Quantitative Analysis of Well-being with economic Applications
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Chapter 1

Introduction

1.1 How to measure welfare and well-being?
Individual satisfaction, quality of life, happiness and well-being are broad concepts that include not only material achievements but also other aspects of life, such as health, love, employment, and having children. In other words, individual satisfaction with life is a multi-dimensional concept and income falls short in assessing it. Economics often defines individual welfare in terms of income or material satisfaction. In this thesis, well-being is used to denote individual satisfaction with life, and welfare to refer to the more narrow concept of financial or income satisfaction. In order to be more specific, one needs to agree on the relevant aspects and variables covered by these concepts. In common language, people talk about ‘individual x being happy’ or ‘country y having a high quality of life’. In science, however, researchers are often skeptical about using concepts like happiness and well-being, mainly because it is difficult to measure and define them. Nevertheless, policy makers and international organizations do use quality of life indicators for evaluating and comparing the socio-economic performance of countries. A well-known example is the Human Development Index of the United Nations. To construct such an index, composing indicators need to be selected. For example, if education and health are believed to be relevant for the well-being of a population, indicators such as literacy and the number of hospital beds will be built in the index. The specific choice of indicators to be included in indexes of well-being or quality of life depends on the dimensions that are considered to be relevant, e.g. education, health, employment, and income.

In economics, welfare is linked to the concept of utility. Utility is defined as the satisfaction obtained from ‘consuming a good’. Usually, the utility function depends only on material consumption and excludes non-economic aspects of life that also produce satisfaction, e.g. health and love. Note, however, that some economists interpret ‘consuming a good’ so broadly as to include ‘goods’ such as marriage or altruism. Becker (1973, 1974, 1976) is best known for following this approach. The utility function represents individual
preferences, which in standard economics are taken as given and exogenous to any wider model context. Moreover, it is often assumed that individuals maximize utility under a budget constraint. For given prices, the maximum achievable utility would then only depend on income. A higher income would allow individuals to achieve a higher level of utility and, thus, of material satisfaction and welfare. In standard economics, utility theory is mainly used as a theoretical tool to explain and predict behavior. Since Robbins (1932), most economists are, however, very reluctant to bring utility into an empirical framework, and avoid measuring and comparing the utility levels of different people. Indeed, for most economists the measurement of welfare is a non-issue. Nevertheless, income is often considered as a good proxy for (material) welfare. In fact, most economists assume this is true, even if only implicitly, when placing a high value on GDP/capita as an indicator of country performance, or when using income to measure poverty and inequality. From the foregoing, it can be concluded that economists are inconsistent in their approach to empirical statements about welfare, well-being and happiness.

This thesis starts from the premise that one can use subjective measures as a proxy for measuring welfare and well-being. Subjective measures can be derived from individual answers to questions about individuals’ own perception of their welfare or well-being situation. In other words, such subjective measures are based on self-reported individual satisfaction.

Subjective questions on welfare and well-being have been included in household questionnaires for decades. Psychologists, sociologists and, later, economists have made ample use of these questions. This will be surveyed in Chapter 2. By using the answers to subjective questions, it is not necessary to define precisely what welfare and well-being means or which are the relevant variables. Instead, the researcher allows the individuals themselves to define their level of welfare and well-being. Next, the researcher examines the relationship between the subjective answers and objective economic and non-economic variables, such as income, job situation, age, or marital status, so as to disentangle what is defining and determining individual welfare and well-being. In this connection, there are two main groups of subjective questions. One refers to satisfaction with life as a whole, and has often been termed as ‘subjective well-being’, ‘subjective happiness’, or ‘subjective general satisfaction’. In this thesis, the terms ‘well-being’, ‘happiness’, and ‘general satisfaction’ are
taken as interchangeable. The other group of subjective satisfaction questions refers to individual satisfaction with specific domains of life, such as job, finance, housing, and health situation. The answers to these questions are referred to as Domain Satisfactions, and one speaks, for example, of Job Satisfaction, Financial Satisfaction, House Satisfaction, and Health Satisfaction.

