevin M. Murphy and Robert Topel, 9-40. Chicago: University of Chicago Press, 2003.

Nordhaus, William D., and James Tobin. "Is Growth Obsolete?" In *Economic Research: Retrospect and Prospect Vol 5: Economic Growth*, 1-80. New York: National Bureau of Economic Research, 1972.

Okun, Arthur Melvin. "Social Welfare has no Price Tag." *Survey of Current Business* 51, no. 7 (1971): 129-133.

Osberg, Lars, and Andrew Sharpe. "An Index of Economic Well-Being for Selected OECD Countries." *Review of Income and Wealth* 48, no. 3 (2002): 291-316.

Ott, Jan C. "Good Governance and Happiness in Nations: Technical Quality Precedes Democracy and Quality Beats Size." *Journal of Happiness Studies* 11, no. 3 (2010): 353-368.

Ott, Jan C. "Government and Happiness in 130 Nations: Good Governance Fosters Higher Level and More Equality of Happiness." *Social Indicators Research* 102, no. 1 (2011): 3-22.

Powdthavee, Nattavudh. "Unhappiness and Crime: Evidence from South Africa." *Economica* 72, no. 287 (2005): 531-547.

Prescott, Edward C. "Why do Americans Work So Much More than Europeans?" *Quarterly Review* 28 (July 2004): 2-14.

Ravallion, Martin. *Mashup Indices of Development.* Policy Research Working Paper 5432, Washington, DC: World Bank, 2010.

Ravallion, Martin. "Troubling Tradeoffs in the Human Development Index." *Journal of Development Economics 99*, no. 2 (2011): 201-209.

Rehdanz, Katrin, and David Maddison. "Local Environmental Quality and Life-satisfaction in Germany." *Ecological Economics* 64, no. 4 (2008): 787–797.

Reichling, Felix, and Charles Whalen. *Review of Estimates of the Frisch Elasticity of Labor Supply.* Washington, DC: Congressional Budget Office, 2012.

Rodrik, Dani, Arvind Subramanian, and Francesco Trebbi. "Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development." *Journal of Economic Growth* 9, no. 2 (2004): 131-165.

Schwarz, Norbert, and Fritz Strack. "Report of Subjective Well-Being: Judgmental Processes and Their Methodological Implications." In *Well-being: The Foundations of Hedonic Psychology*, by Daniel Kahneman, Ed Diener and Norbert Schwarz, 61-84. New York: Russel Sage Foundation, 1999.

Sen, Amartya. "A Decade of Human Development." *Journal of Human Development* 1, no. 1 (2000): 17-23.

Sen, Amartya. *Commodities and Capabilities.* Amsterdam: Elsevier, 1985.

Sen, Amartya. *Inequality Reexamined.* Cambridge: Harvard University Press, 1992.

Sen, Amartya. "Real National Income." *Review of Economic Studies* 43, no. 1 (1976): 19-39.

Slesnick, Daniel T. "Poverty in the Postwar United States." *Journal of Political Economy* 101, no. 1 (1993): 1-38.

Stiglitz, Joseph E., Amartya Sen, and Jean-Paul Fitoussi. "Report by the Commission on the Measurement of Economic Performance and Social Progress." 2009. http://stiglitz-sen-fitoussi.fr/en/index.htm (accessed October 21, 2012).

Talberth, John, Clifford Cobb, and Noah Slattery. *The Genuine Progress Indicator 2006. A Tool for Sustainable Development.* Oakland: Redefining Progress, 2007.

Transparency International. *Corruption Perception Index.* 2012. http://www.transparency.org/research/cpi/ (accessed November 23, 2012).

undata. *Healthy life expectancy (HALE) at birth (years), Source: WHO Data.* 2007b. http://data.un.org/ (accessed December 11, 2012).

undata. *Life expectancy at birth (years), Source: WHO Data.* 2007a. http://data.un.org (accessed December 11, 2012).

UNDP. *Human Development Report 2005.* New York: UNDP, 2005.

United Nations Statistics Division. *Composition of macro geographical (continental) regions, geographical sub-regions, and selected economic and other groupings.* 2013.

http://millenniumindicators.un.org/unsd/methods/m49/m49regin.htm (accessed May 8, 2013).

van de Kerk, Geurt, and Arthur R. Manuel. "A Comprehensive Index for a Sustainable Society: The SSI — the Sustainable Society Index." *Ecological Economics* 66, no. 2-3 (2008): 228-242.

van den Bergh, Jeroen C.J.M. "Abolishing GDP." *Tinbergen Institute Discussion Paper* TI 2007-019/3 (2007).

Vila, Luis E. "The Non-Monetary Benefits of Education." *European Journal of Education* 35, no. 1 (2000): 21-32.

Viscusi, W. Kip, and Joseph E. Aldy. "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World." *Journal of Risk and Uncertainty* 27, no. 1 (2003): 5-76.

Wagener, Hans-Jürgen. "Good Governance, Welfare, and Transformation." *European Journal of Comparative Economics* 1, no. 1 (2004): 127-143.

Welsch, Heinz. "Environment and Happiness: Valuation of Air Pollution Using Life Satisfaction Data." *Ecological Economics* 58, no. 4 (2006): 801–813.

Welsch, Heinz. "Environmental Welfare Analysis: A Life Satisfaction Approach." *Ecological Economics* 62, no. 3-4 (2007): 544–551.

Welsch, Heinz. "Preferences over Prosperity and Pollution: Environmental Valuation based on Happiness Surveys." *Kyklos* 55, no. 4 (2002): 473-494.

Welsch, Heinz. "The Welfare Cost of Corruption." *Applied Economics* 40, no. 14 (2008): 1839-1849.

WHO. *World health report 2001 statistical annex.* 2001. http://www.who.int/whr/2001/annex/en/index.html (accessed December 11, 2012).

Woolf, Steven H., and Laudon Aron. *U.S. Health in International Perspective: Shorter Lives, Poorer Health.* National Research Council and Institute of Medicine, Washington DC: The National Academic Press, 2013.

World Bank. *BEEPS Data Portal.* 2013. http://beeps.prognoz.com/beeps/Home.ashx (accessed October 27, 2012).

World Bank. *GINI index.* 2012. http://data.worldbank.org/indicator/SI.POV.GINI/ (accessed November 11, 2012).

World Bank. *Population ages 0-14 (% of total).* 2007. http://data.worldbank.org/indicator/SP.POP.0014.TO.ZS (accessed December 12, 2012).

Appendix A: Summary Statistics for Underlying Data

A. 1 Summary Statistics for the Levels Sample

Table 10: Summary Statistics for the Levels Sample, Data for 2007

VARIABLE	Mean	Standard Deviation	Min	Max
Life Expectancy	67.33	10.76	41.00	83.00
Morbidity	7.76	1.08	5.00	11.00
GDP per capita (US = 100)	27.08	34.98	0.73	223.55
Private Consumption Share (in %)	72.36	19.30	19.31	158.96
Government Consumption Share (in %)	10.48	6.83	3.18	53.82
Combined Consumption Share (in %)	82.84	19.99	26.61	165.32
Leisure Rate	0.810	0.032	0.739	0.881
Gini Coefficient	39.81	9.59	23.40	67.40
CPI	3.99	2.15	1.50	9.40

Note: Sample size is 153. Morbidity describes the difference between life expectancy and healthy life expectancy, this is, years lost due to ill health.

A.2 Summary Statistics for the Growth Sample

Table 11: Summary Statistics for the Growth Sample, Data for 2000

VARIABLE	Mean	Standard Deviation	Min	Max
Life Expectancy	68.71	10.45	42.00	81.00
Morbidity	9.16	1.54	6.39	13.64
GDP per capita (US = 100)	33.91	34.88	0.98	163.15
Private Consumption Share (in %)	69.63	12.70	29.52	99.35
Government Consumption Share (in %)	8.53	4.15	1.59	26.35
Combined Consumption Share (in %)	78.16	12.89	44.04	106.23
Leisure Rate	0.807	0.030	0.736	0.877
CPI	4.76	2.39	1.20	10.00

Note: Sample size is 87.

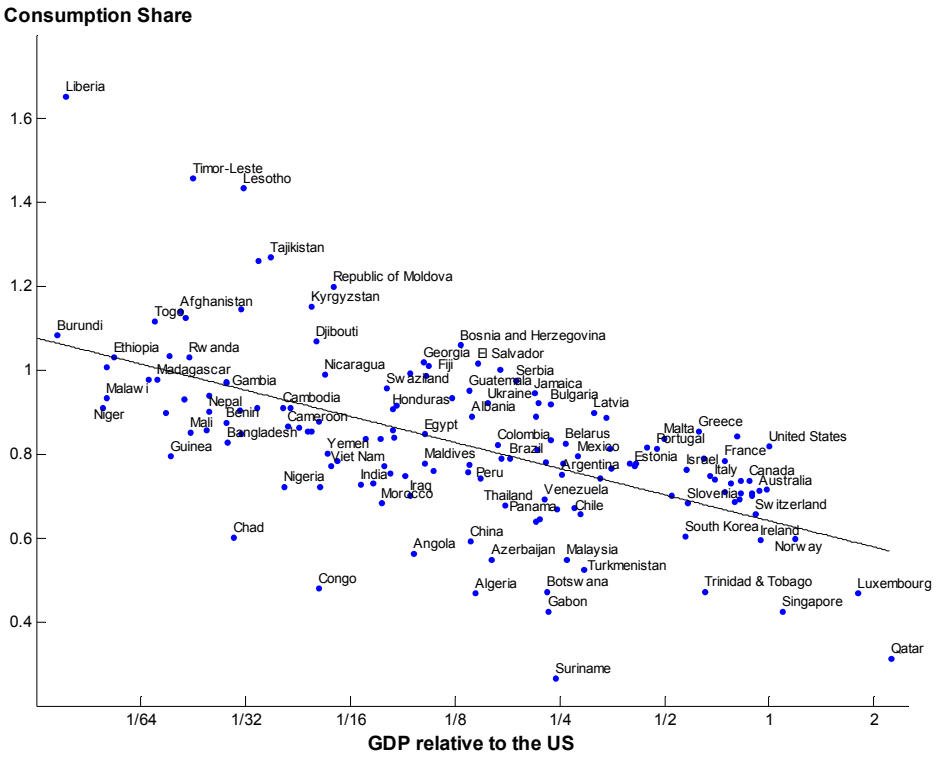
Table 12: Summary Statistics for the Growth Sample, Data for 2007

VARIABLE	Mean	Standard Deviation	Min	Max
Life Expectancy	70.48	10.53	45.00	83.00
Morbidity	7.71	1.01	6.00	11.00
GDP per capita (US = 100)	0.37	0.36	0.01	1.80
Private Consumption Share (in %)	69.94	13.06	33.40	114.15
Government Consumption Share (in %)	8.11	3.82	3.18	24.98
Combined Consumption Share (in %)	78.05	13.44	42.65	119.95
Leisure Rate	0.809	0.032	0.739	0.881
CPI	4.81	2.37	1.70	9.40

Note: Sample size is 87.

