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SUBJECTIVE WELL-BEING IN EUROPEAN UNION COUNTRIES

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Contents

Summary

The aim of this study is to estimate and compare subjective well-being in the EU member states. Moreover, the study investigates the objective factors influencing the level of SWB. The study also contains a comparative analysis of national profiles of subjective well-being in the EU member states. In addition, the EU member states were classified taking into account the degree of similarity between the structure of subjective well-being (similarity of relationships between the indicators of SWB components).

The theoretical part includes a novel approach to measuring subjective well-being, which is based on recent recommendations of Eurostat and A. Sen's capabilities approach. Under this approach, heterogeneous ways of maximizing SWB are taken into account, resulting from individuals' capabilities and preferences and different living conditions, which depend on the stage of economic development and social customs in the country concerned. Moreover, this approach makes it possible to empirically verify hypotheses about potential factors influencing the dimensions of SWB. A multiple indicators and multiple causes (MIMIC) model was used to operationalise the capabilities approach. Based on the results of the MIMIC model, subjective well-being index (SWBI) and subjective well-being component indices (SWBCI) were proposed. The recommended method of constructing SWB indicators yields results that are comparable between countries and SWB components. A comparative analysis of national profiles by subjective well-being was carried out using one of the methods of factor analysis, namely correspondence analysis. The classification of the EU member states in terms of the similarity between their structures of subjective well-being (similarity of relationships between the indicators of SWB components) was conducted using agglomerative hierarchical cluster analysis. Various tools were proposed to analyse the relationship between subjective well-being and income and between subjective well-being and age.

In the empirical part, we used the proposed methodology to estimate SWB indicators in the EU member states in 2018. Moreover, we examined which factors determined subjective well-being in these countries**.** Next, we conducted a **c**omparative analysis of national profiles in terms

of subjective well-being and the clustering of EU-27 countries according to the similarity of their structures of subjective well-being. Finally, interrelationships between subjective well-being and its determinants were analysed. The empirical analyses was based on data from the European Union Survey on Income and Living Conditions (EU-SILC) for 2018.

Introduction

For decades, the concept of welfare was synonymous with material wealth. Rates of economic growth were the main criterion for assessing social progress. This is the perspective that underlies the Scandinavian approach to measuring the quality of life. It was influenced by the work of Drewnowski (1970) and studies of Titmuss (1968, 1974) on the British welfare state. In this approach, welfare was understood as the availability of resources, such as money, assets, knowledge, psychic and physical energy or social bonds, which enable individuals to shape their living conditions in a controlled and conscious manner (Erikson, 1993, 72-3). Moreover, the external living conditions of individuals were considered as the basic elements determining well-being. This does not mean, however, that subjective aspects of the quality of life were not taken into account. However, since subjective assessments depend on the level of individual aspirations, they cannot, according to this approach, serve as suitable criteria for conducting social policy, which is the main reason why the quality of life is measured.

The approach to measuring social development and the quality of life was shaped by a discussion about the limits of economic growth and its impact on social development and the natural environment. The discussion was inspired by the so-called law of diminishing marginal utility, formulated by Gossen (1983), which states that the marginal benefit (usefulness) of each subsequent unit of good consumed is smaller than the marginal benefit of the previous unit of this good. What is more, above a certain limit, owning another good not only results in an ever smaller increase in satisfaction, but can even lead to a decrease in the level of utility. In this context, the disadvantages of a purely objective perspective of social development have become apparent.

A major breakthrough in this area was the development of the American approach to measuring the quality of life, which was formulated in the 1970s. The precursors of this approach include Campbell, Convers and Rodgers (Campbell and Converse, 1972, Campbell, Converse and Rodgers, 1976). They defined the quality of life as the level of a person’s life satisfaction. Therefore, objective symptoms of the quality of life are just means of achieving life satisfaction.

In addition, the quality of life should be holistic as it depends not only on the properties of individuals (biological, mental and social) but also on the environment in which they function. According to this approach, the ultimate goal of social development does involve improvements in the objective characteristics of the quality of life but in people's subjective well-being.

More recently, the idea of considering welfare as the only goal of social development has been replaced by a multi-dimensional concept of the quality of life, which also covers non-material aspects of life, such as health, social relations or the quality of the natural environment. Moreover, it includes subjective assessment of one's personal circumstances and overall life experience. In other words, the quality of life has come to be assessed not only on the basis of objective characteristics of living conditions and their subjective assessment but also by taking into account subjective assessments of overall experience of life.

Within the European Union, a lot of research has been conducted on sustainable socio-economic development, including the quality of life. Subsequent treaties of the European Union reveal a growing awareness of the need to strike a balance between economic development and social progress, while preserving the natural environment and cultural heritage. In 1992, "improving the quality of life of residents" was mentioned as one of objectives of the Treaty of Maastricht. Improving the quality of life and social cohesion was also one of the key objectives of the EU 2020 strategy (Commission of the European Communities, 2010).

Important contributions to developing ways of measuring the quality of life were made in the European Commission's Communication "GDP and beyond: Measuring progress in a changing world" (Commission of European Communities, 2009) and the report of the Commission on the Measurement of Economic Performance and Social Progress, more commonly known as the Stiglitz Commission report, on improving the tools for measuring economic efficiency and social progress (Stiglitz, Sen and Fitoussi, 2009). Ideas included in the "GDP and beyond" road map and the Stiglitz Commission report were inspired, among other things, by Sen's theory of capabilities. The Stiglitz Commission report was a milestone in the development of the approach to measuring the quality of life within the European Union. It also gave an impulse to start efforts to define and measure subjective well-being (SWB) (National Research Council, 2013). The purpose of the report was to, first of all, identify the limitations of GDP as an indicator for assessing economic performance and social progress, and, secondly, to look for alternative instruments and promote discussions on how to correctly present statistical information. The report underlines the importance of using correct measures of economic and social processes and points out that in order to correctly evaluate social progress, the relative measures have to include the quality of life.

The EU and its Member States have developed and have been applying a wide range of social and environmental indicators, which were often nested within systems of sustainable development indicators. In 2011, Eurostat and the French National Institute for Statistical and Economic Research (INSEE) created the Sponsorship Group on Measuring Progress, Well-being and Sustainable Development (SpG). The group developed a comprehensive framework for measuring the quality of life within the European Statistical System (Eurostat, 2011a and 2011b), originally proposed by Berger-Schmitt and Noll (2000), which also referred to the recommendations contained in the Stiglitz report on measuring social development. In the final report of the Expert Group on Quality of Life of the European Commission (Eurostat, 2017) subjective well-being (SWB) was proposed as one of the nine dimensions of the overall quality of life. It was divided into three subdomains to reflect the triadic conceptualization of SWB. The report also contains a complete set of observable indicators to measure the phenomena. As a result, subjective well-being has become one of the essential instrument for evaluating the effectiveness of national policies, making it possible to assess people’s subjective reactions to implemented policies (Dolan and White, 2007; Helliwell and Barrington-Leigh, 2010).

The aim of this study is to estimate and compare subjective well-being in the EU member states. Moreover, the study investigates the objective factors influencing the level of SWB. Special attention was paid to the relationship between subjective well-being and income and subjective well-being and age. The study also contains a comparative analysis of national profiles of subjective well-being in the EU member states. In addition, the EU member states were classified taking into account the degree of similarity between the structure of subjective well-being (similarity of relationships between the indicators of SWB components).

The theoretical part includes a novel approach to measuring subjective well-being, which is based on recent recommendations of Eurostat and A. Sen's capabilities approach. Under this approach, heterogeneous ways of maximizing SWB are taken into account, resulting from individuals' capabilities and preferences and different living conditions, which depend on the stage of economic development and social customs in the country concerned. Moreover, this approach makes it possible to empirically verify hypotheses about potential factors influencing the dimensions of SWB. A multiple indicators and multiple causes (MIMIC) model was used to operationalise the capabilities approach. Based on the results of the MIMIC model, subjective well-being index (SWBI) and subjective well-being component indices (SWBCI) were proposed. The recommended method of constructing SWB indicators yields results that are comparable between countries and SWB components. In addition, a number of SWB kernel density estimations were performed in the general populations of the countries analysed in the study in order to gain addition comparative insights into SWB. A comparative analysis of national profiles by subjective well-being was carried out using one of the methods of factor analysis, namely correspondence analysis. The classification of the EU member states in terms of the similarity between their structures of subjective well-being (similarity of relationships between the indicators of SWB components) was conducted using agglomerative hierarchical cluster analysis. Various tools were proposed to analyse the relationship between subjective well-being and income and between subjective well-being and age. Firstly, the relationships were evaluated by estimating the kernel regression of SWB on income and on age, for each the EU country separately. Next, differences in the relationship between average SWBI and average equivalised income in the EU countries were analysed. Finally, the kernel regression function of average values of SWBI on average equivalised income was estimated for all data points representing the EU countries.

In the empirical part, we used the proposed methodology to estimate SWB indicators in the EU member states in 2018. Moreover, we examined which factors determined subjective well-being in these countries. Next, we conducted a comparative analysis of national profiles in terms of subjective well-being and the clustering of EU-27 countries according to the similarity of their structures of subjective well-being. Finally, interrelationships between subjective well-being and its determinants were analysed. The empirical analyses was based on data from the European Union Survey on Income and Living Conditions (EU-SILC) for 2018.

Part I: Theoretical background and methodology

1.1. Subjective well-being

Research on subjective well-being (SWB) has a long history initiated by Greek philosophers. However, the widespread interest in this field commenced in the 1960s when concepts such as SWB and quality of life appeared as an alternative to the dominant goal of social development, which was to improve material living standards. Since then, SWB and quality of life have been the subject of many studies in various research disciplines, such as economics, political sciences, sociology, psychology, philosophy and medical sciences. (Kot, 2004; Phillips 2006; Panek 2016). In recent years, interest in SWB has intensified as a result of the realisation that an accurate assessment of the phenomena may help to monitor economic, social and health conditions of populations and inform policy decisions (Ferreira and Moro, 2010; Krueger and Mueller, 2011; National Research Council, 2013; Dolan, Kavetsos, and Tsuchiya, 2013)

Subjective well-being describes how people experience and evaluate their overall life circumstances as well as specific domains and activities of life. The debate on how to define, identify and measure SWB has been continuing for decades. During the past decade, following the Stiglitz report (2009), SWB became the subject of considerable interest not for researchers and academics but also for policy makers, national statistical offices and the media.

Different approaches to subjective well-being are proposed, depending on what theoretical model has been adopted. SWB models can generally be classified into hedonistic or eudemonistic (Ryan and Deci, 2001). The first one has its source in the philosophy of Aristippus of Cyrene. From the hedonistic perspective, subjective well-being is measured in terms of life satisfaction, which is associated with a balance of emotional experiences. Sometimes the hedonistic concept of subjective well-being also involves assessing satisfaction with specific aspects of life (Diener et al., 1999). In the eudemonistic model, which is based on Aristotle's philosophy, subjective well-being is defined as enjoying and striving for valuable attributes of life.

The pioneering works on SWB, relevant for the ongoing discussion in this field, include those written by Brudburn (1969) and Andrews and Withey (1976). Brudburn changed the paradigm related to understanding negative and positive affects. According to Brudburn, the two kinds of affects are independent phenomena rather than opposite ends of the same dimension. Therefore, any empirical research aimed at measuring SWB should contain tools for measuring both of these dimensions independently. Andrews and Withey laid foundation for the use of subjective, self-reported indicators in empirical social research. They advocated the use of subjective indicators of the quality of life. His works validated the application of empirical research in the measurement of SWB and, moreover, the inclusion of SWB in the overall assessment of the quality of life.

A psychological theory of SWB was summarized by Diener (1984). He divided SWB into three subcategories, namely positive and negative affect and general assessment of life satisfaction. Diener stated that the three components of SWB represent distinct constructs, which, even though closely related, should be understood separately.

A concept of SWB adopted in the European Social Survey combines the hedonistic and the eudemonistic approaches. However, it leaves out the category of associated with the evaluation of specific aspects of life. Subjective well-being is understood as the way people feel and how they function, on a personal and societal level, and how they evaluate their lives as a whole (Huppert et al., 2009, Huppert, Mickaelson and Vittersø, 2013)

More recently, the triadic conceptualisation of SWB has been proposed. The three categories of SWB are referred to as evaluative, experienced and eudaimonic well-being (National Research Council, 2013). Evaluative well-being refers to people's global judgements of how satisfied they are with their lives. When applied to specific areas of life, these judgments represent sub-domains of evaluative SWB, such as satisfaction with relationships, health, professional career, etc.

Experienced well-being refers to people's emotional states and sensations, such as pain or arousal. It also comprises feelings of meaningfulness or pointlessness of life, which are somehow associated with emotional states. Experienced well-being is often divided into positive (joy, happiness) and negative (stress, pain, anxiety) experiences, which somehow correspond to Diener's positive and negative affects.

Eudaimonic well-being concerns perceptions of meaningfulness, the sense of purpose and the value of life. While it is somehow connected with evaluative and experienced well-being, eudaimonic well-being is viewed as constituting a distinct dimension of the phenomena. The most commonly used way of measuring it involves asking individuals to assess overall meaning and sense of purpose in their lives.

These components are not entirely independent and may be thought of in terms of a continuum, with real time assessments of experience, emotional states and sensations at one end (the shortest time-frame) and overall evaluations of life satisfaction, purpose or suffering at the other end (the long-term perspective). The three categories of SWB provide empirical researchers with a theoretical guide for constructing survey questions designed to measure SWB.