For a meaningful analysis of subjective questions, and to assure the validity and significance of the analysis presented in this thesis, two main assumptions are needed. First, individuals are supposed to be able and willing to evaluate their own situation. This will allow for measurement of welfare, well-being, and utility. Second, responses among individuals are assumed to be interpersonally comparable, at an ordinal or cardinal level. The research presented here is very pragmatic, in the sense that it uses the less restrictive assumption of ordinality whenever possible and assumes cardinality only if necessary.

1.2 Why should we be interested in measuring welfare and well-being?

The empirical analysis of welfare and well-being allows economists and behavioral scientists to address a wide range of scientifically and politically relevant questions that otherwise would not be feasible. Here, four main areas of study are distinguished.

First, subjective questions can be used to disentangle the determinants of welfare and well-being. In other words, the structure of individuals' welfare and well-being can be modeled to study individual preferences (van Praag 1971; Frey and Stutzer, 1999). An example of such an application is presented in Chapter 3 of this thesis. To link the structure of individual well-being to preferences and behavior, it is necessary to make an extra assumption: namely, that individual behavior is driven by the need to achieve higher welfare or well-being, or by the maximization of it. Traditionally, economists have not focused on the study of preferences and have left this to anthropologists, psychologists and sociologists. In Stigler's and Becker's words: "... economists continue to search for differences in prices or incomes to explain any differences or changes in behavior..." (1977, p.76). In recent times, however, there has been an increased awareness of the importance of understanding preferences to disentangle economic behavior (see, e.g., Bowles, 1998; Bowles and Gintis, 2000). Subjective questions can be used for this aim as they provide many new insights. For example, they can be used to test whether higher incomes lead to happier individuals, as is always taken for granted in any
standard economic textbook. Chapter 4 of this thesis addresses this issue and presents an empirical analysis of the importance of an individual's own income and of the income of the reference group for an individual's well-being. Also using subjective questions, Clark (2000) studied individual preferences over employment and found for England that while an individual's own unemployment had a negative impact on subjective well-being, unemployment in the region concerned had a positive impact. This finding is relevant for economics as it may contribute to explanations of unemployment polarization and labor market hysteresis (Clark, 2000).

A second area of study relates to the use of the determinants of welfare and well-being to evaluate the impact of socioeconomic policies on individual welfare and well-being (Frey and Stutzer, 1999; Diener and Biswas-Diener, 1999). In other words, using information on determinants of well-being, socio-economic policies can be evaluated and redesigned. For example, information regarding the relationship between the number of children and individual well-being, can be used as the basis for policies of family support. Similarly, an understanding of the relationship between unemployment and individual well-being can help to design policies relating to unemployment benefits (see, for example, Plug, 1997, Chapter 7). Oswald (1997) has argued that the "economics of happiness" is relevant to traditional economics, as it may be used to "test old ideas in new ways" (p. 1815). For instance, happiness reports can serve to test politically-relevant ideas such as 'economic growth is good' or 'inflation is bad'. Also along these lines, subjective well-being questions can shed light on the welfare impact of trade-off policies, such as inflation versus unemployment (DiTella et al., 2001). Finally, it is possible to study the impact of different illnesses on individual well-being or on Health Satisfaction, so as to inform the design of health policies. Chapter 5 presents an example in which individual health satisfaction is regressed on various illnesses.

A third area of study uses subjective questions to design distributional policies (Ng, 1996). Traditionally, distributional policies have been aimed at improving income distribution. Nevertheless, equality of subjective Financial Satisfaction or of well-being are also desirable objectives, because these indicators reflect how individuals really feel. Moreover, one expects that when answering subjective questions regarding their financial situation, individuals take into account their personal and family situation with respect to, for example, family size, age,
education, and illness. In Chapter 7, the inequality of subjective Financial Satisfaction for Germany is analyzed by looking for the causes of the observed inequality. Similarly, subjective questions can be used to define poverty according to an individual's own evaluations. Traditionally, economic studies evaluate poverty incidence in terms of how many people have an income below a certain predefined minimum income. Nevertheless, one could also define poverty on the basis of an individual's answers to subjective Financial or Well-Being Satisfaction questions. Subjective poverty could be assessed by using financial subjective questions: namely, welfare poverty, or by using subjective questions on well-being: namely, well-being poverty (see Goedhart et al., 1977). Chapter 6 presents a comparison of welfare and well-being poverty for the Russian Federation.