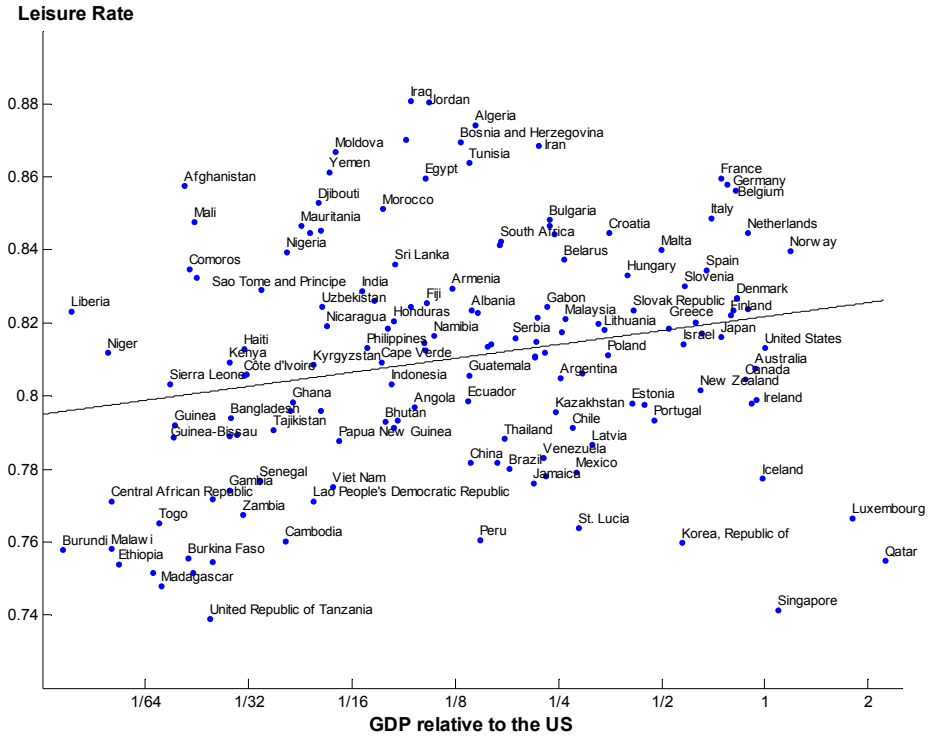
Appendix B: Graphical Illustration of Underlying Data

Figure 9: Consumption Share



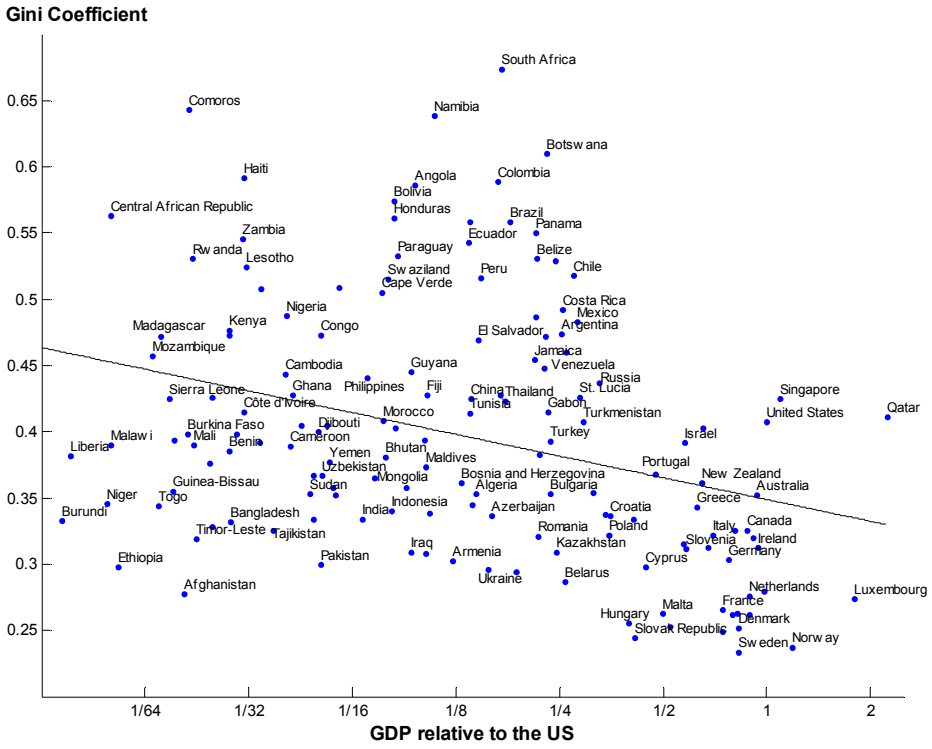
Note: This plot and the following three display 2007 values for the 153 countries of the levels calculation, with the lines being the respective regression lines. Correlation of consumption share and income is -0.4943.

Figure 10: Leisure Rate



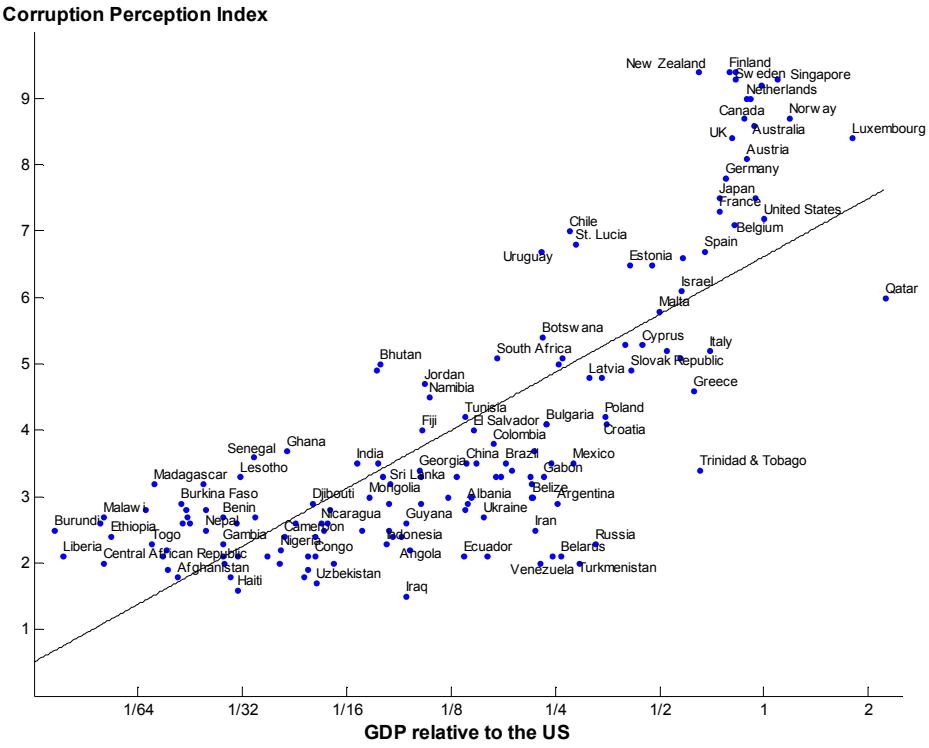
Note: Correlation between leisure rate and income is 0.0050.

Figure 11: Gini Coefficient



Note: Correlation between the Gini coefficient and income is -0.3903.

Figure 12: Corruption Perception Index



Note: Correlation between CPI and income is 0.8064.