1.2. Determinants of subjective well-being

A number of personal, social and environmental exogenous characteristics affect a person's subjective well-being. They can strengthen and weaken SWB in different ways. Among different variables affecting subjective well-being, a person's wealth, measured in terms of personal income, has been analysed the most (Diener and Oishi, 2000; Diener and Biswas-Diener, 2002; Sanfey and Teksoz, 2005; Kahneman and Deaton, 2010; Jakobsson Bergstad et al., 2012). The link between income and subjective well-being has been the focus of extensive research dating back to the early 1970s. Various reports show that income increases significantly boost SWB for higher income classes, while lower incomes (mainly incomes insufficient to satisfy basic needs at an acceptable level) do not affect SWB in a similar manner, and the overall effect of income on SWB is weaker than people generally believe (Aknin, Norton and Dunn, 2009). This influence is relatively limited for several reasons. Firstly, a study by Easterlin (1974) revealed an interesting paradox: at a given point in time happiness varies proportionally to income both among and within nations, but over time happiness does not increase as income continues to grow. This may suggest that the variation in subjective well-being is not determined by the level of absolute income as much as by income inequalities among individuals. Secondly, some studies indicate that as income grows, wealth aspirations also rise (see e.g. Kahnemanand and Krueger, 2006). Thirdly, after a change in income level subjective well-being tends to gradually return to the previous level, which seems to indicate that the effect of a higher income on well-being is only temporary (see for example Clark, Frijters and Shields, 2008).

Several studies have showed the existence of a strong relationship between demographic variables and SWB. However, the specific manner in which each of these variables contributes to SWB is a matter of debate in the literature. The impact of age, sex or life circumstances on well-being has been the subject of numerous studies (see e.g. Helliwell and Putnam, 2004; Abbott and Wallace, 2012; Luhmann et al., 2012; Steptoe, Deaton and Stone, 2015). Findings from large population-based surveys identified a U-shaped relationship between subjective well-being and age (Frijters and Beatton, 2012; Clark, 2019). Moreover, earlier studies show that age squared should be included in order to account for its non-linear effects (Abdallah, Stoll and Eiffe. 2013; Oguz., Merad and Snape, 2013). There is a consensus that subjective well-being is higher for young and elderly people and lower for individuals between these age groups. The impact of marital status and household composition on subjective well-being has also been systematically examined (see e.g. Haring-Hidore et al., 1985; Watson, Pichler and Wallace, 2010; Helliwell, Layard and Sachs, 2012; Feasel, 2013). Living alone, being divorced or separated have been found to have an adverse effect on subjective well-being. Conversely, being married increases subjective well-being. Sex is also considered to be an important determinant of SWB. However, research on sex differences in SWB has been inconsistent. Some studies have found that men have higher levels of SWB (Lucas and Gohm, 2000;

Stevenson and Wolfers, 2009), while others provide evidence for an opposite pattern (Tesch-Römer, Motel-Klingebieland and Tomasik, 2008).

The education level is recognized as another variable significantly affecting a person's SWB (OECD, 2011; Kristoffersen, 2018). However, survey results concerning the impact of education on well-being are rather contradictory. A higher level of education is obviously associated with better labour market prospects but can also bring other benefits, such as better health, higher status and self-esteem and additional advantages in the labour market. All these benefits correlate positively with measures of subjective wellbeing (Graham and Pettinato, 2002; Mc Mahon, 2009). There are, however, a number of studies showing that the level of education has no effect (Flouri, 2004) or even a negative impact on subjective well-being (Melin, Fugl-Meyer and Fugl-Meyer, 2003; Hickson and Dockery, 2008; Shields, Wheatley Price and Wooden, 2009; Dockery, 2010). Moreover, evidence from several studies suggests that the effect of education on subjective well-being can be mediated by its impact on other variables (Helliwell, 2008; Blanchflower and Oswald, 2011)

Many studies show that the labour market status (being employed, self-employed, unemployed, a student, retired, permanently disabled and confined to living at home) have a significant impact on subjective well-being (Helliwell 2003; Helliwell and Putnam, 2004; Feasel, 2013; Flavin, Pacek and Radcliff, 2014; Axelrad, Sherman and Luski, 2020). Generally, unemployment is associated with a large negative impact on a person's life satisfaction. There is evidence from many studies that being out of work can decrease people's subjective well-being level drastically (Clark and Oswald, 1994; Winkelmann, 2009). However, economically inactive people, such as retirees, students and full-time parents, do not consistently report lower levels of life satisfaction (Blanchflower and Oswald, 2011; Hoang and Knabe, 2021.)

Health is another determinant of subjective well-being, reported in many studies (see for example Fleche, Smith and Sorsa, 2011). Subjective well-being is significantly affected either by subjective (self-assessed health status) or objective health measures (e.g. heart attacks, strokes or high blood pressure). Empirical results also indicate that current well-being is determined by past health status (Layard et al., 2014). Moreover, longitudinal data show that there is an inverse relationship (Helliwell, Layard and Sachs., 2012, Cross et al., 2018). Some studies show that mental health has a bigger impact on well-being than does physical health (Fleche, Smith and Sorsa, 2011; Layard et al., 2014).

The analysis of subjective well-being accounts for variables measuring certain social and societal characteristics, such as people's personal and social relationships (family, friends, etc.), the general living environment (housing, local environment, physical insecurity, etc.) and public institutions (political institutions, the judicial system, police, etc.). Overall, personal and social relationships have the biggest impact on subjective well-being, which depends on their number and quality. All studies that account for variables measuring personal and social relationships (e.g. having someone you can trust, being able to rely on someone's help, the level of trust towards other people or the amount of time spent with friends) confirm that they are important determinants of well-being (see e.g. Godefroy and Lollivier, 2014; Helliwell et al., 2009). As regards the general living environment, studies show that a higher level of physical insecurity adversely affects subjective well-being. Several studies also conclude that the living environment (size of one's place of residence and the degree of satisfaction with it) have an impact on subjective well-being (see e.g. Helliwell, Layard and Sachs, 2012). Environmental problems, such as grime-covered buildings, pollution or noise can have severe negative effects on health and subjective well-being. Finally, trust in public institutions (political, judicial, etc.) has an important, positive impact on subjective well-being (Hudson, 2006; OECD, 2017).

It is generally believed that genetic factors are the most important determinants of differences in the level of SWB in the general population. Several studies suggest that people's levels of happiness and overall SWB are, to a large extent, determined by their genetic make-up (Diener and Lukas, 1999; Inglehart and Klingemann, 2000, Cummins, Gullone and Lau, 2002; Røysambet et al., 2018). Multivariate studies indicate that some genetic factors enhancing SWB also protect against depression and other mental health problems (Røysamb and Nes, 2018) and determine personality traits (Røysamb et al., 2018). A wide range of personality traits seem to influence SWB, specifically, the traits from the five factor personality model (Soto and Jackson, 2020). While neuroticism is associated with poorer SWB, the other four traits, namely extraversion, agreeableness, conscientiousness and openness to experience tend to increase levels of SWB. Weiis, King and Enns (2002) even found that subjective well-being was genetically indistinguishable from personality traits such as neuroticism, extraversion and conscientiousness. According to various empirical studies, these traits are inherited in up to 50% of their total variability, meaning that the differences in SWB associated with them are also genetically determined up to a similar level of variability (Bouchard and Loehlin, 2001).

1.3. Measuring subjective well-being under the capability approach

1.3.1 The concept of capabilities

The concept of capabilities was developed and refined by Amartya Sen in a series of books and journal articles (1982, 1985, 1987, 1999, 2000, 2010), following the Tanner lecture delivered in 1979 (Sen, 1980), in which he described how personal well-being should be measured. This approach has since been synthesised and applied by various authors in a wide variety of fields (Alkire, 2002; Robeyns, 2003, 2005; Kuklys, 2005; Comim, Qizilbash and Alkire, 2008; Schokkaert, 2009; Basu and López-Calva, 2011; Schlosberg, 2012; Lorgelly et al., 2015; Slabbert, 2018; Panek and Zwierzchowski, 2020) Unlike other philosophical approaches to measuring people's happiness, which focus on desire fulfilment, income, consumption or satisfaction of basic needs, Sen's capability approach is concerned with people's capabilities, which describe what people are actually able to do and to be.

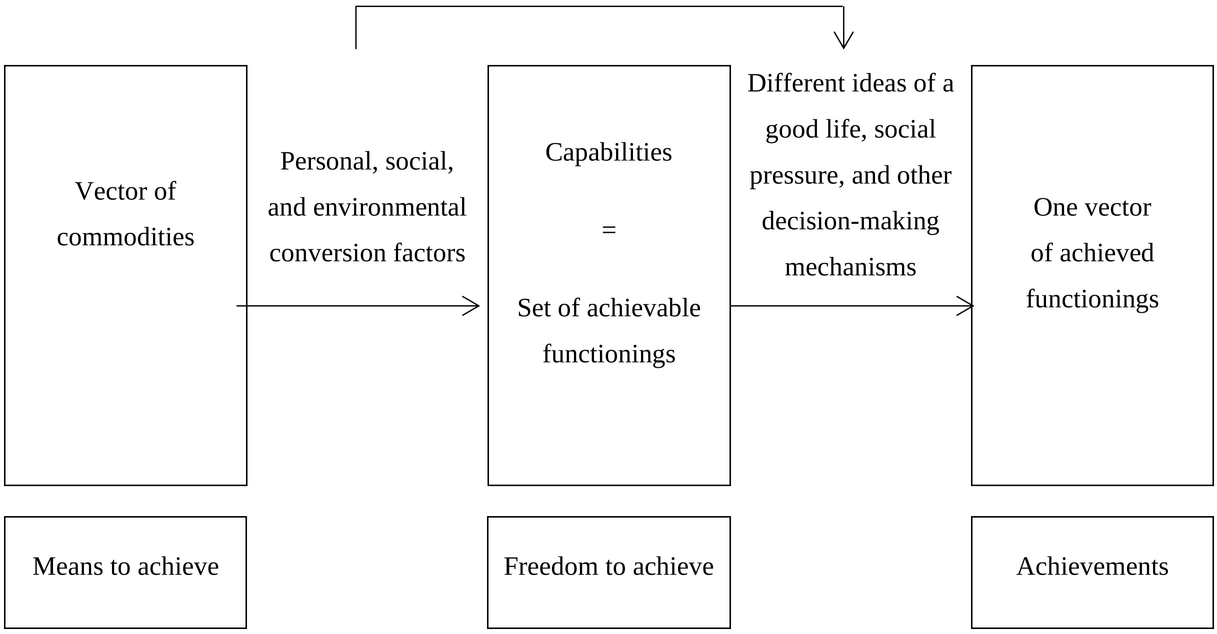
According to Nussbaum and Sen (1993, p. 27) a person's capability to live a good life can be defined as "*the capability to achieve valuable functionings (...) where functionings represent parts of the state of a person - in particular the various things that he or she manages to do or be in leading a life. The capability of a person reflects the alternative combinations of functionings the person can achieve, and from which he or she can choose one collection*". In other words, capabilities are potential ways of being and doing that are accessible. The set of capabilities available to an individual is limited by objective external factors and their personal characteristics. Functionings are people's actual beings and doings. They can be understood as observable manifestations of the way individuals live their lives and choices they make. According to Sen (1987), capabilities are the doings and beings that people can achieve, while functionings are capabilities that have been realised. Capabilities cover the notion of freedom to choose among real opportunities, whereas functionings are more directly related to people's current circumstances. Capabilities refer to possibilities of achieving certain states, such as the possibility of living a healthy life, being able to achieve a certain level of education or living a happier, more satisfied life. Functionings describe actual states of life achieved by the individual, such as being healthy, being educated or, in the context of subjective well-being, being happy.

Sen (1999) uses the concept of "freedom" to describe the process in which people choose a particular way of living from among different available opportunities they encounter. Therefore, a low quality of life results from the lack of freedom to choose a satisfying way of living. Thus, a reported low level of SWB should be understood not merely as a low self-assessment of well-being, but rather as a deprivation of the freedom to undertake life activities which would eventually lead to higher levels of SWB.

Critical to the capability approach is the recognition of human heterogeneity, which results in people choosing different ways of living from a common set of capabilities. In order to transform capabilities into particular functioning, it is necessary to introduce three sets of conversion factors – personal, social, and environmental (Sen, 1992; Robeyns, 2005).

Figure 1.1 contains a diagram showing the relationship between commodities, capabilities, and functionings, using the key concepts of the capability approach.

Figure 1.1. The relationship between commodities, capabilities, and functionings in the capability approach



Source: The diagram is based on Robeyns (2005).

Personal conversion factors (personal characteristics, such as metabolism, physical condition, intelligence, or sex) influence what types and degrees of capabilities a person can generate from commodities. Social conversion factors are determined by the society in which a person lives (characteristics of social settings, social institutions, and power structures, such as social norms, public policies, societal hierarchies, rule of law, political rights, etc.). Environmental conversion factors emerge from the physical or built environment in which a person lives (environmental characteristics, such as climate, infrastructure, institutions, and public goods). The set of functionings that can be achieved is not only constrained by personal, social, and environmental characteristics (Robeyns, 2005; Crocker, 2008) but is also subject to personal preferences, social pressure, and other decision-making mechanisms.

Another important requirement is that individuals should have equal opportunities to function in the way they prefer (Sen, 2010). Given equal opportunities, people have the freedom to determine their capabilities, that is, their potential ways of functioning and to maximize their quality of life accordingly by realising subjectively optimal functionings. However, this does not mean that in a perfectly equal society all people will live the same lives, as their chosen functionings will depend on their individual conversion factors. Therefore, individuals with comparable levels of capabilities related to SWB may differ significantly in various areas and sub-dimensions of SWB, which is reflected by differences in basic values of SWB indicators.

1.3.2. Operationalization of the measurement of subjective well-being under the capability approach

The operationalisation of the measurement of the quality of life under the capability approach is a complex process. In his Tanner Lectures (1980) Sen argues that the right approach to the assessment of the quality of life (QOL) should not only accurately measure the natural complexity underlying the QOL concept (the criterion of validity) but also take into account the degree to which it can be applied in empirical assessment (the criterion of suitability).