A fourth area of study derives from the insight that determinants of welfare and well-being can help us to understand the necessary trade-offs between income and other variables, such as employment, health, and children. With this information, it is possible to perform an empirical analysis of family equivalence scales or shadow prices for 'goods' such as 'being employed', health, noise, and climate. Usually, family equivalence scales are estimated by objective measures based on expert opinions: for example, the well-known Oxford Scale. Subjective family equivalence scales, however, are based on individuals' answers to subjective questions about, for instance, the evaluation of income or life satisfaction (see, e.g., Plug and van Praag, 1995). In standard economics, shadow prices are usually estimated using observed behavior, i.e. through individual preferences expressed in parallel or linked markets. For example, the shadow price of noise is usually estimated by its effect on housing or property values (revealed preferences). The shadow price indicates the change of welfare followed by a change in the provision of a good. Therefore, the shadow price could also be estimated by means of subjective questions on welfare and well-being. For example, the decrease in well-being caused by a reduction of Health Satisfaction due to a chronic disease can be measured by means of subjective questions. Similarly, the necessary increase in income to 'compensate' for such a decrease in well-being can be assessed. In Chapter 8, we undertake this type of analysis, whereby we value health losses by means of a subjective well-being model that was presented in Chapter 3. In a similar way, one can value a large range of changes in the provision of nonmarket 'goods', such as noise and climate. Empirical results
have been obtained by Frijters and van Praag (1998) and van Praag (1988) for climate; by van Praag and Baarsma (2000) for noise; and by van Praag and Plug (1995) for having children.

1.3 Approach and outline
A variety of econometric techniques are used in this study. Econometric analysis enables us to understand what determines individual subjective satisfaction and at the same time ‘cleans’ the subjective answers for measurement errors and unobservable phenomena, such as the individual ability to adapt to adverse situations, and individual personal traits, such as optimism. When assuming ordinal interpersonal comparability, the analysis will be based on Ordered Probit. If it is necessary to assume cardinality, then OLS will be used. The empirical analysis of the thesis is based on three different data sets: the German Socio-Economic Panel Data (GSOEP); the British Household Panel Data (BHPS); and, the Russian Socio-Economic Transition Panel (RUSSET). These data sets are in panel form, i.e. the same individuals are followed through time. The panels are, however, unbalanced in that not all the respondents are present in all the years. This does not pose any limitation for the econometric analysis, as unbalanced panels are easily treatable with any standard econometric technique. In order to make use of the panel structure of the data, the econometric analysis always includes individual random effects, i.e. unobservable variables relating to personal characteristics, as mentioned above, that are constant across time but vary per individual. Additionally, fixed time effects are included, i.e. unobserved variables that are constant across individuals but change over time. These represent, for example, the political or economic situation of a country in a particular year, for instance, high inflation.

This study contributes to the literature on subjective well-being. Innovations are discussed below, separately for each chapter. Many chapters of this thesis are based on existing papers. Chapter 2 is based on Ferrer-i-Carbonell (2000b), Chapter 3 on van Praag, Frijters, and Ferrer-i-Carbonell (2002), Chapter 4 on Ferrer-i-Carbonell (2000a), Chapter 5 on van Praag and Ferrer-i-Carbonell (2002), Chapter 6 on Ferrer-i-Carbonell and van Praag (2001), Chapter 7 on Ferrer-i-Carbonell and van Praag (2002b), and Chapter 8 on Ferrer-i-Carbonell and van Praag (2002a).

Chapter 2 presents a survey of the literature on well-being measurement and provides some arguments in favor of using subjective questions as a proxy to measure welfare and
well-being. The chapter introduces the subjective questions that are most widely used in the literature. It also discusses the two main assumptions needed for this type of research: namely, that individuals are able to evaluate their own situation, i.e. utility can be measured, and that responses among individuals can be compared at an ordinal or cardinal level. Finally, the chapter ends with a survey of empirical studies that use subjective questions. This survey offers a first overview of what influences individual well-being.