Appendix C: Regional Classification of Sample Countries

Table 13: Sample Countries in the UN Geoscheme

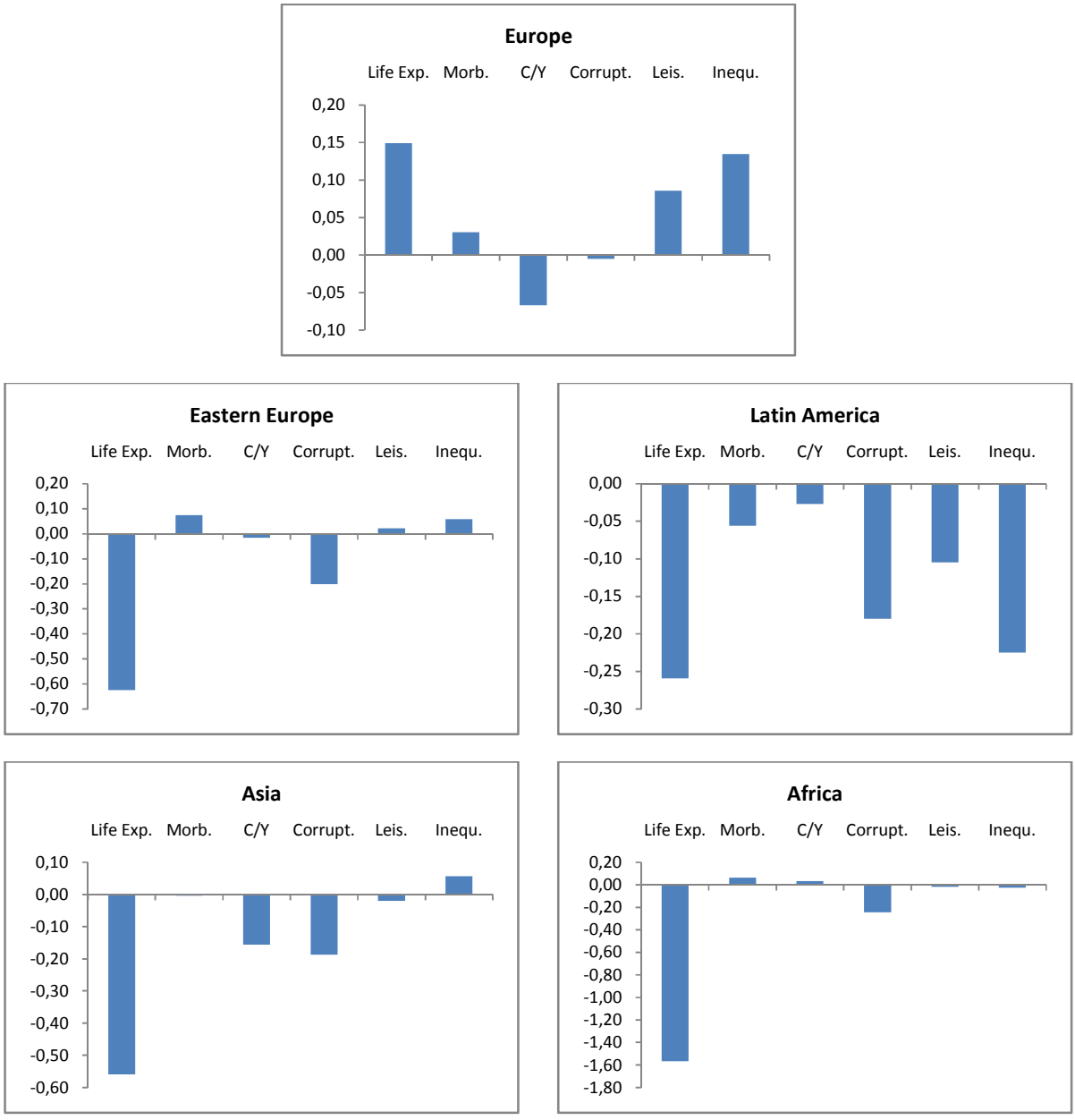
AFRICA	AMERICA	ASIA	EUROPE
Eastern Africa	**Caribbean**	**Central Asia**	**Eastern Europe**
Burundi	Dominican Republic	Kazakhstan*	Belarus*
Comoros	Haiti	Kyrgyzstan	Bulgaria*
Djibouti	Jamaica	Tajikistan	Czech Republic*
Ethiopia*	Saint Lucia	Turkmenistan	Hungary*
Kenya*	Trinidad and Tobago	Uzbekistan*	Moldova*
Madagascar			Poland*
Malawi*	**Central America**	**Eastern Asia**	Romania*
(Mauritius*)	Belize	China*	Russia*
Mozambique*	Costa Rica*	Japan*	Slovakia*
Rwanda	El Salvador*	Mongolia	Ukraine*
Tanzania*	Guatemala	South Korea*	
Uganda*	Honduras		
Zambia*	Mexico*	**South Asia**	**Northern Europe**
Zimbabwe*	Nicaragua	Afghanistan	Denmark*
	Panama	Bangladesh	Estonia*
Central Africa		Bhutan	Finland*
Angola*	**North America**	India*	Iceland*
Cameroon*	Canada*	Iran	Ireland*
Central African Republic	USA*	Maldives	Latvia*
Chad		Nepal	Lithuania*
Congo	**South America**	Pakistan	Norway*
Gabon	Argentina*	Sri Lanka	Sweden*
São Tomé and Príncipe	Bolivia*		UK*
Northern Africa	Brazil*	**South-East Asia**	
Algeria	Chile*	Cambodia	**Southern Europe**
Egypt*	Colombia*	Indonesia*	Albania
Morocco*	Ecuador*	Laos	Bosnia and Herzegovina
Sudan	Guyana	Malaysia*	Croatia*
Tunisia*	Paraguay	Philippines*	Greece*
	Peru*	Singapore*	Italy*
Southern Africa	Suriname	Thailand*	Macedonia
Botswana*	Uruguay	Timor-Leste	Malta
Lesotho	Venezuela*	Vietnam*	Portugal*
Namibia*			Serbia
South Africa*	**OCEANIA**	**Western Asia**	Slovenia*
Swaziland	Australia*	Armenia*	Spain*
	Fiji	Azerbaijan*	
Western Africa	New Zealand*	Cyprus	**Western Europe**
Benin	Papa New Guinea	Georgia	Austria*
Burkina Faso*		Iraq	Belgium*
Cape Verde		Israel*	France*
Côte d'Ivoire*		Jordan*	Germany*
Gambia		Qatar	Luxembourg*
Ghana*		Syria	Netherlands*
Guinea		Turkey*	Switzerland*
Guinea-Bissau		Yemen	
Liberia			
Mali			
Mauritania			
Niger			
Nigeria*			
Senegal*			
Sierra Leone			
Togo			

Note: Countries marked with a "*" are sample countries for both levels and growth calculations. Countries without a "*" only form part of the sample for the 2007 levels calculation. Mauritius only entered the growth calculations due to the lack of data on inequality. For reference see United Nations Statistics Division (2013).

Appendix D: Graphical Illustration of Results

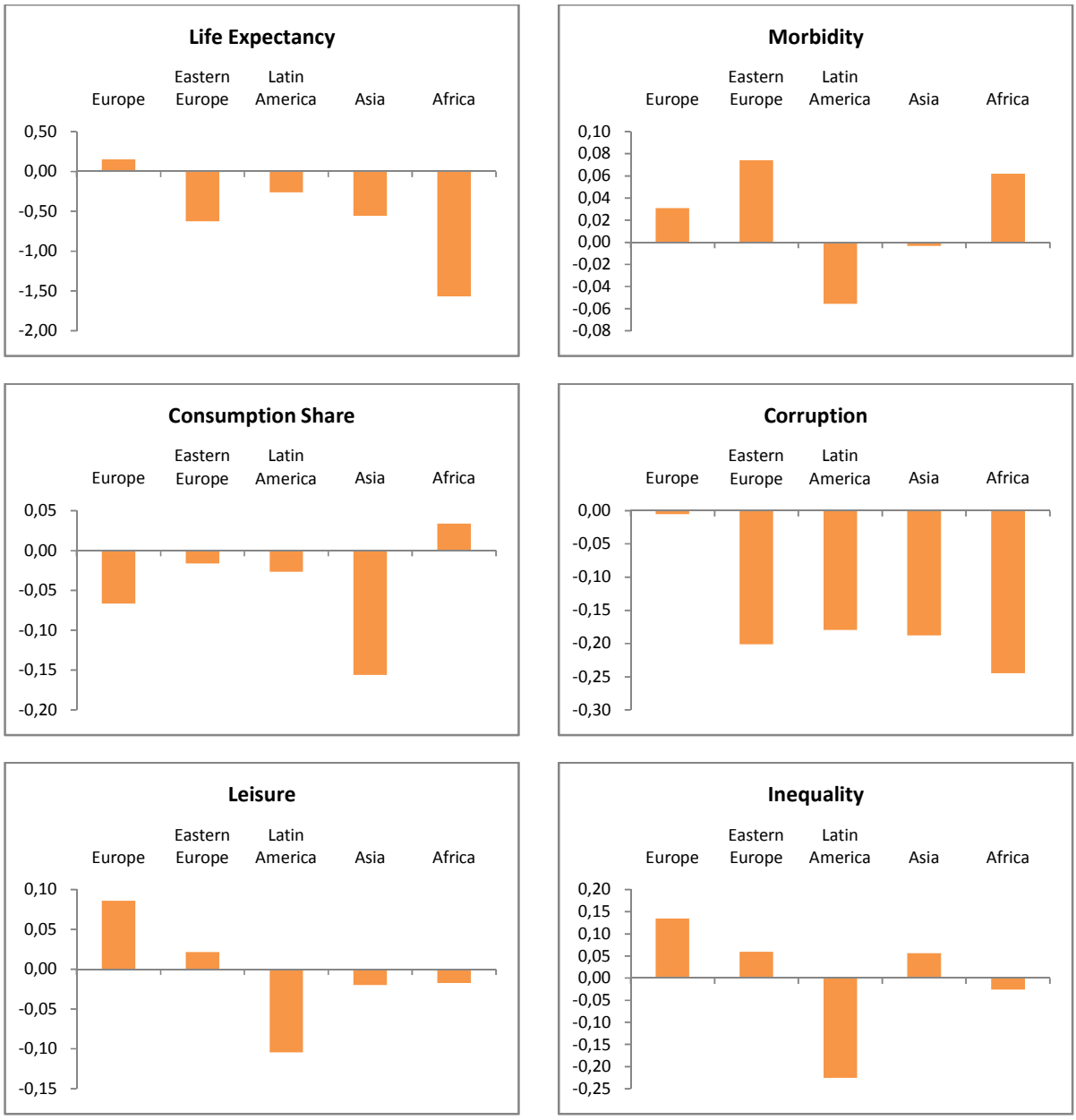
D.1 Welfare in 2007

Figure 13: Detailed Welfare Determinants in Major Regions, 2007



Note: The vertical axes measure the difference in welfare (in %) caused by the various factors.