Sen attempted to operationalize the way of measuring QOL (1985) based on capabilities and functionings. The starting point was the vector of goods (resources) owned by an individual, enabling them to function (Basu and Lopez-Calva, 2010). Based on the work of Gorman (1968) and Lancaster (1966), Sen used the fact that goods can be transformed into properties of goods - an individual can use the properties of owned goods to achieve certain functionings - the chosen ways of beings and doings. The individual has the freedom to choose from among the set of possibilities provided by the goods in their possession. In general, the bigger the set of available resources, the greater the freedom enjoyed by individuals. With a view to assessing the quality of life, Sen advocated measuring latent capabilities, which reflect the scope of freedom rather than observed functionings:

"*… human beings must have equal possibilities and equal opportunities in order to function. In this perspective the attention is moving from the means to real opportunities and the freedom of being and doings. With equal opportunities people have the freedom to express their capabilities, potentially reach the functionings and accordingly wellbeing. In this context in order to measure quality of life the focus has to rely on the measurement of the capabilities to function rather than on the achievements."* (Sen 2010, 148)

The implication is that policymakers should not attempt to design and constrain people's lives in order to optimize values of some abstract indices. Instead, they should strive to provide the population with a broad set of available ways of living to choose from and leave the optimisation process to individuals.

Following Sen, we propose assessing people's levels of well-being by estimating values corresponding to their capabilities rather than realised functionings. In other words, the broader the set of resources and possibilities available to an individual, which corresponds to their capabilities, the higher the level of well-being that can be achieved, regardless of actual, realised functionings.

Within this proposed approach we can also take into account the differences in individual resources, possibilities and preferences, as well as cultural diversity between EU countries and within each of these countries, which will facilitate comparative empirical analysis. For example, in some cultures feeling happy may be regarded as being childish or immature. Therefore individuals may consciously refrain from undertaking activities which could result in momentary happiness but might undermine their well-being in the long run as a result of a lower self-assessment. In other words, there may be a trade-off between experienced and eudaimonic or evaluative well-being and different people may find it optimal to locate themselves at different points of the available spectrum. We believe that social researchers should focus on people's ability to choose their preferred way of living rather than on actual, realised well-being in any given moment in time.

Owing to the complex nature of the quality of life, it is usually difficult to directly observe its different aspects, including subjective well-being, which is why they are referred to as latent variables. When a given phenomenon cannot be directly observed and measured, other variables, called indicators, are used to measure it indirectly. An indicator is an observable and measurable property of the latent phenomenon. In the context of the current study, subjective well-being should be regarded as a latent, unobservable trait, which can, however, be estimated through a set of observable indicators.

In order to operationalise the measurement of subjective well-being under the capabilities approach, we apply a multi-indicator and multiple causes model (MIMIC). The MIMIC model was formulated by Hauser and Goldberger (1971) and then popularised by Jöreskog and Goldberger (1975), who presented its detailed assumptions as a special case of the structural equation model (SEM) (Bollen, 1989; Brown and Moore, 2012). Krishnakumar and Ballon (2008) pointed to the SEM approach as the most suitable tool for estimating capabilities that are not directly observable. This model makes it possible not only to measure the individual's subjective well-being, but also to explain it – it enables us to identify personal functionings that are derived from their capabilities, and to assess the impact of external determinants (the individual's personal, social, and environmental characteristics) on their latent capabilities. Moreover, with a MIMIC model, it is possible to use determinants of the latent variable along with its indicators (its symptoms).

The operationalised measurement of SWB by means of a MIMIC model can be presented as follows (Krishnakumar, 2007): capabilities representing SWB are unobservable endogenous latent variables. However, they can be estimated using two sets of variables. Firstly, a set of selected indicators, which can be interpreted as realised functionings, can be used to construct the reflective part of the model. The formative part of the model is constructed using the individuals' personal, social and environmental exogenous characteristics, which are interpreted as the conversion factors, which strengthen or weaken the capabilities and influence the process of transforming the capabilities into achieved functionings. The freedom of individual choice is represented by an unobservable latent variable, which can be estimated using two sets of observable variables, i.e. symptoms and conversion factors (determinants) of SWB.

In order to determine the form of the MIMIC model for measuring SWB, one should start by identifying relevant indicators of the phenomena (symptoms of SWB), which are variables measuring capabilities available within the European Statistical System (ESS). Partial indicators of SWB, which represent individuals' achieved functionings in the model, are clearly defined in the report of the European Commission (Eurostat, 2017). On the other hand, individuals' exogenous characteristics (conversion factors) are not defined and should be selected depending on their availability and adequacy.

Formally, the MIMIC model equation for SWB has the following form:

$$\boldsymbol{y} = \boldsymbol{\Lambda}\eta + \boldsymbol{\varepsilon} \tag{1}$$

$$\eta = \boldsymbol{\Gamma}\boldsymbol{x} + \psi \tag{2}$$

where:

$\boldsymbol{y}$ – a vector of observable endogenous variables (symptoms of SWB represented by partial variables),

$\boldsymbol{\Lambda}$ – a matrix of factor loadings of endogenous variables,

η – the latent endogenous variable, which is interpreted as a composite indicator of SWB,

$\boldsymbol{\varepsilon}$ – a vector of error terms, which, in this context, consist of a classical measurement error and, moreover, specific variability of a given indicator, which is not shared with other indicators of SWB, and therefore, does not influence the estimates of the SWB measure,

$\boldsymbol{\Gamma}$ – a matrix of coefficients of contribution of the latent variable to observable exogenous variables x, defining the pattern of structural relations in the MIMIC model,

$\boldsymbol{x}$ – a vector of observable exogenous structural variables, which are interpreted as capabilities or objective causes for SWB,

ψ – error terms in the equation for the latent SWB variable. It can be interpreted as the part of variability of SWB that does not depend on objective, observable causes.

As was already pointed out, the main purpose of the MIMIC analysis is to estimate individual levels of SWB capabilities. It should be noted, however, that because individuals in different countries have different individual resources, possibilities, and preferences, they are characterised by various functionings derived from SWB capabilities. Furthermore, people's personal, social, and environmental characteristics can strengthen or weaken their SWB capabilities in different ways. Considering these differences, values of individuals' latent capabilities were estimated separately for each country using integrated MIMIC models. Thus, a distinct MIMIC model was estimated for each country. However, the models shared the same set of determinants and symptoms.

In the second step, we used the estimated values of individual latent SWB capabilities as proxies for calculating the subjective well-being index (SWBI) for surveyed individuals. SWBI was calculated using the following formula:

$$\mathrm{SWBI_i} = \frac{x_{e.i} - x^{*}_{min}}{x^{**}_{max.} - x^{*}_{min.}} \qquad (3)$$

where:

$x_{e.i}$ is the estimated value of the latent variable (SWB capabilities) for the *i*-th individual,

x^{*}_{min}, $x^{**}_{max.}$ are the lowest and highest achievable values (thresholds) for the latent variable (SWB capabilities), respectively.

The thresholds were created for each country separately. To calculate these thresholds, two artificial records were added to the database representing hypothetical individuals with the worst and best values of all symptoms and determinants of SWB (the person with the most desired values of all symptoms and determinants of SWB and the person with the least desired values of all symptoms and determinants of SWB). Then, using parameters of the estimated models for each country, values of the latent variables were obtained for these artificial records. These values were used as SWB thresholds, which represent the highest and lowest possible degree of SWB for each country; that is, the possibility to achieve the most and the least desired functionings. Thus, the critical values (thresholds) of the latent SWB capabilities were determined in such a way as to enable a comparative analysis of SWB between different countries.

The SWBI calculated in the proposed manner yields scores ranging from zero to one, where one indicates that a person has reached the highest possible level of SWB, while zero indicates the lowest possible level of SWB. The higher the value of the SWBI, the higher the level of SWB. The proposed approach reveals differences in how particular functionings are manifested among individuals living in different cultural and social circumstances, as it utilises distinct MIMIC models for each country. However, because of the proposed normalisation method, the results are still comparable between countries.

1.4. Comparative analysis of national profiles of subjective well-being

A comparative analysis of national profiles depending on subjective well-being was carried out using one of the methods of factor analysis, namely correspondence analysis. This is the only method of factor analysis that offers a graphic representation of relationships between spatial objects (between countries analysed in the study) and between variables characterising these objects (indicators of subjective well-being components). Its results can therefore be used to reveal the underlying data structure and patterns.

The indicators used in this study represent three SWB components: evaluative well-being, negative experienced well-being and positive experienced well-being (see section 2.1). The indicators of SWB components (SWBCI) for surveyed individuals were calculated in a similar way as the SWBI indicator, using the following formula:

$$\mathrm{SWBCI_{ki}} = \frac{x_{e.ki} - x^{*}_{min\,k}}{x^{**}_{max.\,k} - x^{*}_{min.\,k}} \tag{4}$$

where:

$x_{e.k.i}$ is the value of the *k*-th latent variable (SWB component) for the *i*-th individual,

$x_{*min\,k}$, $x_{**max\,k.}$ are the highest and lowest achievable values (thresholds) for the latent *k*-th variable (SWB component), respectively.

A SWBCI score ranging from zero to one, where one indicates that the highest possible level of one SWB component, and zero – the lowest possible level of that component. The higher the value of the SWBCI, the higher the level of that SWB component.

Correspondence analysis has several features that other methods of factor analysis lack. It is the only method that makes it possible to put points representing variables and points representing objects in the same factor space, thereby greatly facilitating the interpretation of results. Correspondence analysis can be used to analyse qualitative and quantitative data.

Correspondence analysis was developed in scientific centres in many countries in parallel (Beh 2004). The primary contribution to the development of correspondence analysis was made by the research team led by Benzécri (1973a and 1973b).

The following data matrix is the most general starting point for correspondence analysis:

$$\boldsymbol{X} = \lfloor x_{ji} \rfloor, \qquad x_{ji} \geq 0; \qquad j=1,2,...,m;\ i=1,2,....n. \qquad (5)$$

where:

x_{ji} – is the value of the j-th variable in the i-th object.

It should be noted that only non-negative entries can be used as elements of a data matrix (5). The rows of the matrix (13) can be interpreted in geometrical terms as coordinates of m-points -variables in an n-dimensional space of objects Rn. On the other hand, the column in this matrix can be interpreted in geometrical terms as coordinates of n-points objects in an m-dimensional space of variables Rm.

The starting point for correspondence analysis is to transform a data matrix into a relative frequency matrix, also called a correspondence matrix, by dividing each element of the matrix in question by the sum of its elements:

$$\boldsymbol{P} = \lfloor p_{ji} \rfloor, \qquad j=1,2,...,m;\ i=1,2,....n. \qquad (6)$$

where:

$$p_{ji} = \frac{z_{ji}}{\sum_{j=1}^{m}\sum_{i=1}^{n} z_{ji}}, \tag{7}$$

z_{ji} –is the standardized value of the j-th variable in the i-th object.

The $\boldsymbol{P}$ matrix is used to set profile matrices. The row profile matrix $\boldsymbol{R}$ is obtained by dividing the frequency in each row of the matrix $\boldsymbol{P}$ by the sum of all frequencies in this row:

$$\boldsymbol{R} = \left[r_{ji}\right] = \left[\frac{p_{ji}}{p_{j.}}\right], \qquad j=1,2,...,m;\ i=1,2,....n. \tag{8}$$

The column profile matrix $\boldsymbol{C}$ is derived by dividing the relative frequencies in each column of the $\boldsymbol{P}$ matrix by the sum of all the relative frequencies in this column:

$$\boldsymbol{C} = \left[c_{ji}\right] = \left[\frac{p_{ji}}{p_{.i}}\right], \qquad j=1,2,...,m;\ i=1,2,....n. \tag{9}$$

The elements of row profiles (column profiles) then become the coordinates of the row (column) vectors in an n-dimensional (m-dimensional) Euclidean space R^n (R^m).

The marginal relative frequencies of rows ($\boldsymbol{r}$) and columns ($\boldsymbol{c}$) in the $\boldsymbol{R}$ and $\boldsymbol{C}$ matrices are the average row and column profiles, respectively. Points represented by the average row and average column profiles are called centroids and lie in the middle of the coordinate system.

The distance between two row profiles (between points representing variables) in space R^n is calculated using a weighted Euclidean metric, where the weights are the column marginal relative frequencies:

$$d^2\left(\boldsymbol{r}_j, \boldsymbol{r}_{j'}\right) = \sum_{i=1}^{n} \frac{1}{p_{.i}} \left(\frac{p_{ji}}{p_{j.}} - \frac{p_{j'i}}{p_{j'.}}\right)^2, \qquad j,j'=1,2,...,m;\ j \neq j'. \tag{10}$$

In a symmetric fashion, we define the distances between column profiles (between points representing objects) in space R^m using a weighted Euclidean metric, where the weights are the row marginal frequency:

$$d^2(\boldsymbol{c}_i, \boldsymbol{c}_{i'}) = \sum_{j=1}^{m} \frac{1}{p_{j.}} \left(\frac{p_{ji}}{p_{.i}} - \frac{p_{ji'}}{p_{.i'}} \right)^2, \qquad i,i'=1,2,...,n;\ i \neq i'. \tag{11}$$

Analysis of the distance between row profiles (column profiles) is identical to analysis of the distances between row profiles (column profiles) and the average row (column) profile. The distance thus obtained is called the chi-square distance. The chi-square distance is related to the concept of inertia. Inertia is a measure of variation between spatial objects or between variables characterising these objects.

The total inertia of an input matrix determines the degree of dispersion of row (column) profiles with regard to the corresponding centroid. It indicates how much each row (column) profile differs from the average corresponding profile. Inertia also has a geometric interpretation as a measure of the dispersion of points representing the profiles in a multidimensional space. When the value of inertia is zero, the points representing row (column) profiles are concentrated in the origin. This corresponds to the case when all row (column) profiles are identical. The higher the value of inertia, the greater the dispersion of the points representing profiles from the origin.