The second part of the thesis (Chapters 3 to 5) deals with the structure of individual welfare and well-being. All chapters study individual preferences by means of subjective questions about life satisfaction as a whole or satisfaction with some domains of life.

Chapter 3 presents a nested structural model of well-being. This takes the form of a simultaneous equation model where individual general satisfaction is explained by individual subjective satisfactions with respect to concrete domains of life: namely, job, finance, health, leisure, housing, and environment. Simultaneously, individual satisfaction with the different domains of life are explained by ‘objective’ variables, such as income, employment status, and education. The model can distinguish between long- and short-term effects. This structural model helps us to understand of how the various objective variables enter through the different domain satisfactions. Thus, it gives a much clearer picture of the structure of an individual’s preference than a reduced model that is standard in economic studies. The empirical analysis uses a large German panel data set known as the German Socio-Economic Panel (GSOEP).

Chapter 4 considers individual preferences concerning income and examines the controversial question of whether more income makes individuals happier. The chapter explores the relationship between income and happiness by allowing individual well-being to depend not only on an individual’s own income but also on the average income of the individual’s reference group. The main novelty of this chapter is that various hypotheses are tested using the same data set: the importance of an individual’s own income, the relevance of the income of the reference group, and the asymmetry of comparisons, i.e. the hypothesis that the ‘comparison income’ effect differs between richer and poor individuals. This last hypothesis is used to test Dusenberry’s (1949) famous thesis that comparisons are mostly ‘upwards’: namely, that while poorer individuals are negatively affected by comparing themselves to richer individuals, richer individuals are not positively influenced by the
knowledge that they are at the top of the income distribution. This empirical testing is, to our best knowledge, the first in the literature. The data used in the empirical analysis is the GSOEP.

Chapter 5 deals with individuals' preferences concerning health and examines the determinants of individual health satisfaction. The analysis is based on a large British panel survey, known as the British Household Panel Survey (BHPS), and uses a Health Satisfaction question as a measure of individual health. The regression analysis presented here is different from previous analyses as it allows the impact of a specific illness on health to depend on age.

The third part of the thesis (Chapters 6 to 8) presents concrete applications of the measurement and quantification of individual welfare and well-being.

Chapter 6 sheds light on the extent of subjective poverty in the Russian Federation. It presents estimates of poverty lines and poverty ratios derived from subjective questions on welfare and well-being. These clearly differ from the objective approach to poverty, in which the definition of poverty is based on the opinion of experts. Three subjective poverty lines are presented: the Financial Satisfaction Poverty Line; the Leyden Poverty Line; and, the Subjective Well-Being Poverty Line. The first two poverty lines are based on subjective questions regarding income and economic welfare, while the last one focuses on satisfaction with life as a whole. Whereas the Leyden Poverty Line has been already applied for different countries, the Financial Satisfaction and the Subjective Well-Being Poverty Lines are applied for first time in this study. The results obtained in this chapter are compared with each other and with results derived using objective measures. The empirical analysis is based on a large Russian household panel data set, known as the Russian Socio-Economic Transition Panel (RUSSET).

Chapter 7 studies distributional issues. The concept of Financial Satisfaction Inequality (FSI) is operationalized on the basis of individual responses to the Financial Satisfaction question as posed in the GSOEP. The chapter defends the ideas that Financial satisfaction is the subjective analogue of the objective income concept and that it includes objective income inequality as a special case. As well as measuring FSI, the chapter focuses on analyzing the objective variables to which this inequality can be attributed. The analysis uses a method to decompose FSI according to the contributions from objective variables, such as income,
education, and the number of children. Given the panel structure of the data, inequality can be attributed partly to permanent individual circumstances and partly to transitory changes.

Chapter 8 presents an analysis of individual trade-offs between health and income. It proposes a method to evaluate health losses or gains by looking at the impact on well-being of a change in health status. The chapter presents estimates of the equivalent income that would be necessary to change general satisfaction with life to the same extent as a change in Health Satisfaction would do. Next, this Health Satisfaction change is linked to specific diseases, such as diabetes and heart and blood problems, in order to estimate the equivalent income. The empirical analysis is based on the well-being model presented in Chapter 3.

Finally, Chapter 9 concludes.