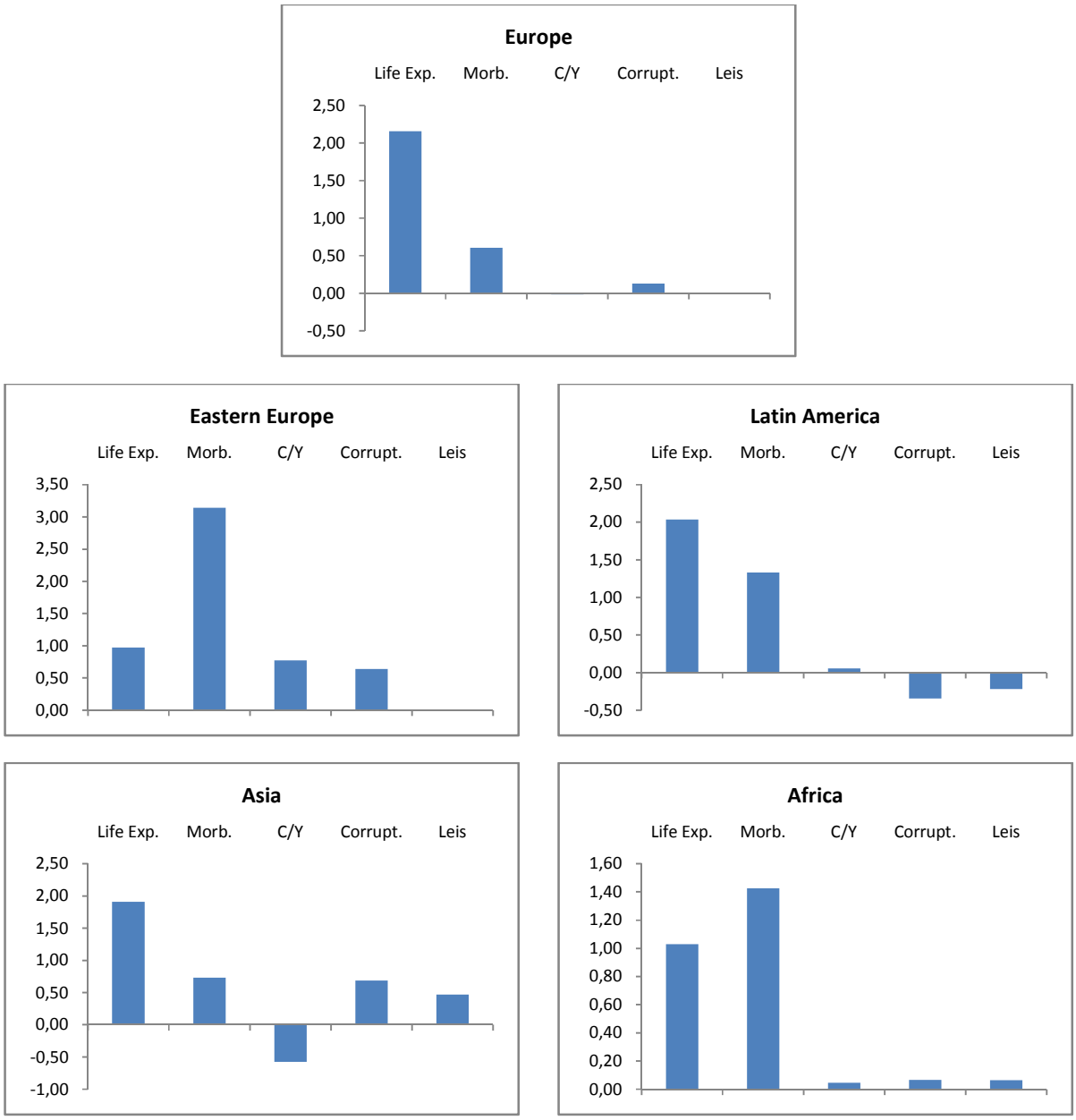
Figure 14: Welfare Impacts of the Six Factors on Major Regions, 2007



Note: The vertical axes measure the difference in welfare (in %) caused by the various factors.

D.2 Welfare Growth 2000-2007

Figure 15: Detailed Welfare Growth Determinants in Major Regions, 2000-2007



Note: The vertical axes measure the difference in welfare growth (in %) caused by the various factors.

Figure 16: Impact of Various Factors on Welfare Growth, 2000-2007

Note: The vertical axes measure the difference in welfare growth (in %) caused by the various factors. Morbidity was omitted due to the shortcomings of the underlying data source.

Appendix E: Results for All Countries

E.1 Welfare in 2007

Table 14: Results for All Countries, Welfare 2007

	Welfare	p.c.	Log	Decomposition of Log Ratio					
COUNTRY	(λ)	Income	Ratio	Life Exp.	Morbidity	C/Y	Corruption	Leisure	Inequality
Norway	154.15	118.56	0.262	0.221	0.000	-0.316	0.076	0.085	0.196
				81	8	0.599	8.7	0.84	23.7
Sweden	140.55	82.59	0.532	0.215	0.072	-0.106	0.107	0.045	0.199
				81	7	0.738	9.3	0.827	23.4
Netherlands	135.52	88.81	0.423	0.145	0.073	-0.149	0.092	0.100	0.163
				80	7	0.707	9	0.845	27.6
Luxembourg	133.15	179.56	-0.299	0.145	0.073	-0.559	0.060	-0.183	0.164
				80	7	0.47	8.4	0.766	27.4
Iceland	129.38	98.31	0.275	0.285	0.000	-0.134	0.102	-0.136	0.159
				82	8	0.718	9.2	0.777	28
Australia	122.40	93.21	0.272	0.284	0.000	-0.141	0.070	-0.020	0.079
				82	8	0.713	8.6	0.808	35.2
France	121.34	74.32	0.490	0.217	0.000	-0.044	0.005	0.141	0.172
				81	8	0.785	7.3	0.86	26.6
Japan	120.77	74.54	0.483	0.347	0.069	-0.145	0.014	0.010	0.187
				83	7	0.71	7.5	0.816	24.9
Switzerland	120.43	90.86	0.282	0.279	0.070	-0.220	0.091	-0.055	0.117
				82	7	0.659	9	0.798	32
UK	118.02	80.85	0.378	0.146	0.000	0.027	0.061	0.035	0.110
				80	8	0.843	8.4	0.824	32.6
Denmark	115.97	82.52	0.340	0.000	0.145	-0.148	0.114	0.045	0.184
				78	6	0.708	9.4	0.827	25.2
Germany	115.75	77.63	0.399	0.144	0.072	-0.117	0.030	0.136	0.135
				80	7	0.73	7.8	0.858	30.4
Canada	113.53	87.23	0.264	0.214	0.000	-0.107	0.076	-0.030	0.110
				81	8	0.738	8.7	0.805	32.6
Austria	113.18	88.69	0.244	0.145	0.000	-0.157	0.045	0.035	0.175
				80	8	0.702	8.1	0.824	26.2
Belgium	108.39	82.16	0.277	0.145	0.000	-0.170	-0.005	0.132	0.174
				80	8	0.693	7.1	0.857	26.3
Finland	105.25	79.14	0.285	0.072	0.072	-0.178	0.114	0.030	0.175
				79	7	0.687	9.4	0.822	26.2
United States	100.00	100.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				78	8	0.821	7.2	0.813	40.8
Spain	96.37	67.26	0.360	0.210	0.070	-0.091	-0.024	0.070	0.125
				81	7	0.75	6.7	0.835	31.3
Italy	94.79	69.41	0.312	0.281	0.000	-0.103	-0.092	0.111	0.115
				82	8	0.74	5.2	0.849	32.2
Ireland	91.96	93.81	-0.020	0.141	0.070	-0.320	0.015	-0.051	0.125
				80	7	0.596	7.5	0.799	31.3
New Zealand	88.04	64.68	0.308	0.208	0.000	-0.038	0.114	-0.041	0.066
				81	8	0.791	9.4	0.802	36.2
Greece	74.45	62.36	0.177	0.142	0.000	0.043	-0.120	0.023	0.090
				80	8	0.857	4.6	0.82	34.3
Malta	71.14	49.82	0.356	0.140	0.000	0.022	-0.066	0.086	0.174
				80	8	0.839	5.8	0.84	26.3
Israel	64.35	57.64	0.110	0.205	0.000	-0.070	-0.052	0.003	0.024
				81	8	0.766	6.1	0.814	39.2
Slovenia	60.81	58.38	0.041	0.000	0.070	-0.181	-0.029	0.056	0.126
				78	7	0.685	6.6	0.83	31.2
Singapore	55.54	108.86	-0.673	0.199	0.000	-0.655	0.108	-0.298	-0.027
				81	8	0.427	9.3	0.741	42.5
Qatar	50.85	223.55	-1.481	-0.146	-0.073	-0.963	-0.059	-0.235	-0.005
				76	9	0.313	6	0.755	41.1
Czech Rep.	49.77	52.27	-0.049	-0.070	0.070	-0.155	-0.095	0.018	0.183
				77	7	0.703	5.2	0.819	25.3
Portugal	47.86	47.32	0.011	0.068	0.000	-0.008	-0.034	-0.072	0.058
				79	8	0.814	6.5	0.794	36.8