The primary goal of correspondence analysis is to conduct a simultaneous analysis of row and column profiles. For this purpose, the ***P*** matrix is converted into matrix ***A***, called a matrix of standardized differences:

$$\boldsymbol{A} = \lfloor a_{ji} \rfloor, \qquad j=1,2,...,m;\ i=1,2,....n, \tag{12}$$

where:

$$a_{ji} = \frac{p_{ji} - p_{j.}p_{.i}}{\sqrt{p_{j.}p_{.i}}}. \tag{13}$$

The transformation of the ***A*** matrix into the ***P*** matrix is symmetric with respect to rows and columns. Symmetric standardization of the input data matrix makes it possible to determine the factor structure of objects and the position of the variables in the same frame of reference, which cannot be achieved with any other method of factor analysis. In other words, when conducting correspondence analysis, we seek to obtain a common orthogonal reference system for the points representing row and column profiles.

Correspondence analysis is a method of decomposing total inertia. Subsequent factor axes are searched to yield dimensions that explain the greatest proportion of total inertia. Decomposition of the $\boldsymbol{A}$ matrix by singular values is the most common method used to seek a common factor space for row and column profiles.

One data analysis method frequently used in correspondence analysis involves analysing the configuration of points representing variables or objects in a figure. When we reconstruct the distance between the points representing objects or variables in the maximum dimension space, we reproduce the original configurations of points without any distortion. The angles between vectors and the distances between vectors representing row (column) profiles are preserved, hence, the distances between points are also preserved. Any reduction in the maximum dimension of the factor space distorts the configuration of the points, signifying a loss of information about the phenomenon of interest.

The quality of representation of a point in the coordinate system, defined by the selected number of dimensions, is defined as the ratio of the point's squared distance from the origin in the chosen number of dimensions to the squared distance from the origin in the space defined by the maximum number of dimensions. This ratio is the same as the ratio of the share of a given dimension in inertia.

Graphical analysis of the configuration of points representing variables or objects (interpretation of perception maps) is considerably more convenient in two-dimensional space, where general patterns in systems of variables or objects can be visualised. This space is created by the first two factor axes.

When analysing the results, we consider primarily the following aspects of how the points are configured:

- the position of the points with respect to the origin,
- distances between the points representing objects or variables.

The profile of points representing objects situated near the origin does not differ greatly from the average profile, while points representing objects located far from the origin have significantly atypical profiles.

A small distance between a variable point and the origin indicates that variable values are less scattered compared to those of other variables. A large distance between a variable point and the origin constitutes evidence of a variable whose spread is larger than that of other variables.

If the points representing variables are located close to one another, this means that these variables in the examined objects are similar. Similarly, close proximity of points representing objects indicates that the structure of variables describing them is similar.

In correspondence analysis the distance between variable points and object points can be interpreted only by referring to the configuration of all the points. For example, the relative proximity of a point representing a given variable in relation to another point representing a given object indicates that the value of that variable in that object differs from its corresponding values in the other objects under examination.

1.5 Classification of EU member states depending on the similarity of the structure of subjective well-being

EU member states in the study were classified in terms of similarities between their structures of subjective well-being (similarity of relationships between the indicators of SWB components) using agglomerative hierarchical cluster analysis (Lance and Williams, 1967 and 1968; Aldenderfer and Blashfield, 1984). This kind of hierarchical cluster analysis starts by treating each object as a single-element cluster. Next, at each step of the procedure, two clusters with the highest degree of similarity are merged into a new bigger cluster. This similarity is measured in terms of distances between clusters of objects. The general formula for determining distances between a newly formed object cluster $G_{r''}$, obtained by combining object clusters G_r

and $G_{r'}$, and remaining object clusters $G_{r''}$, when creating a tree diagram (so-called dendrogram) has the following form (Lance and Williams, 1967 and 1968):

$$d_{r''r''} = \alpha_r d_{r''r} + \alpha_{r'} d_{r''r'} + \beta d_{rr'} + \gamma |d_{r''r} - d_{r''r'}|, \quad (14)$$

where:

$d_{r''r''}$, $d_{r''r}$, $d_{r''r'}$, $d_{rr'}$ - distances between object clusters,

$\alpha_r, \alpha_{r'}, \beta, \gamma$ - transformation coefficients different for different agglomeration methods.

Pairs of clusters are successively merged until at the end all clusters have been merged into one cluster containing all objects.

A dendrogram is a graphical illustration of the hierarchy of connected objects representing the decreasing degree of similarity between objects included in the tree in subsequent stages and those included at earlier stages. The hierarchy of these connections makes it possible to determine the relative position of objects and groups of objects formed at successive stages of dendrogram creation (Sneath and Sokal, 1973).

Several different algorithms (agglomeration techniques) can be used in hierarchical cluster analysis to determine how linkages between clusters are created. Individual algorithms differ in the way distances between objects are determined (Wishart, 1969). In our survey complete linkage clustering (farthest neighbour) technique was applied. This method is based on the maximum distance, i.e. the similarity of any two clusters is the similarity of their most dissimilar objects. It creates a small number of clusters with relatively more objects. In this method, the transformation coefficients in formula (14) take the form: α_r=0.5, $\alpha_{r'}$ =0.5, β=0 and γ= - 0.5.

In order to identify clusters of objects that are as similar as possible in terms of the variables that describe them, we need to split the tree (see Table 2.10). For this purpose we look for a critical value of distance (d*), at which branches of the tree are cut off, thus creating clusters of objects. The decision to determine the critical value is a subjective one.

1.6 The relationship between subjective well-being and its determinants

Various tools were considered to analyse relationships between subjective well-being and its determinants. We began the evaluation of the relationship between subjective well-being and its determinants by estimating kernel regression of SWB on income and age, for each EU country separately. Kernel regression is a non-parametric technique for estimating the conditional expectation of a random variable (Blundell and Duncan, 1998). Its objective is to find a non-linear relationship between a pair of random variables; in our study these are the subjective well-being index and income or age.

In the next step, we analysed differences in the relationship between the average SWBI and the average income in the EU countries. Moreover, we estimated the kernel regression function of SWBI average values on the average income for all data points representing the EU countries.

Part II: Comparative analysis of subjective well-being in EU member states in 2018

2.1 Data source and assumptions

Empirical analyses conducted in this study are based on data from the European Union Survey on Income and Living Conditions (EU-SILC) carried out in 2018. The main objective of the EU-SILC is to provide data that are comparable across the EU on income, poverty, social exclusion, and living conditions of the populations of the EU members states (Wolf et al. 2010). Although the survey is conducted by national statistical offices, it collects information on core variables in every EU member state. These core variables describe:

- the demographic composition of households;
- the health status and participation in education and economic activities of household members;
- the amount and source of households' income;
- the durable goods equipment of households;

- housing conditions;
- the existence of certain symptoms of material deprivation in households.

The survey is based on representative random samples of households and covers individuals aged 16 and older who are members of a sample of households in each EU member state. A household is defined as a group of people living in the same dwelling who share their incomes. Family members who live together but do not share their incomes are considered as separate households.

The EU-SILC is an instrument designed to collect timely and comparable cross-sectional and longitudinal micro-data using a rotational panel designed involving a four-year rotation scheme. The sample selected in each country is divided into four subsamples, all of which have the same size and structure. From the second year of the survey onwards, one of the four sub-samples is removed from the sample and another is drawn that has the same size and structure as all of the sub-samples. From the third year of the survey onwards, each sub-sample is expected to stay in the survey for four years.

The survey results are weighted so that they represent the size and the structure of the entire population of households and citizens for each EU member state. The total sum of weights corresponds to the total number of households and individuals in a given country[1].

The sample sizes differ across countries and can be as low as 4,000 households or as high as 20,000 households. Missing income data are imputed using methods of data imputation.

In 2018 the EU-SILC Survey Questionnaire contained an ad-hoc module on personal well-being. The following questions were identified as indicators of SWB, which clearly correspond to the indicators proposed in the EU Commission report (Eurostat, 2017):

1. How satisfied with your life are you in general? (Overall life satisfaction),

[1] For instance, the weights system in Poland takes into account selection probability for dwellings, survey completeness within different categories of the place of residence, and consistency of the sample composition in terms of age and sex with data from the last census and current demographic estimates (CSO, 2019).

2. How often during the last month have you felt depressed? (Negative affect),
3. How often during the last month have you felt nervous? (Negative affect),
4. How often during the last month have you felt sad? (Negative affect),
5. How often during the last month have you felt calm? (Positive affect),
6. How often during the last month have you felt happy? (Positive affect),

The first variable measures evaluative well-being, while the remaining variables measure different aspects of experienced well-being. Variables created on the basis of these questions were used as symptoms of SWB in the MIMIC model. The variables measuring different aspects of experienced well-being are divided into two categories: negative experienced well-being and positive experienced well-being.

We used several individual characteristics in the formative part of the MIMIC model as conversion factors for SWB (determinants of SWB). These characteristics was selected after reviewing the literature on possible SWB determinants at the international level (Boarini et al., 2012; Jun, 2015; Joskin, 2017; Azizan, and Mahmud, 2018, see also chapter 1.2). Moreover, when selecting the determinants, we took into account the underlying complexity of the SWB concept (the criterion of validity) and the degree to which it can be applied in empirical assessment (the criterion of suitability).

The final proposed MIMIC model includes eleven variables that measure the following four aspects: demographic characteristics (sex, household size, marital status: living alone), standard of living and poverty (equivalised household income, monetary poverty, material deprivation), economic activity (unemployment, retirement, being a student), health (self-perceived health, unmet medical needs). All these variables are drawn from the EU-SILC survey and not from the ad hoc module on well-being. The definitions of these SWB determinants are given in the appendix.

In our analysis of SWB, the unit of analysis is defined as a person. However, in the analysis of income, each person is assigned the equivalised disposable income of the household to which s/he belongs. To ensure comparability of income across EU countries, income values in the EU are given in the purchasing power standard (PPS), which is an artificial common reference currency used in the EU for international comparisons. Household income is defined as the yearly household equivalised disposable income in the last calendar year preceding the survey[2]. The disposable income is defined as the sum of the net monetary income earned by all household members. The disposable income does not take into account any fringe benefits received by household members (except for the use of a company car) and other forms of non-monetary income. However, food produced by households living in rural areas often substantially increases their ability to meet their basic needs. This can lead to the underestimation of the disposable income of certain households, particularly of those engaged in farming.

The equivalised disposable income is calculated by dividing the disposable household income by the OECD modified equivalence scales. The modified OECD scale assigns a value of 1 to the first household member, 0.5 to every additional household adult member and 0.3 to each child. The disposable income is defined as a sum of net monetary income gained by all households' members. It does not take into account any fringe benefits (with exception of a company car) and other types of non-monetary income. Each individual is assigned the value of their household's equivalised income.

Table 2.1 below presents summary statistics of the analysed national samples.

[2] With the exception of Great Britain (where the annual household income was estimated on the basis of the current monthly income) and Ireland (where the estimated annual income included half of the income from the year preceding the survey and half of the estimated annual income from the year of the survey).

Table 2.1. Descriptive statistics of the analysed national samples

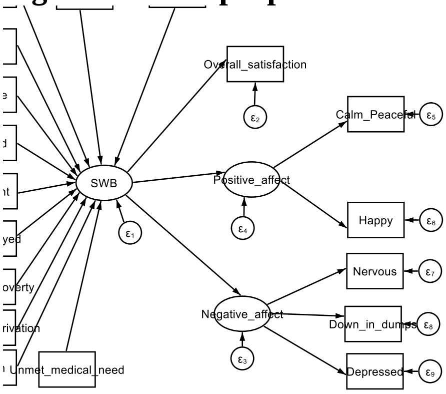
Country	Sample size	Age	Sex (% Women)	Income (PPS)	Unmet medical needs	Retired	Student	Unemployed	Impoverished	Material Deprivation	Living Alone
AT	9 756	51.0	54.0%	29 077	0.4%	30.8%	5.0%	3.6%	14.1%	0.39	22.9%
BE	9 908	50.9	51.9%	24 959	2.3%	28.6%	6.5%	4.6%	16.5%	0.68	19.4%
BG	10 317	56.1	56.9%	10 696	3.3%	38.8%	3.0%	7.2%	21.7%	1.68	18.8%
CY	8 057	51.5	53.9%	18 291	1.7%	27.5%	4.9%	7.1%	15.2%	1.18	10.1%
CZ	9 840	56.4	61.9%	16 750	2.3%	42.1%	1.9%	2.0%	11.5%	0.64	26.0%
DE	20 034	53.3	52.8%	29 823	0.4%	32.3%	5.7%	2.7%	12.6%	0.51	22.1%
DK	5 398	56.5	52.8%	32 545	5.8%	36.1%	5.1%	2.8%	7.2%	0.47	34.1%
EE	9 775	51.8	57.9%	17 164	16.3%	26.9%	6.4%	3.3%	23.3%	0.85	16.8%
EL	44 608	54.7	52.3%	13 535	11.2%	31.8%	5.3%	9.9%	17.7%	1.62	14.8%
ES	27 733	51.6	52.3%	23 410	0.4%	20.5%	7.0%	10.8%	19.7%	0.86	11.2%
FI	9 014	51.4	48.5%	29 673	5.3%	26.3%	7.3%	5.5%	10.8%	0.47	25.5%
FR	14 318	54.5	57.9%	29 606	3.4%	37.3%	2.9%	5.3%	12.1%	0.67	23.0%
HR	10 068	58.4	58.9%	12 739	5.5%	48.0%	1.7%	10.0%	26.5%	1.49	21.0%
HU	12 549	55.0	58.8%	11 234	5.6%	40.0%	4.7%	2.9%	15.6%	1.25	20.3%
IE	5 405	54.1	56.5%	28 452	2.8%	23.1%	3.0%	4.6%	18.8%	0.80	22.2%
IT	27 956	56.2	54.7%	25 810	2.7%	32.1%	3.4%	4.8%	16.4%	0.98	26.4%
LT	5 811	55.8	65.1%	8 218	3.7%	32.5%	2.8%	5.9%	23.2%	1.49	22.1%
LU	5 906	49.0	55.5%	49 024	1.2%	20.7%	5.6%	3.6%	16.0%	0.35	12.2%
LV	7 772	55.4	64.1%	7 715	11.5%	34.2%	3.3%	5.3%	30.9%	1.47	26.7%
MT	8 173	49.1	50.8%	16 034	0.5%	21.5%	6.1%	1.0%	18.1%	0.63	9.4%
NL	12 003	54.5	54.6%	29 598	1.0%	23.1%	5.2%	1.9%	10.0%	0.44	35.2%
PL	19 966	54.5	64.0%	14 354	8.8%	36.0%	3.1%	4.2%	18.4%	0.96	16.5%
PT	18 681	55.8	58.3%	16 119	5.0%	33.1%	3.0%	7.7%	19.8%	1.18	16.1%
RO	12 187	53.1	53.4%	9 167	7.6%	37.2%	5.8%	0.3%	20.9%	1.61	15.6%
SE	5 555	51.3	50.0%	29 298	3.4%	28.2%	10.1%	2.9%	12.5%	0.27	23.3%
SI	6 536	53.7	57.9%	20 413	3.9%	39.0%	5.0%	6.6%	15.4%	0.79	17.8%
SK	11 326	49.5	54.6%	12 796	6.2%	29.7%	8.1%	4.6%	11.7%	1.08	8.6%
UK	17 114	56.0	54.3%	27 639	7.8%	38.4%	2.1%	1.9%	20.4%	0.62	21.2%

Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

2.2. Estimating the MIMIC model

All estimation procedures were conducted using the SEM module within the Stata 15 program. Parameters of the MIMIC sub-models were estimated using the maximum likelihood method. The results of these estimates are presented in Tables 2.2, 2.3 and in Figure 2.1.

Figure 2.1. The proposed form of the MIMIC model



It should be noted that the method of constructing the MIMIC model for SWB was determined by solutions adopted during the operationalisation of the approach to measuring the individual dimensions of the quality of life proposed by Eurostat. In other words, we assessed to what extent the approach to measuring SWB proposed by Eurostat was consistent with the data obtained from the EU-SILC study.

The overall fit of the models was assessed using three fit measures (Hu and Bentler, 1999): NNFI (Non-Normed Fit index), CFI (Confirmatory Fit index), and RMSEA (Root Mean Square Error of Approximation). The NNFI and CFI measures take values in the range [0; 1], with higher values indicating a better fit. In this case, index values of not less than 0.95 indicate a very good fit of the model. By contrast, lower values of the RMSEA index indicate a better model fit, with values below 0.08 representing an acceptable model fit.

For all the models and countries, the RMSEA met the imposed criteria (see Table A1 in the Appendix). Moreover, values of the CFI and NNFI were higher than 0.81 for all the models and countries. Still, given the complexity of the underlying theoretical concepts, the models exhibit an overall good fit. It means that the list of SWB indicators proposed by Eurostat experts is well suited to measure the phenomenon.

Table 2.2 contains results of estimating the formative part of the MIMIC model, i.e. estimates of parameters in the regression model of the latent SWB variable. These parameters are estimated for standardised variables to make sure that their values are comparable and their interpretation is similar to the way factor loadings in factor analysis were interpreted. Therefore, higher absolute values indicate that a given determinant is more important in shaping the overall SWB values, whereas the lack of statistical significance may suggest that a certain variable does not influence overall SWB. The value of R^2 in this equation is equal to 0.35, which means that 35% of the SWB variance can be explained by observable exogenous characteristics used in the linear regression model. Therefore, the majority of individual differences in SWB are due to other, probably unobservable factors.

For the majority of countries, the highest absolute values of estimated parameters are associated with two variables – self-perceived health and material deprivation (see Table 2.2). This means that, out of the whole analysed set, these two variables are the strongest observable determinants of SWB. The variables which have a positive effect on SWB are better self-perceived health, higher income, the fact of being a student or a retiree and bigger household size. The variables that can be associated with lower SWB include older age, monetary poverty and material deprivation, being unemployed, having unmet medical needs.

Table 2.2. Parameter estimates in the formative (structural) part of the MIMIC model

Country	Age	Sex	Income	Health	Unmet med. needs	Retired	Student	Unemployed	Monetary poverty	Material deprivation	Household size	Living alone	Negative affect	Positive affect
AT	-0.009	-0.069	0.037	0.389	-0.039	0.046	-0.024	-0.061	-0.014	-0.248	0.018	-0.036	-0.898	0.972
	(0.020)	(0.012)	(0.013)	(0.015)	(0.013)	(0.019)	(0.015)	(0.018)	(0.015)	(0.018)	(0.019)	(0.017)	(0.010)	(0.013)
BE	0.022	-0.052	0.019	0.318	-0.105	0.063	0.033	-0.048	0.006	-0.348	0.032	-0.089	-0.829	0.930
	(0.020)	(0.011)	(0.012)	(0.013)	(0.016)	(0.017)	(0.012)	(0.016)	(0.015)	(0.018)	(0.015)	(0.015)	(0.011)	(0.013)
BG	-0.222	0.015	0.128	0.236	-0.093	0.048	0.030	-0.162	-0.053	-0.288	-0.060	0.002	-0.736	0.771
	(0.020)	(0.011)	(0.012)	(0.011)	(0.010)	(0.016)	(0.014)	(0.012)	(0.013)	(0.013)	(0.014)	(0.013)	(0.010)	(0.009)
CY	-0.080	-0.046	0.019	0.302	-0.085	0.130	0.055	-0.119	-0.047	-0.248	0.019	-0.050	-0.876	0.879
	(0.023)	(0.014)	(0.014)	(0.017)	(0.018)	(0.020)	(0.015)	(0.018)	(0.017)	(0.017)	(0.019)	(0.016)	(0.009)	(0.010)
CZ	-0.105	-0.053	0.071	0.274	-0.018	0.169	0.034	-0.021	-0.036	-0.298	0.015	0.003	-0.841	0.951
	(0.021)	(0.012)	(0.014)	(0.014)	(0.012)	(0.020)	(0.011)	(0.018)	(0.015)	(0.015)	(0.017)	(0.015)	(0.011)	(0.011)
DE	-0.009	-0.058	0.050	0.338	-0.045	0.101	0.032	-0.055	-0.023	-0.239	0.009	-0.050	-0.869	0.950
	(0.016)	(0.009)	(0.009)	(0.010)	(0.011)	(0.012)	(0.011)	(0.013)	(0.012)	(0.012)	(0.015)	(0.012)	(0.007)	(0.009)
DK	-0.012	-0.201	-0.027	0.254	-0.154	0.018	-0.083	-0.128	-0.079	-0.322	-0.043	-0.229	-0.756	0.708
	(0.000)	(0.002)	(0.028)	(0.003)	(0.012)	(0.000)	(0.001)	(0.001)	(0.001)	(0.004)	(0.000)	(0.003)	(0.004)	(0.401)
EE	-0.058	0.054	0.054	0.333	-0.076	0.090	0.029	-0.085	-0.004	-0.283	0.009	-0.050	-0.700	0.985
	(0.027)	(0.015)	(0.018)	(0.016)	(0.015)	(0.020)	(0.013)	(0.016)	(0.019)	(0.017)	(0.016)	(0.021)	(0.027)	(0.030)
ES	-0.122	-0.070	0.020	0.344	-0.027	0.084	0.042	-0.102	-0.009	-0.269	0.031	-0.012	-0.878	0.905
	(0.013)	(0.008)	(0.009)	(0.010)	(0.007)	(0.010)	(0.008)	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)	(0.006)	(0.007)
FI	0.050	0.017	0.033	0.326	-0.063	0.080	0.010	-0.053	0.003	-0.278	0.024	-0.076	-0.819	0.916
	(0.026)	(0.016)	(0.014)	(0.018)	(0.018)	(0.023)	(0.016)	(0.020)	(0.021)	(0.021)	(0.015)	(0.020)	(0.015)	(0.015)
FR	-0.105	-0.118	-0.012	0.261	-0.072	0.113	-0.010	-0.038	0.002	-0.263	-0.027	-0.079	-0.853	1.000
	(0.023)	(0.013)	(0.017)	(0.015)	(0.012)	(0.021)	(0.016)	(0.014)	(0.016)	(0.015)	(0.019)	(0.016)	(0.010)	(0.012)
GR	-0.147	0.016	0.029	0.219	-0.066	0.104	0.046	-0.145	-0.031	-0.219	0.030	-0.019	-0.891	0.865
	(0.010)	(0.006)	(0.007)	(0.008)	(0.007)	(0.008)	(0.006)	(0.007)	(0.007)	(0.007)	(0.009)	(0.007)	(0.004)	(0.004)
HR	-0.101	0.000	0.055	0.312	-0.072	0.040	0.069	-0.045	-0.036	-0.306	0.032	0.035	-0.825	0.861
	(0.020)	(0.011)	(0.014)	(0.014)	(0.013)	(0.017)	(0.011)	(0.014)	(0.014)	(0.014)	(0.016)	(0.014)	(0.009)	(0.010)
HU	-0.218	-0.015	0.014	0.305	-0.097	0.109	0.027	-0.079	-0.041	-0.343	0.066	-0.021	-0.845	0.851
	(0.022)	(0.011)	(0.012)	(0.013)	(0.012)	(0.017)	(0.015)	(0.017)	(0.014)	(0.014)	(0.016)	(0.013)	(0.010)	(0.010)
IE	-0.025	-0.064	0.023	0.262	-0.052	0.077	-0.023	-0.047	-0.007	-0.341	-0.011	-0.057	-0.866	0.802
	(0.029)	(0.019)	(0.017)	(0.022)	(0.024)	(0.021)	(0.024)	(0.022)	(0.023)	(0.024)	(0.027)	(0.023)	(0.015)	(0.024)
IT	-0.139	-0.024	0.054	0.348	-0.083	0.084	0.037	-0.113	-0.021	-0.228	0.018	-0.022	-0.879	0.841
	(0.013)	(0.008)	(0.008)	(0.009)	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.007)	(0.007)
LT	-0.136	0.004	0.078	0.231	-0.091	0.106	0.037	-0.091	-0.020	-0.429	0.043	0.034	-0.786	0.906
	(0.029)	(0.016)	(0.020)	(0.020)	(0.015)	(0.024)	(0.017)	(0.019)	(0.022)	(0.019)	(0.021)	(0.023)	(0.019)	(0.021)
LU	-0.044	-0.080	-0.001	0.264	-0.053	0.074	0.026	-0.110	-0.067	-0.241	-0.048	-0.104	-0.888	1.000
	(0.030)	(0.020)	(0.021)	(0.027)	(0.018)	(0.024)	(0.019)	(0.033)	(0.023)	(0.029)	(0.025)	(0.027)	(0.018)	(0.025)
LV	-0.153	-0.004	0.061	0.229	-0.104	0.066	0.028	-0.120	-0.056	-0.361	0.051	-0.015	-0.738	1.000
	(0.028)	(0.013)	(0.018)	(0.020)	(0.014)	(0.020)	(0.014)	(0.013)	(0.016)	(0.013)	(0.021)	(0.017)	(0.019)	(0.022)
MT	-0.041	-0.011	0.052	0.237	-0.037	0.074	0.043	-0.028	-0.011	-0.339	-0.008	0.022	-0.897	0.866
	(0.022)	(0.015)	(0.018)	(0.017)	(0.019)	(0.018)	(0.014)	(0.014)	(0.018)	(0.018)	(0.019)	(0.019)	(0.012)	(0.019)
NL	0.141	0.004	0.049	0.346	-0.042	0.043	0.038	-0.039	-0.010	-0.294	0.043	-0.063	-0.835	0.903
	(0.018)	(0.012)	(0.014)	(0.015)	(0.013)	(0.013)	(0.016)	(0.016)	(0.018)	(0.017)	(0.015)	(0.017)	(0.011)	(0.014)
PL	-0.168	-0.033	0.022	0.200	-0.079	0.064	0.015	-0.037	-0.018	-0.325	0.004	-0.066	-0.770	0.959
	(0.015)	(0.009)	(0.011)	(0.011)	(0.010)	(0.013)	(0.009)	(0.010)	(0.010)	(0.011)	(0.012)	(0.012)	(0.009)	(0.012)
PT	-0.207	-0.149	0.079	0.309	-0.069	0.054	0.019	-0.046	-0.019	-0.261	0.006	-0.012	-0.942	0.985
	(0.015)	(0.009)	(0.009)	(0.010)	(0.009)	(0.013)	(0.008)	(0.010)	(0.010)	(0.011)	(0.012)	(0.011)	(0.005)	(0.007)
RO	-0.155	0.008	0.149	0.215	-0.076	0.037	0.087	-0.034	-0.030	-0.242	-0.026	-0.096	-0.742	0.788
	(0.022)	(0.012)	(0.014)	(0.015)	(0.013)	(0.018)	(0.013)	(0.017)	(0.016)	(0.014)	(0.020)	(0.014)	(0.013)	(0.015)
SE	0.131	-0.023	0.074	0.252	-0.131	0.035	0.058	-0.074	0.012	-0.246	0.014	-0.145	-0.869	0.958
	(0.028)	(0.016)	(0.016)	(0.020)	(0.020)	(0.025)	(0.020)	(0.025)	(0.023)	(0.022)	(0.020)	(0.022)	(0.010)	(0.012)
SI	-0.018	-0.037	0.044	0.308	-0.048	0.053	0.023	-0.010	-0.001	-0.364	-0.006	-0.012	-0.845	0.943
	(0.032)	(0.018)	(0.018)	(0.021)	(0.021)	(0.028)	(0.012)	(0.019)	(0.022)	(0.022)	(0.019)	(0.023)	(0.016)	(0.016)
SK	-0.180	0.006	0.083	0.319	-0.069	0.152	0.064	-0.145	0.014	-0.275	0.028	0.022	-0.764	0.843
	(0.022)	(0.011)	(0.014)	(0.015)	(0.012)	(0.018)	(0.012)	(0.016)	(0.015)	(0.014)	(0.014)	(0.013)	(0.013)	(0.011)
UK	0.062	-0.035	0.028	0.334	-0.089	0.155	0.012	-0.054	-0.013	-0.264	0.052	-0.051	-0.887	0.868
	(0.016)	(0.009)	(0.009)	(0.011)	(0.010)	(0.013)	(0.011)	(0.011)	(0.011)	(0.012)	(0.014)	(0.012)	(0.007)	(0.010)

Table contains parameter estimates and standard errors of estimation (in parentheses).
Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

Table 2.3 contains estimates of the reflective part of the MIMIC model. In other words, it contains estimates of regression model parameters for particular symptoms (realised functionings) of the latent SWB variable. Each equation contains a single explanatory variable (SWB) and a constant term. In all analysed countries latent variables explain variability of all proposed symptoms in a statistically significant manner.