Appendix E: Results for All Countries

	Welfare	p.c.	Log	---------- Decomposition of Log Ratio ----------					
COUNTRY	(λ)	Income	Ratio	Life Exp.	Morbidity	C/Y	Corruption	Leisure	Inequality
Cyprus	43.79	44.32	-0.012	0.138	-0.138	-0.006	-0.090	-0.056	0.141
				80	10	0.816	5.3	0.798	29.8
South Korea	37.14	57.01	-0.428	0.067	0.000	-0.306	-0.099	-0.212	0.122
				79	8	0.605	5.1	0.76	31.6
Slovak Rep.	35.35	41.11	-0.151	-0.212	0.000	-0.052	-0.111	0.034	0.190
				75	8	0.779	4.9	0.823	24.5
Hungary	32.90	39.56	-0.184	-0.355	0.071	-0.052	-0.093	0.065	0.181
				73	7	0.779	5.3	0.833	25.6
Croatia	30.14	35.09	-0.152	-0.137	0.000	-0.067	-0.146	0.100	0.097
				76	8	0.768	4.1	0.845	33.7
Estonia	29.40	40.86	-0.329	-0.349	0.070	-0.061	-0.035	-0.055	0.101
				73	7	0.773	6.5	0.798	33.4
Poland	27.10	34.74	-0.248	-0.207	0.000	-0.007	-0.142	-0.007	0.115
				75	8	0.815	4.2	0.811	32.2
Lithuania	21.96	33.81	-0.431	-0.503	0.000	0.078	-0.119	0.016	0.096
				71	8	0.888	4.8	0.818	33.8
Bulgaria	20.86	23.46	-0.118	-0.341	0.068	0.116	-0.148	0.110	0.078
				73	7	0.922	4.1	0.848	35.3
Latvia	19.56	31.22	-0.467	-0.488	0.070	0.091	-0.118	-0.098	0.076
				71	7	0.899	4.8	0.787	35.4
Turkey	17.89	23.46	-0.271	-0.335	0.067	0.016	-0.148	0.106	0.023
				73	7	0.834	4.1	0.847	39.26
Trinidad & Tobago	17.83	65.01	-1.294	-0.648	0.072	-0.555	-0.184	0.014	0.008
				69	7	0.471	3.4	0.817	40.3
Costa Rica	17.80	25.51	-0.360	0.064	-0.127	-0.054	-0.105	0.014	-0.152
				79	10	0.778	5	0.818	49.25
Romania	16.94	21.66	-0.246	-0.339	0.000	0.117	-0.167	0.027	0.116
				73	8	0.923	3.7	0.821	32.1
Chile	16.76	27.53	-0.496	0.000	0.000	-0.198	-0.010	-0.080	-0.208
				78	8	0.674	7	0.791	51.84
Uruguay	15.57	22.79	-0.381	-0.192	0.000	-0.048	-0.025	-0.005	-0.111
				75	8	0.782	6.7	0.812	47.2
Serbia	15.44	18.66	-0.190	-0.336	0.000	0.173	-0.180	0.009	0.145
				73	8	0.976	3.4	0.816	29.4
Belarus	14.57	25.84	-0.573	-0.567	0.000	0.005	-0.241	0.078	0.152
				70	8	0.825	2.1	0.837	28.74
Mexico	14.53	28.07	-0.658	-0.129	-0.065	-0.030	-0.173	-0.129	-0.133
				76	9	0.797	3.5	0.779	48.3
Bosnia & Herzog.	14.45	12.89	0.114	-0.194	0.000	0.258	-0.181	0.165	0.066
				75	8	1.062	3.3	0.87	36.2
Macedonia	13.97	16.84	-0.187	-0.262	0.000	0.200	-0.183	0.090	-0.032
				74	8	1.003	3.3	0.841	42.78
St. Lucia	13.88	28.55	-0.722	-0.193	-0.064	-0.221	-0.020	-0.194	-0.029
				75	9	0.658	6.8	0.764	42.6
Argentina	13.61	25.33	-0.621	-0.193	0.000	-0.086	-0.198	-0.029	-0.114
				75	8	0.753	2.9	0.805	47.37
Russia	11.07	32.48	-1.076	-0.856	0.143	-0.101	-0.237	0.022	-0.047
				66	6	0.742	2.3	0.82	43.71
Jamaica	10.93	21.17	-0.660	-0.395	0.000	0.142	-0.186	-0.142	-0.079
				72	8	0.946	3.3	0.776	45.5
Dominican Rep.	10.20	21.26	-0.734	-0.400	-0.067	0.082	-0.200	-0.008	-0.141
				72	9	0.891	3	0.811	48.69
Malaysia	10.08	26.15	-0.953	-0.388	0.000	-0.400	-0.104	0.027	-0.088
				72	8	0.551	5.1	0.821	46
Tunisia	10.08	13.74	-0.310	-0.251	0.000	-0.058	-0.143	0.152	-0.009
				74	8	0.775	4.2	0.864	41.4
Venezuela	9.77	22.59	-0.838	-0.190	-0.063	-0.168	-0.237	-0.114	-0.067
				75	9	0.694	2	0.783	44.8
Jordan	9.59	10.47	-0.087	-0.394	-0.066	0.209	-0.124	0.191	0.096
				72	9	1.012	4.7	0.881	33.82
Albania	9.41	13.89	-0.390	-0.390	0.000	0.081	-0.203	0.034	0.088
				72	8	0.89	2.9	0.824	34.5
Iran	9.09	21.89	-0.879	-0.411	-0.205	-0.237	-0.226	0.163	0.037
				72	11	0.648	2.5	0.869	38.3
Panama	8.56	21.30	-0.912	-0.122	-0.061	-0.249	-0.186	-0.010	-0.285
				76	9	0.64	3.2	0.811	55.06

Appendix E: Results for All Countries

	Welfare	p.c.	Log	Decomposition of Log Ratio					
COUNTRY	(λ)	Income	Ratio	Life Exp.	Morbidity	C/Y	Corruption	Leisure	Inequality
Ukraine	8.10	15.48	-0.648	-0.688	0.000	0.116	-0.219	0.000	0.142
				68	8	0.922	2.7	0.813	29.65
El Salvador	7.80	14.48	-0.618	-0.401	-0.200	0.216	-0.159	0.032	-0.107
				72	11	1.019	4	0.823	46.97
Armenia	7.54	12.25	-0.485	-0.602	0.000	0.130	-0.204	0.054	0.136
				69	8	0.935	3	0.83	30.23
Georgia	7.41	10.15	-0.314	-0.378	0.000	0.219	-0.181	0.005	0.022
				72	8	1.022	3.4	0.815	39.37
Belize	6.98	21.47	-1.123	-0.676	0.000	-0.010	-0.206	0.005	-0.237
				68	8	0.813	3	0.815	53.1
Colombia	6.68	16.52	-0.906	-0.180	-0.060	0.002	-0.161	-0.119	-0.388
				75	9	0.822	3.8	0.782	58.88
Brazil	6.50	17.99	-1.018	-0.310	-0.062	-0.038	-0.177	-0.125	-0.306
				73	9	0.79	3.5	0.78	55.89
Fiji	6.38	10.25	-0.474	-0.576	0.064	0.187	-0.157	0.041	-0.032
				69	7	0.989	4	0.825	42.8
Thailand	6.34	17.37	-1.008	-0.514	0.000	-0.189	-0.189	-0.092	-0.025
				70	8	0.679	3.3	0.789	42.35
Peru	6.24	14.75	-0.860	-0.117	-0.058	-0.099	-0.173	-0.209	-0.204
				76	9	0.743	3.5	0.761	51.65
Kazakhstan	6.02	24.52	-1.404	-1.013	0.000	-0.201	-0.255	-0.065	0.129
				64	8	0.671	2.1	0.796	30.88
Maldives	5.82	10.18	-0.558	-0.306	-0.061	-0.053	-0.186	-0.002	0.050
				73	9	0.779	3.3	0.813	37.4
Egypt	5.80	10.22	-0.566	-0.662	0.000	0.034	-0.210	0.141	0.130
				68	8	0.85	2.9	0.86	30.8
China	5.70	13.77	-0.882	-0.235	0.000	-0.327	-0.174	-0.119	-0.027
				74	8	0.592	3.5	0.782	42.5
Syria	5.34	8.93	-0.514	-0.372	-0.062	-0.092	-0.226	0.167	0.071
				72	9	0.749	2.4	0.87	35.8
Algeria	5.21	14.25	-1.007	-0.440	-0.063	-0.557	-0.202	0.177	0.078
				71	9	0.47	3	0.874	35.3
Ecuador	5.00	13.58	-0.998	-0.302	-0.060	-0.079	-0.237	-0.053	-0.266
				73	9	0.758	2.1	0.799	54.31
Sri Lanka	4.97	8.31	-0.513	-0.428	0.000	0.025	-0.192	0.074	0.008
				71	8	0.842	3.2	0.836	40.3
Guatemala	4.82	13.75	-1.048	-0.583	-0.065	0.148	-0.215	-0.027	-0.306
				69	9	0.952	2.8	0.806	55.9
Turkmenistan	4.75	29.17	-1.815	-1.080	0.000	-0.448	-0.262	-0.025	0.000
				63	8	0.525	2	0.806	40.8
Moldova	4.73	5.58	-0.167	-0.570	0.000	0.379	-0.213	0.159	0.078
				69	8	1.2	2.8	0.867	35.27
Azerbaijan	4.44	15.84	-1.273	-0.657	-0.066	-0.405	-0.247	0.004	0.097
				68	9	0.548	2.1	0.814	33.7
Paraguay	3.87	8.45	-0.779	-0.234	-0.117	0.111	-0.224	-0.073	-0.242
				74	10	0.917	2.4	0.793	53.31
Morocco	3.71	7.64	-0.724	-0.360	-0.120	-0.180	-0.180	0.119	-0.002
				72	10	0.686	3.5	0.851	40.9
Nicaragua	3.70	5.26	-0.352	-0.290	-0.058	0.187	-0.216	0.020	0.005
				73	9	0.99	2.6	0.819	40.5
Honduras	3.38	8.23	-0.890	-0.418	-0.060	0.101	-0.224	0.024	-0.313
				71	9	0.908	2.5	0.82	56.16
Indonesia	3.35	8.10	-0.883	-0.621	0.000	-0.084	-0.237	-0.036	0.094
				68	8	0.755	2.3	0.803	34
Suriname	3.34	24.34	-1.986	-0.544	0.000	-1.127	-0.182	0.099	-0.232
				69	8	0.266	3.5	0.845	52.9
Cape Verde	3.33	7.61	-0.827	-0.480	-0.060	0.021	-0.116	-0.015	-0.178
				70	9	0.839	4.9	0.809	50.5
Philippines	3.31	6.91	-0.734	-0.417	-0.060	0.019	-0.224	0.000	-0.053
				71	9	0.837	2.5	0.813	44.04
Viet Nam	2.75	5.47	-0.686	-0.335	0.000	-0.060	-0.216	-0.146	0.072
				72	8	0.773	2.6	0.775	35.75
Gabon	2.73	23.07	-2.135	-1.367	0.072	-0.658	-0.208	0.038	-0.011
				59	7	0.425	3.3	0.825	41.5
Mongolia	2.72	7.21	-0.976	-0.881	0.126	-0.116	-0.210	0.043	0.062
				64	6	0.731	3	0.826	36.5

Appendix E: Results for All Countries

	Welfare	p.c.	Log	Decomposition of Log Ratio					
COUNTRY	(λ)	Income	Ratio	Life Exp.	Morbidity	C/Y	Corruption	Leisure	Inequality
Iraq	2.70	9.24	-1.230	-1.039	-0.069	-0.157	-0.287	0.192	0.129
				63	9	0.702	1.5	0.881	30.9
Guyana	2.62	9.27	-1.264	-1.263	0.070	0.192	-0.239	0.038	-0.061
				60	7	0.994	2.6	0.825	44.5
Kyrgyzstan	2.50	4.83	-0.659	-0.767	-0.064	0.340	-0.252	-0.016	0.101
				66	9	1.153	2.1	0.809	33.43
Bhutan	2.36	7.78	-1.192	-0.979	0.000	-0.060	-0.118	-0.075	0.040
				63	8	0.773	5	0.793	38.1
India	2.33	6.68	-1.055	-0.900	0.000	-0.117	-0.190	0.052	0.101
				64	8	0.73	3.5	0.829	33.4
Bolivia	2.17	8.22	-1.332	-0.734	0.000	0.044	-0.214	-0.081	-0.348
				66	8	0.858	2.9	0.791	57.44
Pakistan	2.04	5.06	-0.910	-0.977	0.000	0.069	-0.244	0.102	0.139
				63	8	0.88	2.4	0.846	30
Tajikistan	2.02	3.66	-0.597	-0.685	-0.124	0.437	-0.252	-0.083	0.111
				67	10	1.27	2.1	0.791	32.55
Uzbekistan	1.98	5.12	-0.951	-0.595	-0.060	-0.129	-0.265	0.038	0.059
				68	9	0.722	1.7	0.825	36.7
Yemen	1.74	5.34	-1.118	-0.915	-0.131	-0.022	-0.241	0.145	0.046
				64	10	0.803	2.5	0.861	37.69
South Africa	1.58	16.97	-2.371	-1.775	0.148	-0.037	-0.122	0.093	-0.677
				54	6	0.791	5.1	0.842	67.4
Namibia	1.52	10.79	-1.961	-1.266	0.067	-0.077	-0.148	0.011	-0.547
				59	7	0.76	4.5	0.817	63.9
Botswana	1.48	22.83	-2.739	-1.569	0.071	-0.553	-0.104	-0.133	-0.452
				56	7	0.472	5.4	0.778	61
Papua New Guin.	1.36	5.71	-1.432	-0.909	0.061	-0.043	-0.259	-0.094	-0.187
				63	7	0.786	2	0.788	50.9
Laos	1.27	4.83	-1.339	-1.071	0.063	0.042	-0.269	-0.163	0.059
				61	7	0.856	1.9	0.771	36.7
Timor-Leste	1.24	2.20	-0.572	-1.090	0.000	0.576	-0.239	0.063	0.118
				61	8	1.46	2.6	0.833	31.9
Sao Tome & Prin.	1.22	3.39	-1.024	-1.087	0.000	0.430	-0.235	0.053	-0.185
				61	8	1.262	2.7	0.829	50.8
Djibouti	1.18	4.95	-1.432	-1.595	0.000	0.266	-0.238	0.123	0.012
				56	8	1.071	2.9	0.853	40
Mauritania	1.15	4.43	-1.351	-1.336	0.067	0.053	-0.245	0.106	0.005
				58	7	0.866	2.6	0.847	40.5
Sudan	1.11	4.69	-1.441	-1.372	0.000	0.040	-0.286	0.100	0.078
				58	8	0.854	1.8	0.845	35.3
Bangladesh	0.99	2.77	-1.030	-0.812	0.000	0.009	-0.259	-0.070	0.103
				64	8	0.828	2	0.794	33.22
Ghana	0.94	4.20	-1.501	-1.395	0.066	0.106	-0.193	-0.054	-0.032
				57	7	0.913	3.7	0.798	42.8
Cambodia	0.90	3.97	-1.483	-1.050	0.000	0.104	-0.267	-0.210	-0.059
				61	8	0.911	2	0.76	44.37
Haiti	0.82	3.02	-1.300	-0.954	0.000	0.335	-0.282	-0.001	-0.397
				62	8	1.148	1.6	0.813	59.2
Senegal	0.82	3.36	-1.413	-1.208	0.000	0.106	-0.196	-0.140	0.024
				59	8	0.913	3.6	0.777	39.2
Nepal	0.78	2.44	-1.134	-0.861	0.000	0.094	-0.239	-0.236	0.108
				63	8	0.902	2.5	0.755	32.8
Comoros	0.65	2.09	-1.171	-0.708	-0.054	0.315	-0.232	0.070	-0.561
				65	9	1.125	2.6	0.835	64.3
Swaziland	0.64	7.91	-2.518	-2.414	0.161	0.155	-0.237	0.017	-0.200
				48	6	0.958	3.3	0.818	51.5
Benin	0.61	2.74	-1.500	-1.329	0.063	0.065	-0.243	-0.089	0.033
				57	7	0.876	2.7	0.789	38.6
Gambia	0.60	2.73	-1.520	-1.169	0.000	0.171	-0.259	-0.151	-0.113
				59	8	0.974	2.3	0.774	47.3
Cameroon	0.53	4.12	-2.055	-1.873	0.072	0.055	-0.274	-0.063	0.029
				52	7	0.867	2.4	0.796	38.9
Angola	0.52	9.45	-2.898	-1.800	0.000	-0.375	-0.284	-0.058	-0.380
				53	8	0.564	2.2	0.797	58.6
Togo	0.52	1.71	-1.196	-1.206	0.060	0.308	-0.259	-0.188	0.089
				58	7	1.117	2.3	0.765	34.4

Appendix E: Results for All Countries

	Welfare	p.c.	Log	Decomposition of Log Ratio					
COUNTRY	(λ)	Income	Ratio	Life Exp.	Morbidity	C/Y	Corruption	Leisure	Inequality
Kenya	0.51	2.75	-1.690	-1.575	0.131	0.167	-0.278	-0.014	-0.121
				54	6	0.97	2.1	0.809	47.7
Côte d'Ivoire	0.49	3.03	-1.831	-1.613	0.067	0.035	-0.282	-0.027	-0.011
				54	7	0.851	2.1	0.806	41.5
Congo	0.45	5.07	-2.412	-1.488	0.065	-0.536	-0.278	-0.062	-0.113
				55	7	0.48	2.1	0.796	47.3
Madagascar	0.42	1.74	-1.432	-1.074	0.057	0.177	-0.213	-0.266	-0.112
				59	7	0.98	3.2	0.748	47.24
Liberia	0.39	0.95	-0.898	-1.393	0.000	0.700	-0.278	0.034	0.039
				56	8	1.653	2.1	0.823	38.2
Ethiopia	0.35	1.30	-1.303	-1.235	0.059	0.228	-0.257	-0.239	0.141
				57	7	1.031	2.4	0.754	29.8
Nigeria	0.31	4.01	-2.566	-2.161	0.075	-0.125	-0.296	0.085	-0.143
				49	7	0.724	2.2	0.84	48.8
Lesotho	0.30	3.07	-2.311	-2.614	0.238	0.559	-0.244	-0.026	-0.223
				45	5	1.435	3.3	0.806	52.5
Guinea	0.30	1.90	-1.835	-1.519	0.063	-0.032	-0.292	-0.077	0.021
				54	7	0.795	1.9	0.792	39.4
Tanzania	0.29	2.41	-2.111	-1.730	0.067	0.045	-0.232	-0.309	0.047
				52	7	0.859	3.2	0.739	37.6
Mali	0.26	2.17	-2.130	-2.107	0.073	0.039	-0.270	0.108	0.027
				49	7	0.853	2.7	0.848	38.99
Uganda	0.24	2.45	-2.331	-2.157	0.144	0.136	-0.264	-0.160	-0.029
				48	6	0.941	2.8	0.772	42.62
Guinea-Bissau	0.23	1.88	-2.096	-2.159	0.144	0.231	-0.296	-0.091	0.075
				48	6	1.034	2.2	0.789	35.5
Burkina Faso	0.23	2.07	-2.209	-2.002	0.138	0.126	-0.255	-0.231	0.015
				49	6	0.931	2.9	0.756	39.8
Rwanda	0.20	2.14	-2.356	-1.906	0.068	0.228	-0.260	-0.249	-0.237
				50	7	1.031	2.8	0.752	53.09
Niger	0.20	1.21	-1.790	-1.776	0.066	0.106	-0.267	-0.005	0.086
				51	7	0.912	2.6	0.812	34.6
Zambia	0.17	2.99	-2.865	-2.377	0.149	0.099	-0.284	-0.178	-0.273
				46	6	0.906	2.6	0.768	54.6
Malawi	0.17	1.24	-1.994	-1.798	0.128	0.130	-0.262	-0.220	0.027
				50	6	0.935	2.7	0.758	39
Mozambique	0.16	1.63	-2.333	-2.049	0.137	0.175	-0.264	-0.249	-0.083
				48	6	0.978	2.8	0.752	45.7
Chad	0.15	2.88	-2.925	-2.362	0.148	-0.310	-0.327	-0.088	0.015
				46	6	0.602	1.8	0.79	39.8
Afghanistan	0.14	2.02	-2.638	-3.085	0.171	0.329	-0.351	0.136	0.161
				42	6	1.141	1.8	0.858	27.8
Burundi	0.14	0.89	-1.865	-1.880	0.130	0.280	-0.276	-0.220	0.102
				49	6	1.086	2.5	0.758	33.3
Cen. African Rep.	0.11	1.24	-2.415	-1.965	0.131	0.205	-0.307	-0.162	-0.317
				48	6	1.008	2	0.771	56.3
Sierra Leone	0.07	1.84	-3.210	-3.064	0.166	0.090	-0.339	-0.035	-0.027
				41	6	0.898	2.1	0.804	42.5
Zimbabwe	0.06	0.73	-2.562	-2.219	0.134	0.273	-0.316	-0.265	-0.170
				45	6	1.078	2.1	0.748	50.1