It is generally recommended that measurement models are assessed using average variance extracted (AVE) and the coefficient of variation (CV) (Fornell and Larcker, 1981; Ullman and Bentler, 2012). In our opinion, it would be inappropriate to use these indicators in the context of our study, as their values tend to be high when the correlations among selected indicators are high. Their use is justified when a SEM model is used to capture common factors underlying a set of correlated observables. In the case of measuring SWB, we preferred to use a set of observable indicators that represent different aspects of a given domain of SWB, and, consequently, are not strongly correlated. For this reason, we chose to focus our assessment on the statistical significance of factor loadings in the measurement sub-models. Significant factor loadings suggest that the latent capabilities are well captured by the proposed symptoms (Krishnakumor and Ballon, 2008).

Higher values of SWB were, on average, associated with higher values of variables such as being happy, being calm and overall life satisfaction. At the same time higher values of SWB were associated with lower values of the three variables describing symptom of low mood, namely: being sad, being depressed and being nervous.

Table 2.3. Estimates of the reflective (measurement) part of the MIMIC model

Country	Overall life satisfaction	Nervous	Down in the dumps	Depressed	Calm	Happy
AT	0.654	0.657	0.782	0.753	0.643	0.703
	(0.013)	(0.012)	(0.009)	(0.01)	(0.013)	(0.013)
BE	0.683	0.55	0.826	0.825	0.597	0.761
	(0.013)	(0.011)	(0.007)	(0.007)	(0.012)	(0.012)
BG	0.86	0.654	0.88	0.827	0.836	0.922
	(0.007)	(0.01)	(0.007)	(0.007)	(0.007)	(0.006)
CY	0.702	0.731	0.863	0.829	0.785	0.788
	(0.012)	(0.01)	(0.006)	(0.008)	(0.011)	(0.01)
CZ	0.674	0.734	0.783	0.684	0.748	0.696
	(0.012)	(0.008)	(0.007)	(0.009)	(0.011)	(0.01)
DE	0.737	0.628	0.837	0.78	0.665	0.737
	(0.008)	(0.007)	(0.005)	(0.006)	(0.009)	(0.009)
DK	0.871	0.804	1.	1.	0.841	0.867
	(0.015)	(0.004)	(0.)	(0.)	(0.07)	(0.172)
EE	0.661	0.712	0.73	0.673	0.511	0.66
	(0.022)	(0.012)	(0.01)	(0.012)	(0.021)	(0.019)
ES	0.628	0.718	0.92	0.864	0.68	0.784
	(0.008)	(0.006)	(0.003)	(0.005)	(0.009)	(0.007)
FI	0.724	0.592	0.818	0.818	0.657	0.78
	(0.016)	(0.014)	(0.009)	(0.01)	(0.015)	(0.014)
FR	0.643	0.622	0.791	0.767	0.642	0.716
	(0.012)	(0.01)	(0.007)	(0.007)	(0.011)	(0.01)
GR	0.701	0.726	0.912	0.783	0.774	0.81
	(0.005)	(0.004)	(0.002)	(0.004)	(0.004)	(0.004)
HR	0.801	0.761	0.864	0.758	0.739	0.834
	(0.008)	(0.008)	(0.006)	(0.008)	(0.01)	(0.008)
HU	0.75	0.579	0.844	0.769	0.692	0.846
	(0.009)	(0.012)	(0.008)	(0.008)	(0.011)	(0.009)
IE	0.702	0.58	0.815	0.812	0.607	0.848
	(0.017)	(0.017)	(0.011)	(0.014)	(0.024)	(0.015)
IT	0.569	0.805	0.894	0.806	0.832	0.791
	(0.008)	(0.005)	(0.004)	(0.005)	(0.006)	(0.006)
LT	0.757	0.723	0.842	0.718	0.566	0.797
	(0.015)	(0.014)	(0.012)	(0.014)	(0.019)	(0.017)
LU	0.671	0.612	0.73	0.773	0.578	0.653
	(0.02)	(0.015)	(0.015)	(0.015)	(0.021)	(0.022)
LV	0.747	0.755	0.854	0.681	0.533	0.65
	(0.014)	(0.009)	(0.008)	(0.01)	(0.016)	(0.015)
MT	0.62	0.579	0.792	0.754	0.669	0.77
	(0.014)	(0.013)	(0.01)	(0.012)	(0.013)	(0.013)
NL	0.783	0.604	0.833	0.809	0.555	0.82
	(0.013)	(0.011)	(0.007)	(0.007)	(0.016)	(0.012)
PL	0.671	0.551	0.756	0.783	0.476	0.766
	(0.008)	(0.009)	(0.007)	(0.007)	(0.011)	(0.01)
PT	0.637	0.731	0.858	0.837	0.728	0.761
	(0.008)	(0.007)	(0.004)	(0.005)	(0.008)	(0.007)
RO	0.752	0.638	0.833	0.718	0.665	0.724
	(0.01)	(0.01)	(0.008)	(0.01)	(0.012)	(0.014)
SE	0.709	0.665	0.883	0.844	0.779	0.789
	(0.016)	(0.014)	(0.007)	(0.008)	(0.013)	(0.011)
SI	0.674	0.654	0.836	0.716	0.717	0.723
	(0.017)	(0.014)	(0.009)	(0.013)	(0.015)	(0.014)
SK	0.729	0.572	0.828	0.762	0.772	0.773
	(0.012)	(0.01)	(0.008)	(0.009)	(0.011)	(0.009)
UK	0.706	0.615	0.864	0.848	0.66	0.812
	(0.008)	(0.008)	(0.004)	(0.005)	(0.009)	(0.008)

Table contains parameter estimates and standard errors of estimation (in parentheses).
Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

2.3. Subjective well-being in the EU countries

Figures 2.2 and 2.3 present mean values of subjective well-being and its components in the EU countries in 2018. In general, subjective well-being is higher in the countries of Northern and Western Europe and lower in Eastern and Southern Europe. The highest values were observed in Ireland (0.80), Germany (0.77), Austria (0.76) and Finland (0.75). Among the countries that joined the European Union in 2004 relatively high values were observed for Poland (0.73) and Romania (0.71). The lowest values of SWB were observed in Croatia (0.61), Bulgaria (0.62), Lithuania (0.64) and Portugal (0.64).

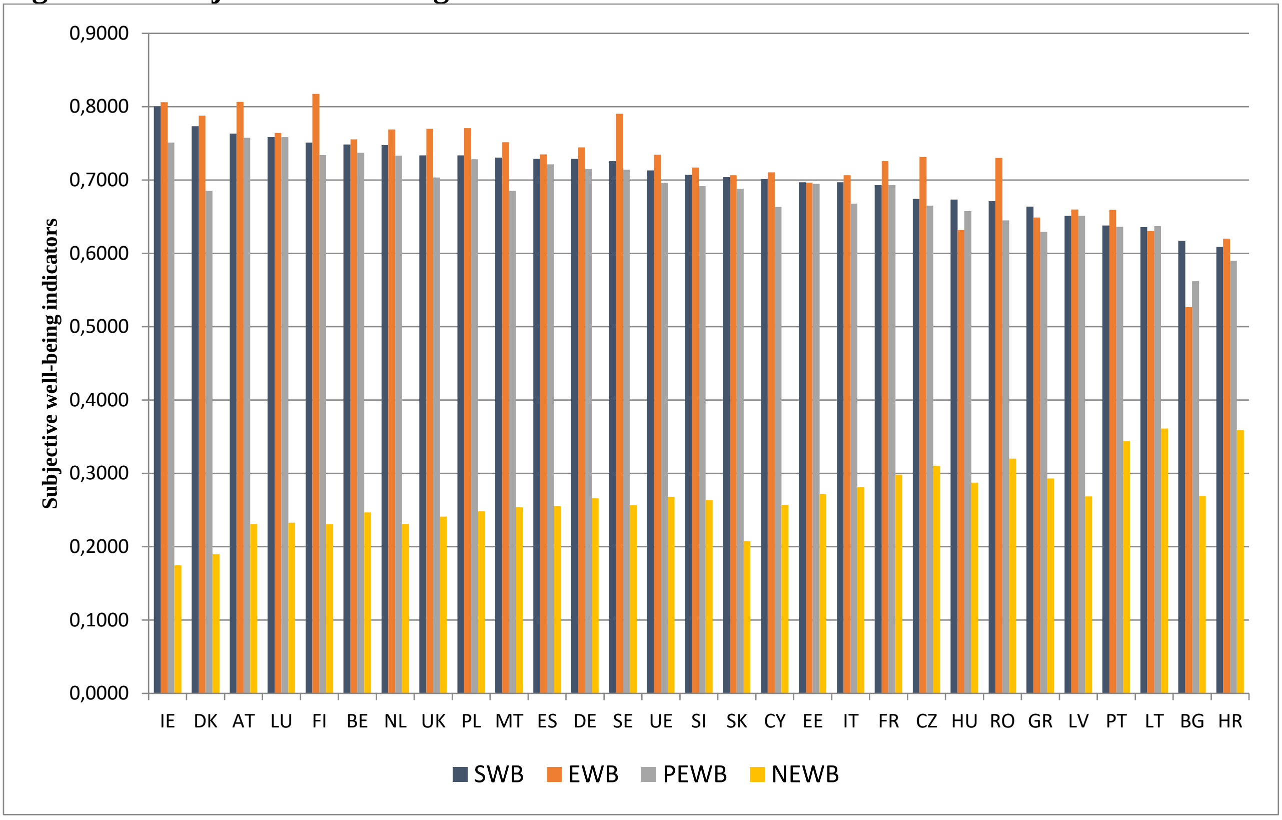
In 2018 the highest mean satisfaction with life in general (evaluative well- being) was observed in Finland (0.82), Ireland (0.81) and Austria (0.81.). It can be noted that among the new EU states countries with a higher average level of life satisfaction include Poland (0.77), Czechia (0.73) and Romania (0.73). Evaluative well-being was the lowest in Bulgaria with a mean value of 0.53. Other countries reporting comparatively low mean ratings include Croatia (0.62), Lithuania (0.63), Hungary (0.63 and Greece (0.65).

As regards positive experienced well-being, Austria, Luxembourg and Ireland had the highest scores of 0.76, 0.76 and 0.75, respectively, while Bulgaria, Croatia and Greece had the lowest scores of 0.56, 0.59 and 0.63, respectively. The highest values of positive experienced well-being among the new EU states were observed for Poland, Estonia and Slovenia with mean values of 0.73, 0.69 and 0.69, respectively.

The lowest negative experienced well-being in 2018 was recorded in Ireland and Germany with mean scores of 0.18 and 0.19, respectively. Slovakia and Poland reported the lowest mean values of negative experienced well-being of all the new EU states, 0.21 and 0.25, respectively.

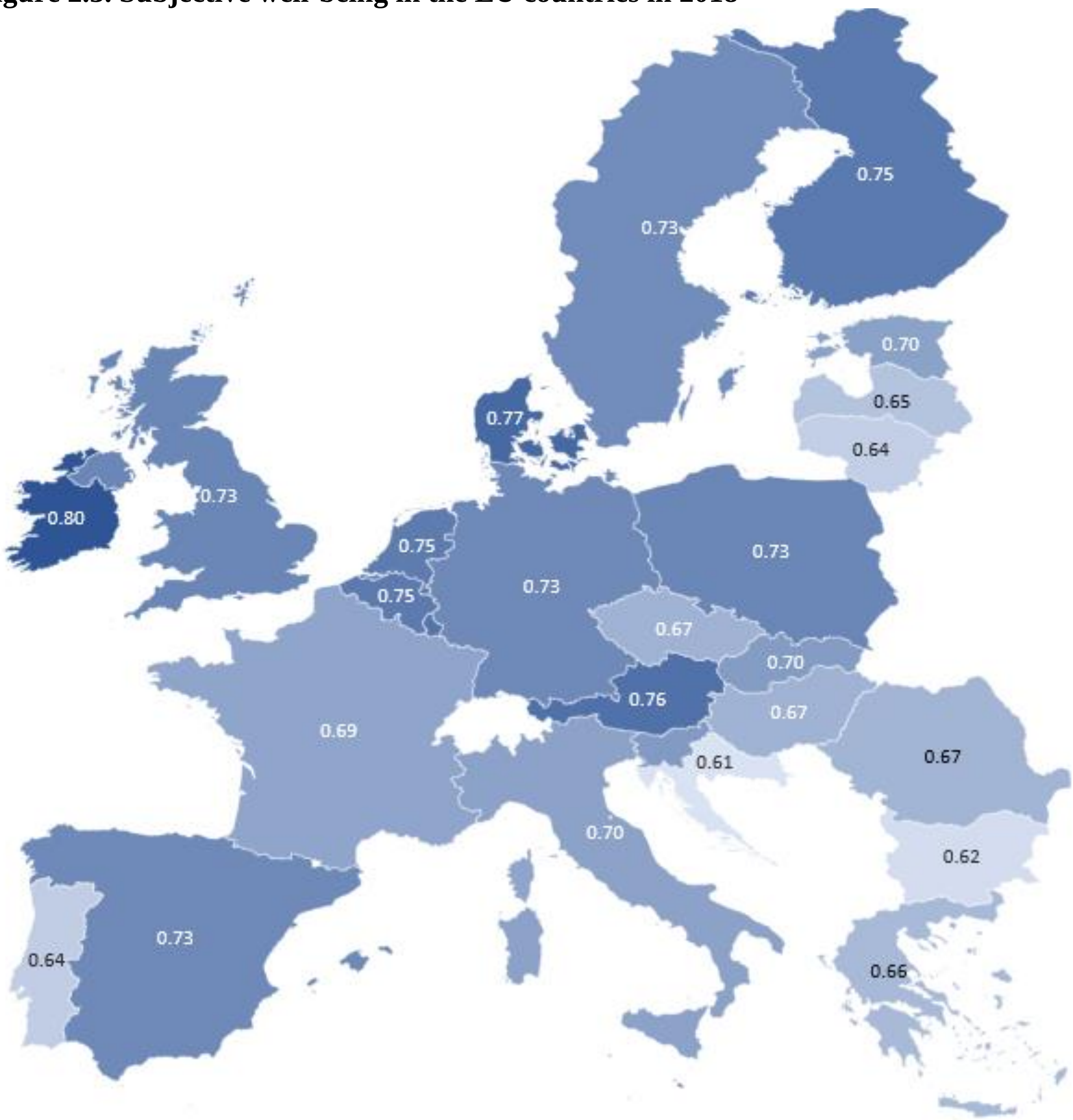
Mean scores of negative experienced well-being were the highest in Lithuania, Croatia, Portugal and Romania: 0.36, 0.36, 0.34 and 0.32 respectively.

Figure 2.2. Subjective well-being in the EU countries in 2018



Source: Based on data in Table A2 in the Appendix and on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

Figure 2.3. Subjective well-being in the EU countries in 2018



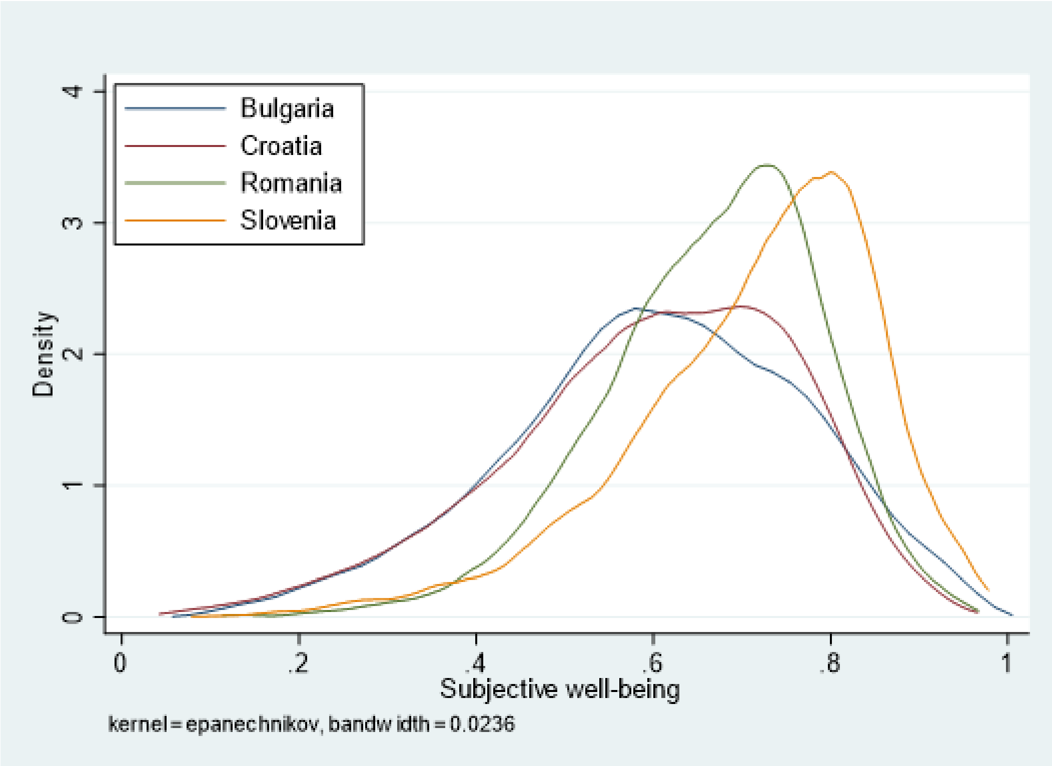
Source: Based on data in Table A2 in the Appendix and on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors..

2.4 Distribution of SWB in the populations of the EU countries

Because SWB values were estimated for all individuals in the database and standardised across all the countries, it was possible to conduct a comparative analysis of SWB. We ran a series of kernel density estimations of SWB in the populations of the analysed countries and their results are presented in a series of figures below (Figures 2.4-2.8). For the sake of clarity, countries are grouped according to their geographical proximity.

It turned out that distributions of SWB were left-skewed in all analysed countries, which means that the majority of the population in each country experienced relatively high levels of SWB, while a small portion of the population suffered from low levels of SWB.

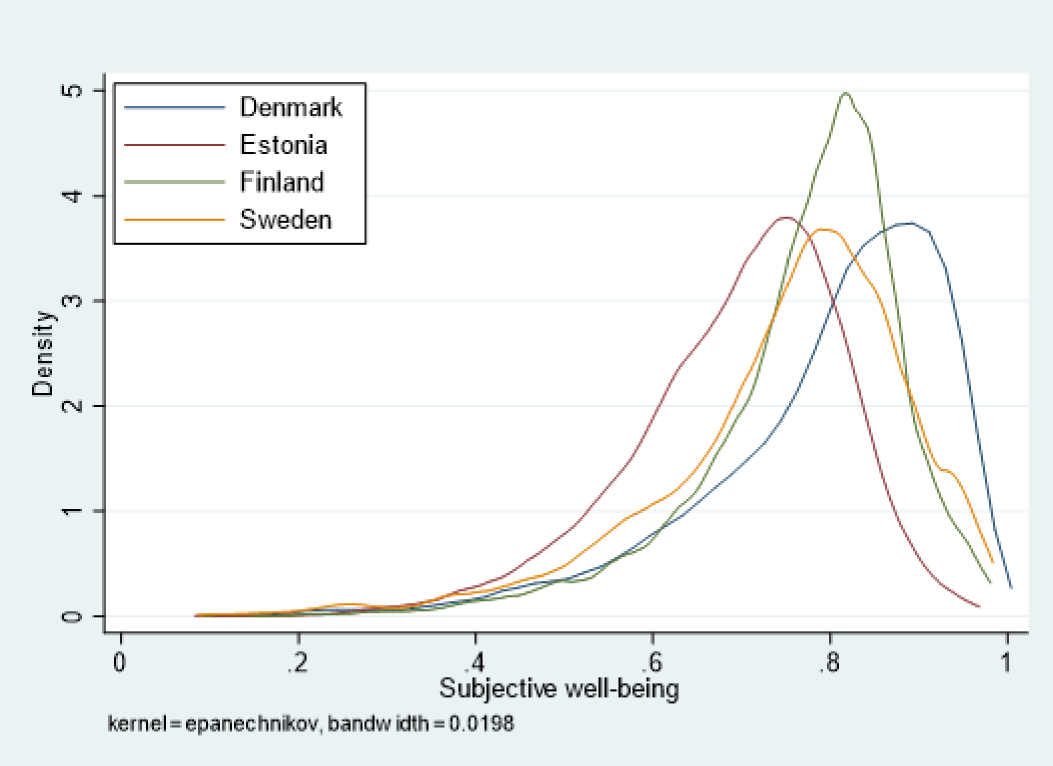
Figure 2.4. Kernel density estimation of SWB in the populations of the EU countries in the Balkans.



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

Figure 2.4 presents distributions of SWB in four Balkan countries. The populations of Slovenia and Romania experienced higher average values of SWB, compared to Bulgaria and Croatia. Moreover, the distributions in the first pair of countries are characterised by higher variance and are almost symmetrical as opposed to positively skewed distributions observed in almost all analysed countries.

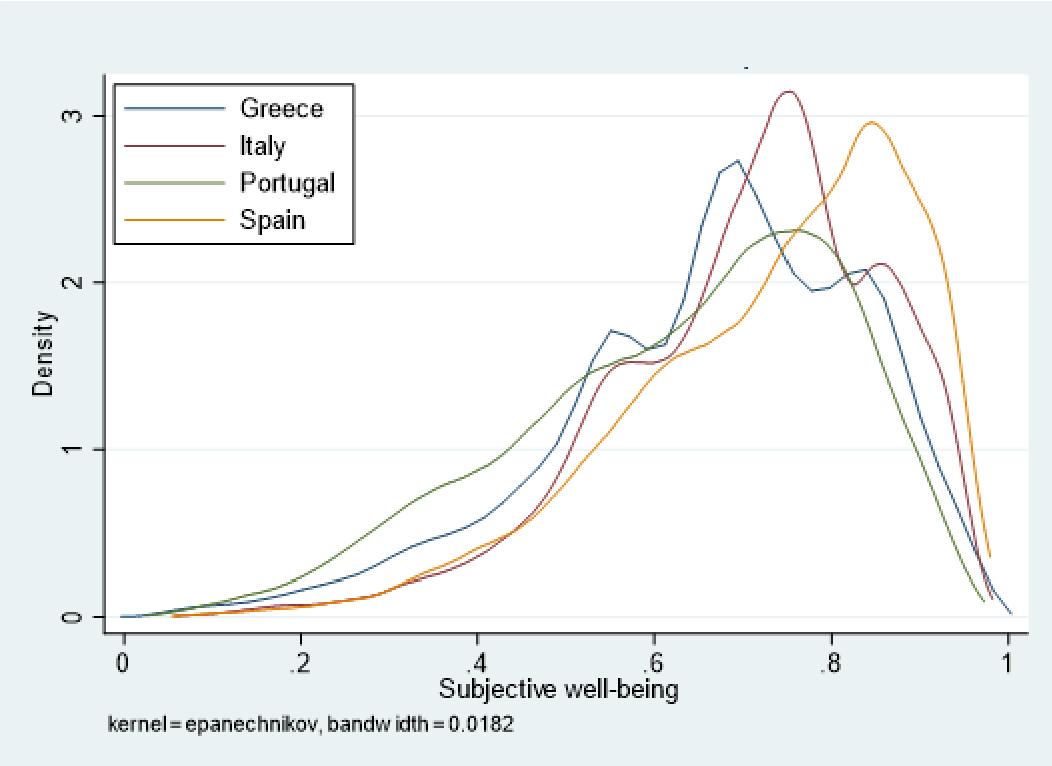
Figure 2.5. Kernel density estimation of SWB in the populations of EU countries in Northern Europe.



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

Figure 2.5 shows distributions of SWB in four Northern European countries. The levels of SWB are the highest in Denmark and the lowest in Estonia. Interestingly, the distribution of SWB in Finland is more symmetrical and centred around average values in comparison with the other three countries.

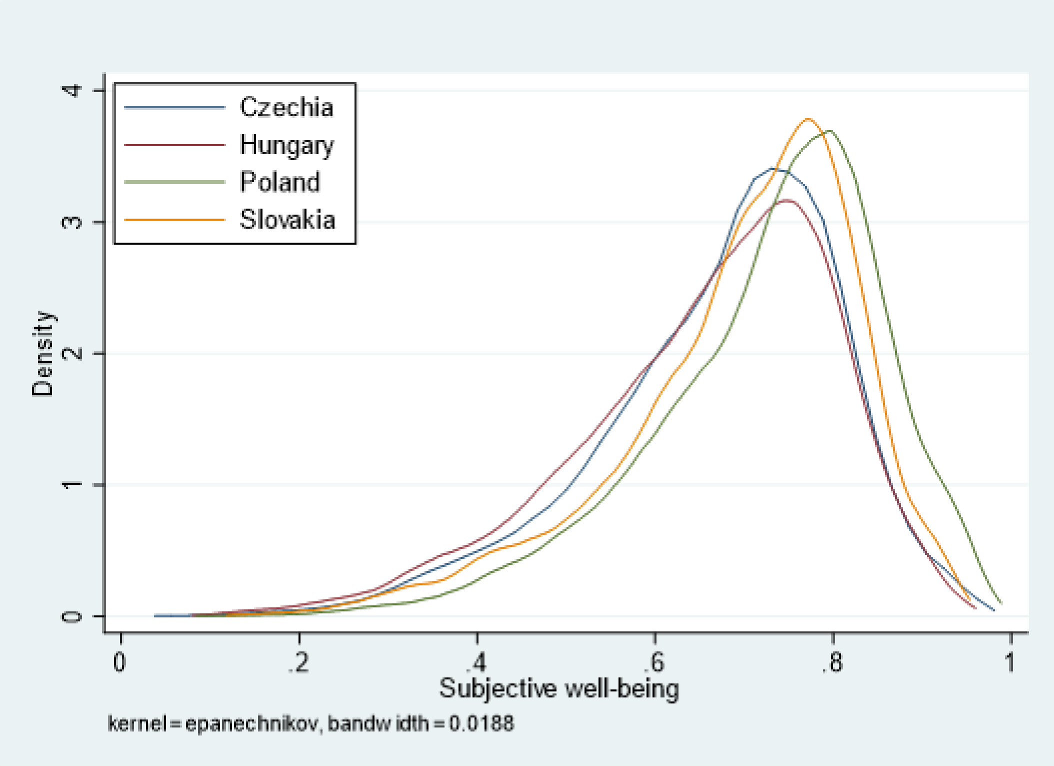
Figure 2.6. Kernel density estimation of SWB in the populations of EU countries in Southern Europe.