Note: See description of Table 1.

E.2 Welfare Growth 2000-2007

Table 15: Results for All Countries, Average Annual Welfare Growth 2000-2007

COUNTRY	Welfare Growth (λ)	Income Growth	Difference	Decomposition of Difference: Life Exp.	Morbidity	C/Y	Corruption	Leisure
Azerbaijan	15.88	15.18	0.70	2.899	0.630	-4.419	1.393	0.197
				64; 68	9.9; 9	0.746; 0.548	1.5; 2.1	0.811; 0.814
Ukraine	14.49	7.77	6.73	0.000	2.607	2.204	2.112	-0.194
				68; 68	11.1; 8	0.79; 0.922	1.5; 2.7	0.817; 0.813
Angola	14.45	8.34	6.10	3.239	1.137	0.148	1.119	0.462
				49; 53	9.4; 8	0.559; 0.564	1.7; 2.2	0.789; 0.797
Latvia	13.76	7.38	6.38	0.000	4.888	0.255	1.421	-0.184
				71; 71	12.2; 7	0.883; 0.899	3.4; 4.8	0.79; 0.787
Russia	13.46	7.14	6.32	1.000	4.219	0.779	0.439	-0.114
				65; 66	10.2; 6	0.703; 0.742	2.1; 2.3	0.822; 0.82
Estonia	12.38	6.75	5.62	1.910	3.010	0.160	0.617	-0.074
				71; 73	10.2; 7	0.764; 0.773	5.7; 6.5	0.8; 0.798
Lithuania	12.28	6.57	5.72	-1.002	5.648	0.229	0.728	0.113
				72; 71	13.6; 8	0.873; 0.888	4.1; 4.8	0.816; 0.818
China	11.84	8.61	3.24	1.836	0.502	-0.265	0.574	0.590
				71; 74	8.8; 8	0.603; 0.592	3.1; 3.5	0.772; 0.782
Turkey	11.66	3.34	8.32	2.740	3.641	0.278	0.370	1.287
				70; 73	11; 7	0.818; 0.834	3.8; 4.1	0.818; 0.847
Romania	11.39	6.24	5.15	1.696	0.095	1.363	1.067	0.925
				71; 73	8.1; 8	0.839; 0.923	2.9; 3.7	0.803; 0.821
Slovakia	10.64	4.89	5.75	1.961	2.928	-0.871	1.393	0.341
				73; 75	11; 8	0.828; 0.779	3.5; 4.9	0.816; 0.823
Nigeria	10.60	5.53	5.07	1.458	1.487	-0.246	2.157	0.214
				47; 49	9; 7	0.737; 0.724	1.2; 2.2	0.835; 0.84
Armenia	10.58	10.72	-0.15	-0.751	0.615	-1.819	0.829	0.980
				70; 69	8.8; 8	1.062; 0.935	2.5; 3	0.809; 0.83
Moldova	10.21	5.41	4.79	0.667	0.224	1.806	0.361	1.737
				68; 69	8.3; 8	1.057; 1.2	2.6; 2.8	0.825; 0.867
Bulgaria	8.90	6.17	2.73	0.882	0.645	0.619	0.730	-0.142
				72; 73	7.7; 7	0.883; 0.922	3.5; 4.1	0.852; 0.848
India	8.76	5.92	2.84	2.023	0.867	-1.323	0.989	0.284
				61; 64	9.3; 8	0.801; 0.73	2.8; 3.5	0.823; 0.829
Czech Rep.	8.62	4.24	4.39	1.922	2.145	-1.177	0.860	0.637
				75; 77	9.2; 7	0.764; 0.703	4.3; 5.2	0.806; 0.819
Botswana	8.50	2.98	5.52	4.908	0.182	0.994	-0.581	0.021
				51; 56	7.2; 7	0.44; 0.472	6; 5.4	0.778; 0.778
Vietnam	8.46	6.07	2.39	0.989	0.936	-0.179	0.196	0.446
				70; 72	9.9; 8	0.783; 0.773	2.5; 2.6	0.768; 0.775
Tanzania	8.31	4.70	3.62	1.801	0.632	-0.083	1.079	0.187
				48; 52	8.4; 7	0.864; 0.859	2.5; 3.2	0.736; 0.739
Malaysia	8.30	3.15	5.14	0.812	1.362	2.311	0.298	0.358
				71; 72	9.7; 8	0.468; 0.551	4.8; 5.1	0.814; 0.821
Kazakhstan	8.21	10.71	-2.49	0.908	0.826	-2.022	-2.383	0.179
				63; 64	8.9; 8	0.773; 0.671	3; 2.1	0.792; 0.796
Poland	8.04	4.12	3.91	0.948	3.480	-0.493	0.121	-0.141
				74; 75	11.7; 8	0.844; 0.815	4.1; 4.2	0.814; 0.811
Hungary	8.03	3.38	4.65	1.002	3.835	-0.213	0.096	-0.069
				72; 73	10.8; 7	0.791; 0.779	5.2; 5.3	0.835; 0.833
Singapore	7.76	4.34	3.42	2.739	1.802	-1.124	0.110	-0.108
				78; 81	10; 8	0.461; 0.427	9.1; 9.3	0.743; 0.741
Slovenia	7.48	3.83	3.65	1.948	1.720	-0.900	0.829	0.055
				76; 78	8.8; 7	0.729; 0.685	5.5; 6.6	0.829; 0.83
South Korea	7.45	4.11	3.35	2.647	0.344	-0.478	1.064	-0.230
				76; 79	8.4; 8	0.625; 0.605	4; 5.1	0.764; 0.76
Croatia	7.28	3.75	3.53	1.883	1.701	-0.680	0.491	0.135
				74; 76	9.8; 8	0.805; 0.768	3.7; 4.1	0.842; 0.845
Mozambique	7.07	5.63	1.44	-0.370	0.522	-0.070	1.057	0.298
				49; 48	7.4; 6	0.983; 0.978	2.2; 2.8	0.747; 0.752
Ireland	7.00	2.63	4.38	4.014	0.536	-0.068	0.203	-0.310
				76; 80	7.5; 7	0.599; 0.596	7.2; 7.5	0.805; 0.799

Appendix E: Results for All Countries

COUNTRY	Welfare Growth (λ)	Income Growth	Difference	Decomposition of Difference: Life Exp.	Morbidity	C/Y	Corruption	Leisure
Mauritius	6.82	3.12	3.71	1.757	0.544	1.009	0.000	0.398
				71; 73	10.6; 10	0.737; 0.791	4.7; 4.7	0.821; 0.829
Thailand	6.80	3.79	3.01	1.570	1.134	-0.078	0.154	0.233
				68; 70	9.4; 8	0.683; 0.679	3.2; 3.3	0.784; 0.789
Uganda	6.65	3.33	3.32	1.174	1.372	-0.976	0.886	0.866
				46; 48	8.3; 6	1.007; 0.941	2.3; 2.8	0.758; 0.772
Jordan	6.60	3.05	3.55	0.822	2.433	0.051	0.109	0.130
				71; 72	12; 9	1.008; 1.012	4.6; 4.7	0.877; 0.881
Colombia	6.10	2.68	3.42	2.342	0.947	-0.532	0.787	-0.120
				72; 75	10.2; 9	0.853; 0.822	3.2; 3.8	0.784; 0.782
Venezuela	6.09	1.71	4.38	0.781	1.724	3.613	-1.915	0.181
				74; 75	11.2; 9	0.539; 0.694	2.7; 2	0.78; 0.783
Chile	5.99	3.14	2.85	0.793	2.003	0.455	-0.296	-0.106
				77; 78	10.5; 8	0.652; 0.674	7.4; 7	0.793; 0.791
Indonesia	5.75	3.24	2.51	1.324	-0.014	-0.164	1.277	0.092
				66; 68	8; 8	0.764; 0.755	1.7; 2.3	0.802; 0.803
Bolivia	5.64	1.55	4.09	2.271	2.147	-0.710	0.349	0.038
				63; 66	10.8; 8	0.902; 0.858	2.7; 2.9	0.791; 0.791
El Salvador	5.61	2.16	3.45	1.785	1.296	0.397	-0.129	0.102
				70; 72	12.5; 11	0.991; 1.019	4.1; 4	0.821; 0.823
Ecuador	5.36	2.75	2.60	2.266	1.478	0.155	-1.275	-0.020
				70; 73	11; 9	0.75; 0.758	2.6; 2.1	0.799; 0.799
Peru	5.33	3.97	1.36	2.806	0.951	-0.771	-1.382	-0.246
				72; 76	10.4; 9	0.785; 0.743	4.4; 3.5	0.764; 0.761
Brazil	5.00	1.85	3.15	2.479	1.725	-0.161	-0.598	-0.291
				70; 73	11.1; 9	0.799; 0.79	3.9; 3.5	0.785; 0.78
Tunisia	4.94	1.44	3.50	0.763	1.474	2.348	-1.275	0.189
				73; 74	9.9; 8	0.657; 0.775	5.2; 4.2	0.859; 0.864
Finland	4.92	2.40	2.51	1.010	1.554	0.019	-0.331	0.261
				78; 79	8.5; 7	0.686; 0.687	10; 9.4	0.817; 0.822
Ghana	4.82	2.96	1.86	-0.651	1.780	-0.513	0.274	0.967
				58; 57	9.7; 7	0.946; 0.913	3.5; 3.7	0.781; 0.798
Norway	4.79	1.61	3.18	2.109	0.022	1.194	-0.237	0.092
				79; 81	8; 8	0.551; 0.599	9.1; 8.7	0.838; 0.84
Canada	4.78	1.68	3.10	2.044	0.761	0.611	-0.297	-0.021
				79; 81	8.7; 8	0.707; 0.738	9.2; 8.7	0.805; 0.805
Japan	4.77	1.14	3.63	1.903	0.316	0.118	0.732	0.563
				81; 83	7.3; 7	0.704; 0.71	6.4; 7.5	0.805; 0.816
Netherlands	4.75	1.33	3.43	2.115	1.570	-0.223	0.057	-0.093
				78; 80	8.5; 7	0.718; 0.707	8.9; 9	0.847; 0.845
Zambia	4.57	3.71	0.86	2.691	0.260	-0.742	-1.670	0.322
				42; 46	6.4; 6	0.955; 0.906	3.4; 2.6	0.762; 0.768
Morocco	4.54	3.41	1.13	1.325	2.238	-0.866	-1.874	0.305
				70; 72	13.4; 10	0.729; 0.686	4.7; 3.5	0.844; 0.851
Ethiopia	4.47	4.21	0.26	1.167	0.387	0.742	-1.818	-0.220
				53; 57	8.3; 7	0.979; 1.031	3.2; 2.4	0.757; 0.754
Senegal	4.45	1.65	2.80	1.161	1.283	0.081	0.142	0.136
				57; 59	10.2; 8	0.907; 0.913	3.5; 3.6	0.774; 0.777
Spain	4.44	1.56	2.88	1.976	1.191	0.395	-0.231	-0.452
				79; 81	8.2; 7	0.729; 0.75	7; 6.7	0.845; 0.835
Italy	4.44	0.62	3.82	3.009	0.000	0.127	0.579	0.107
				79; 82	8; 8	0.734; 0.74	4.6; 5.2	0.846; 0.849
France	4.43	1.12	3.31	2.080	0.463	0.200	0.415	0.157
				79; 81	8.4; 8	0.775; 0.785	6.7; 7.3	0.856; 0.86
Australia	4.39	2.06	2.33	2.019	-0.132	0.226	0.178	0.037
				80; 82	7.9; 8	0.702; 0.713	8.3; 8.6	0.807; 0.808
Belgium	4.31	1.67	2.64	2.100	0.408	-0.415	0.704	-0.153
				78; 80	8.4; 8	0.713; 0.693	6.1; 7.1	0.861; 0.857
United States	4.29	1.33	2.96	1.123	1.627	0.414	-0.433	0.230
				77; 78	9.4; 8	0.798; 0.821	7.8; 7.2	0.809; 0.813
Greece	4.19	3.35	0.84	1.978	-0.903	0.059	-0.338	0.047
				78; 80	7.1; 8	0.853; 0.857	4.9; 4.6	0.819; 0.82
Cameroon	4.14	1.04	3.10	0.000	1.663	0.555	0.829	0.055
				52; 52	9.3; 7	0.834; 0.867	2; 2.4	0.795; 0.796
Portugal	4.13	0.64	3.49	1.901	1.193	0.781	0.079	-0.460
				77; 79	9.3; 8	0.771; 0.814	6.4; 6.5	0.802; 0.794

Appendix E: Results for All Countries

COUNTRY	Welfare Growth (λ)	Income Growth	Difference	Decomposition of Difference: Life Exp.	Morbidity	C/Y	Corruption	Leisure
Germany	4.00	1.15	2.85	2.086	1.082	-0.532	0.131	0.087
				78; 80	8; 7	0.758; 0.73	7.6; 7.8	0.856; 0.858
Mexico	4.00	1.14	2.86	1.733	0.345	0.640	0.290	-0.146
				74; 76	9.4; 9	0.762; 0.797	3.3; 3.5	0.782; 0.779
Belarus	3.97	8.41	-4.43	0.902	-0.104	0.258	-5.967	0.476
				69; 70	7.9; 8	0.811; 0.825	4.1; 2.1	0.827; 0.837
Egypt	3.95	2.70	1.25	0.810	1.746	-0.800	-0.358	-0.150
				67; 68	10.2; 8	0.899; 0.85	3.1; 2.9	0.864; 0.86
New Zealand	3.91	2.05	1.85	1.932	-0.342	0.367	0.000	-0.103
				79; 81	7.6; 8	0.77; 0.791	9.4; 9.4	0.804; 0.802
Sweden	3.77	2.51	1.26	1.013	1.237	-0.818	-0.055	-0.116
				80; 81	8.2; 7	0.782; 0.738	9.4; 9.3	0.829; 0.827
Switzerland	3.75	1.33	2.42	1.964	0.522	-0.325	0.226	0.038
				80; 82	7.5; 7	0.674; 0.659	8.6; 9	0.797; 0.798
Austria	3.68	1.86	1.81	2.081	-0.207	-0.471	0.251	0.160
				78; 80	7.8; 8	0.725; 0.702	7.7; 8.1	0.82; 0.824
Costa Rica	3.59	2.97	0.62	1.696	0.674	-1.282	-0.416	-0.053
				77; 79	10.8; 10	0.851; 0.778	5.4; 5	0.819; 0.818
UK	3.58	2.03	1.55	2.104	-0.535	0.154	-0.184	0.010
				78; 80	7.5; 8	0.834; 0.843	8.7; 8.4	0.824; 0.824
Uzbekistan	3.47	4.89	-1.42	1.147	1.028	-1.369	-2.282	0.058
				66; 68	10.8; 9	0.794; 0.722	2.4; 1.7	0.823; 0.825
Burkina Faso	3.41	2.19	1.22	0.000	1.118	0.043	-0.178	0.242
				49; 49	8.3; 6	0.928; 0.931	3; 2.9	0.752; 0.756
Kenya	3.34	0.76	2.58	0.612	1.354	0.033	0.000	0.581
				53; 54	8.2; 6	0.968; 0.97	2.1; 2.1	0.798; 0.809
Denmark	3.34	1.11	2.23	1.030	0.898	0.476	-0.220	0.047
				77; 78	6.9; 6	0.685; 0.708	9.8; 9.4	0.826; 0.827
Argentina	3.20	3.03	0.16	0.859	1.829	-0.862	-1.101	-0.559
				74; 75	10.1; 8	0.8; 0.753	3.5; 2.9	0.816; 0.805
Israel	2.92	1.45	1.47	1.926	0.636	-0.606	-0.426	-0.062
				79; 81	8.7; 8	0.799; 0.766	6.6; 6.1	0.816; 0.814
Iceland	2.83	1.05	1.78	2.028	0.303	-1.221	0.056	0.618
				80; 82	8.3; 8	0.782; 0.718	9.1; 9.2	0.767; 0.777
Philippines	2.76	2.51	0.25	0.632	-0.048	-0.261	-0.628	0.553
				70; 71	8.9; 9	0.852; 0.837	2.8; 2.5	0.803; 0.813
Namibia	2.68	3.05	-0.37	1.749	0.117	-0.476	-1.063	-0.698
				57; 59	7.1; 7	0.786; 0.76	5.4; 4.5	0.832; 0.817
Luxembourg	2.57	2.70	-0.13	2.118	0.531	-1.495	-0.122	-1.159
				78; 80	7.5; 7	0.521; 0.47	8.6; 8.4	0.786; 0.766
South Africa	0.77	2.99	-2.22	-4.231	1.694	0.337	0.100	-0.118
				58; 54	7.6; 6	0.772; 0.791	5; 5.1	0.845; 0.842
Côte d'Ivoire	-0.17	-1.68	1.50	0.620	0.853	1.476	-1.544	0.099
				53; 54	8.4; 7	0.767; 0.851	2.7; 2.1	0.804; 0.806
Malawi	-0.22	1.81	-2.02	0.961	0.182	0.236	-2.938	-0.463
				47; 50	6.6; 6	0.92; 0.935	4.1; 2.7	0.765; 0.758
Zimbabwe	-4.90	-2.88	-2.02	0.248	0.207	1.625	-2.383	-1.714
				44; 45	6.8; 6	0.962; 1.078	3; 2.1	0.775; 0.748

Note: See description of Table 4.