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

Figure 2.6 illustrates SWB distributions in four EU countries of Southern Europe. At first glance, the distributions in those countries seem to be similar, but there is a noticeable difference in the left tails: Portugal and Greece have relatively bigger shares of the populations experiencing the lowest levels of SWB in comparison with Italy and Spain.

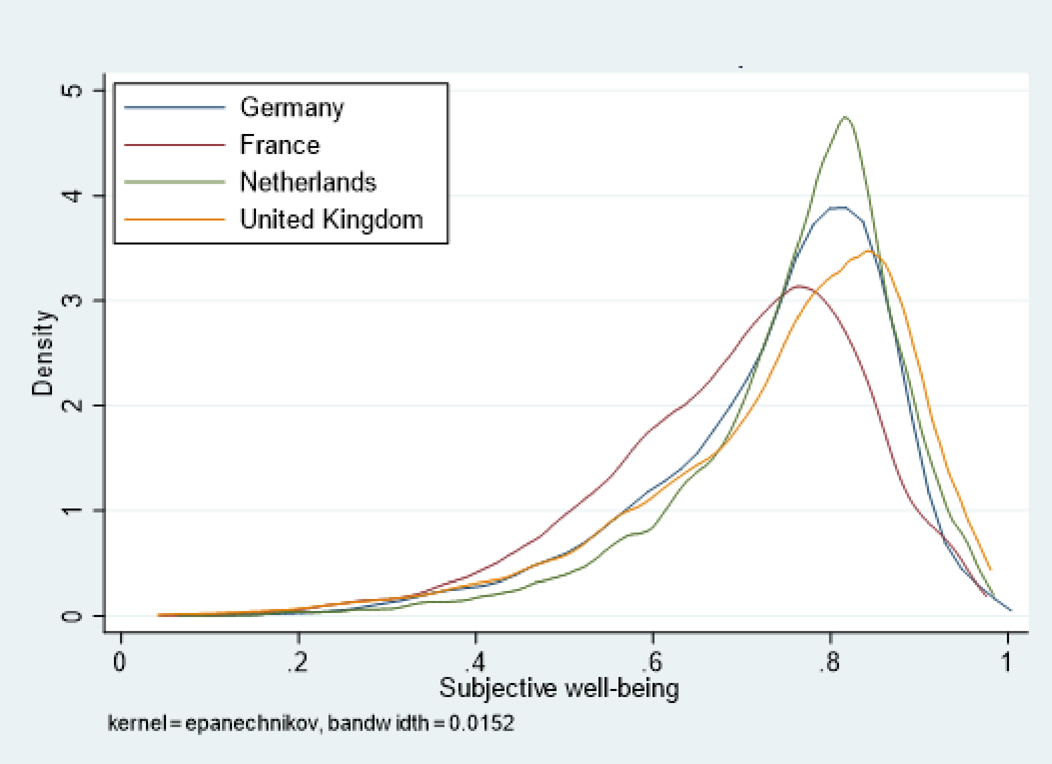
Figure 2.7. Kernel density estimation of SWB in the populations of the Visegrad group countries.



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

Figure 2.7 presents distributions of SWB in the Visegrad group countries. In general, the distributions are very similar, with highest average values in Slovakia and Poland and the lowest in Czechia and Hungary.

Figure 2.8. Kernel density estimation of SWB in the populations of EU countries in Western Europe.



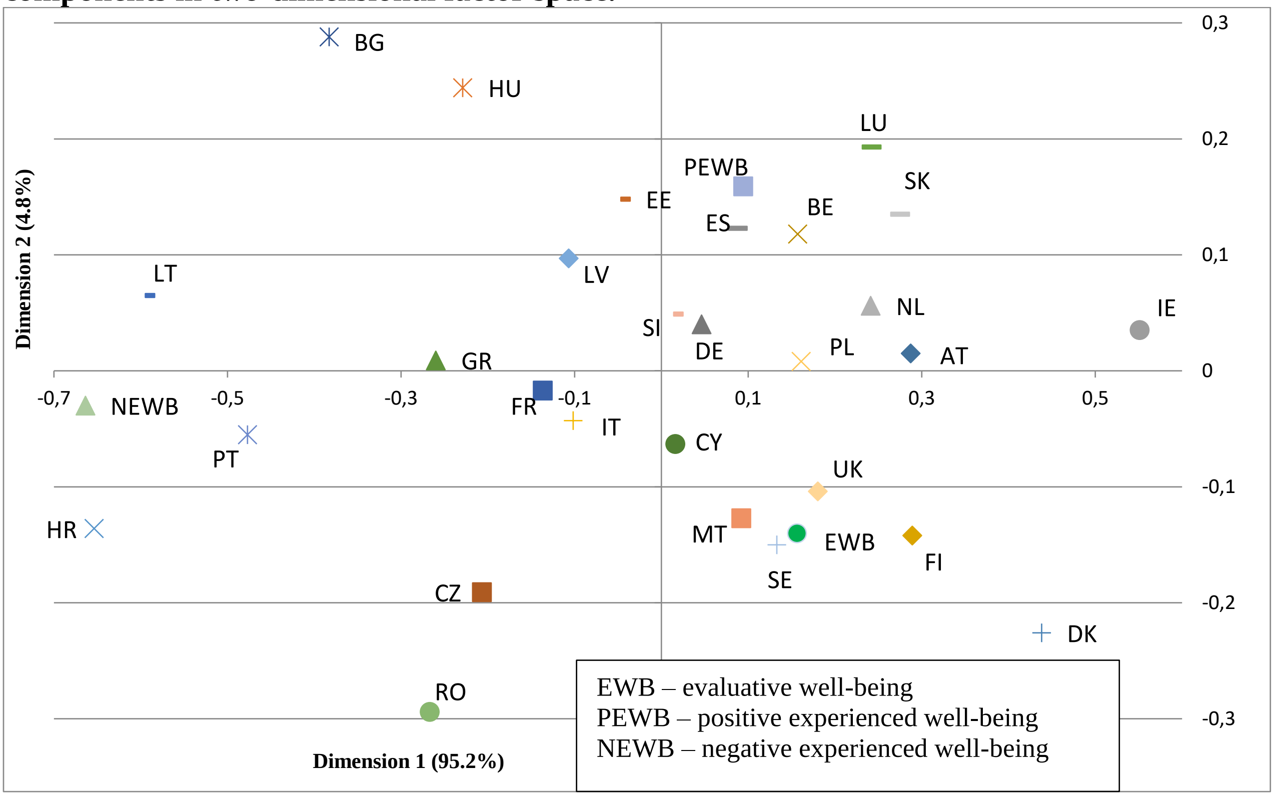
Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

Figure 2.8 presents distributions of SWB in four Western European countries. The distributions for Germany, France and Great Britain are very similar. However, the distribution for France is less left-skewed, which means that a relatively larger proportion of the French population experienced lower levels of SWB compared with the other three countries.

2.5 Profiles of subjective well-being in the EU countries

The first two factors determined in the correspondence analysis (self-perceived health and material deprivation) account for 100% of the total inertia of the data set, with the first factor (dimension) explaining 95.2% of the variance in the data, as shown in Figure 2.9.

Figure 2.9. Configuration of points representing countries and subjective well-being components in two-dimensional factor space.



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

We start the analysis of Figure 2.9 by interpreting the points representing countries separately from those representing SWB components. In 2018, Luxemburg and Slovakia (upper-right quadrant), Denmark (bottom-right quadrant), Croatia and Romania (bottom-left quadrant), Bulgaria and Hungary (upper-left quadrant) had the most unusual profiles of subjective well-being (the most untypical structure of its components). Their points lie relatively far from the origin (the centroid). In relative terms, countries with the most typical structure of subjective well-being include Slovenia and Germany (their points are relatively close to the origin). The point representing Poland is near the origin, so the structure of subjective well-being in Poland did not differ significantly from the average SWB structure in all the countries surveyed.

The biggest relative differences between the countries are due to the value of the component of negative experienced well-being (its point is relatively far the origin). In contrast, the components of positive experienced well-being and evaluative well-being differentiate the countries to a much lesser extent (their points are relatively near from the origin). Moreover, each of these two components is located on the opposite side of the origin, which indicates that they are negatively correlated.

When distances between the points representing countries and subjective well-being components are analysed taking into account the configuration of points as a whole, one can identify characteristic features of subjective well-being in these countries, i.e. the components of subjective well-being whose values differ significantly from the average values of these components calculated for all countries (represented by the origin). Sweden, the United Kingdom, Malta and Finland differ from the other countries in that they have atypical values of evaluative well-being indicators. Values of the negative experienced well-being component distinguish Portugal, Croatia and Lithuania from other countries. Spain, Estonia and Belgium are characterised by untypical values of the positive experienced well-being component.

2.6 Classification of the EU member states depending on the similarity of the structure of subjective well-being

Based on the evaluation of the dendrogram structure (Figure 2.10) and the graphical results of the correspondence analysis (Figure 2.9), it was determined that the most appropriate agglomeration distance of the cut-off level would be 0.15.

Figure 2.10. Dendrogram showing the hierarchical clustering of the UE-28 countries

Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

This creates four clusters of countries (Table 2.4).

Table 2.4. The composition of the four clusters identified by agglomerative hierarchical clustering

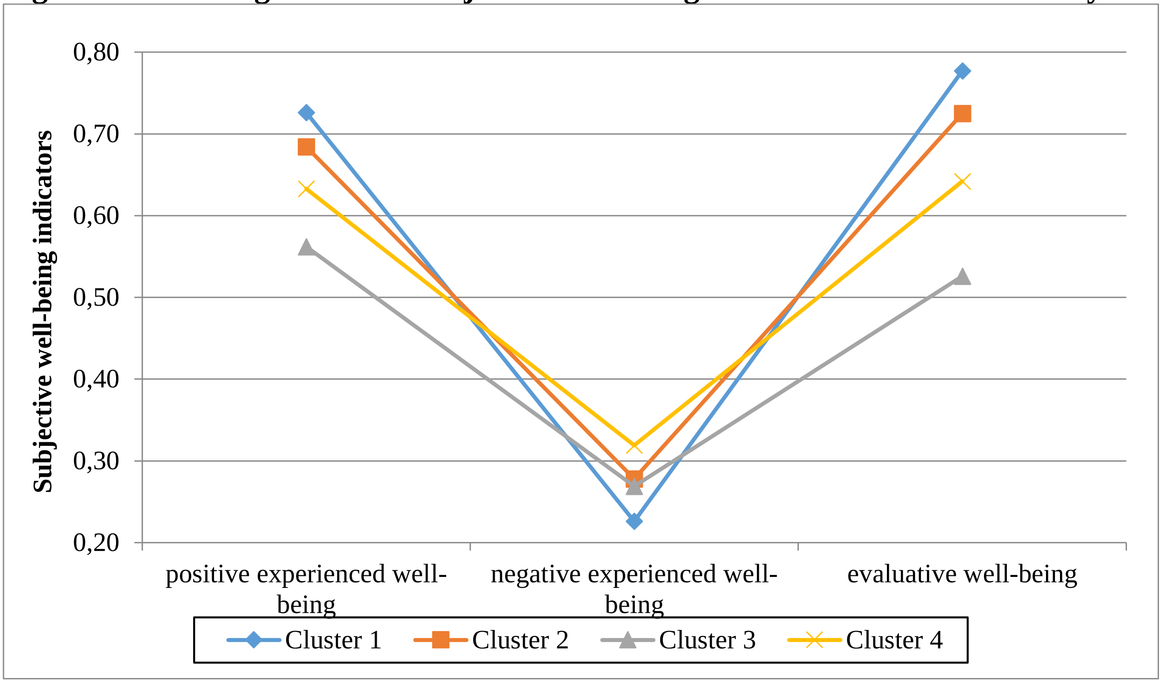
Country	Cluster
Luxemburg	1
Netherlands	1
Ireland	1
Austria	1
United Kingdom	1
Finland	1
Slovakia	1
Belgium	1
Denmark	1
Poland	1
Sweden	1
Malta	2
Estonia	2
Czechia	2
Italy	2
Romania	2
Slovenia	2
Cyprus	2
France	2
Spain	2
Germany	2
Bulgaria	3
Greece	4
Latvia	4
Hungary	4
Lithuania	4
Portugal	4
Croatia	4

Source: Based on Figure 2.10. The responsibility for all conclusions drawn from the data lies entirely with the authors.

Looking from the left side of the dendrogram, the first cluster includes eleven countries: Luxembourg, the Netherlands, Ireland, Austria, the United Kingdom, Finland, Slovakia, Belgium, Denmark, Poland and Sweden. The second one contains ten countries: Malta, Estonia, Czechia, Italy, Romania, Slovenia, Cyprus, France, Spain and Germany. The third cluster covers only one country, namely Bulgaria. The fourth cluster contains six countries: Greece, Latvia, Hungary , Lithuania, Portugal and Croatia.

The first cluster is made up of countries with the highest levels of subjective well-being, as evidenced by the highest average values of evaluative well-being and positive experienced well-being and the lowest average values of negative experienced well-being (Figure 2.11).

Figure 2.11. Average values of subjective well-being indicators in the four country clusters



Source: Based on data in Table A3 in the Appendix. The responsibility for all conclusions drawn from the data lies entirely with the authors.

Countries belonging to the second cluster have the second largest average values of all partial indicators of subjective well-being. They can therefore be classified as countries with a relatively high level of subjective well-being.

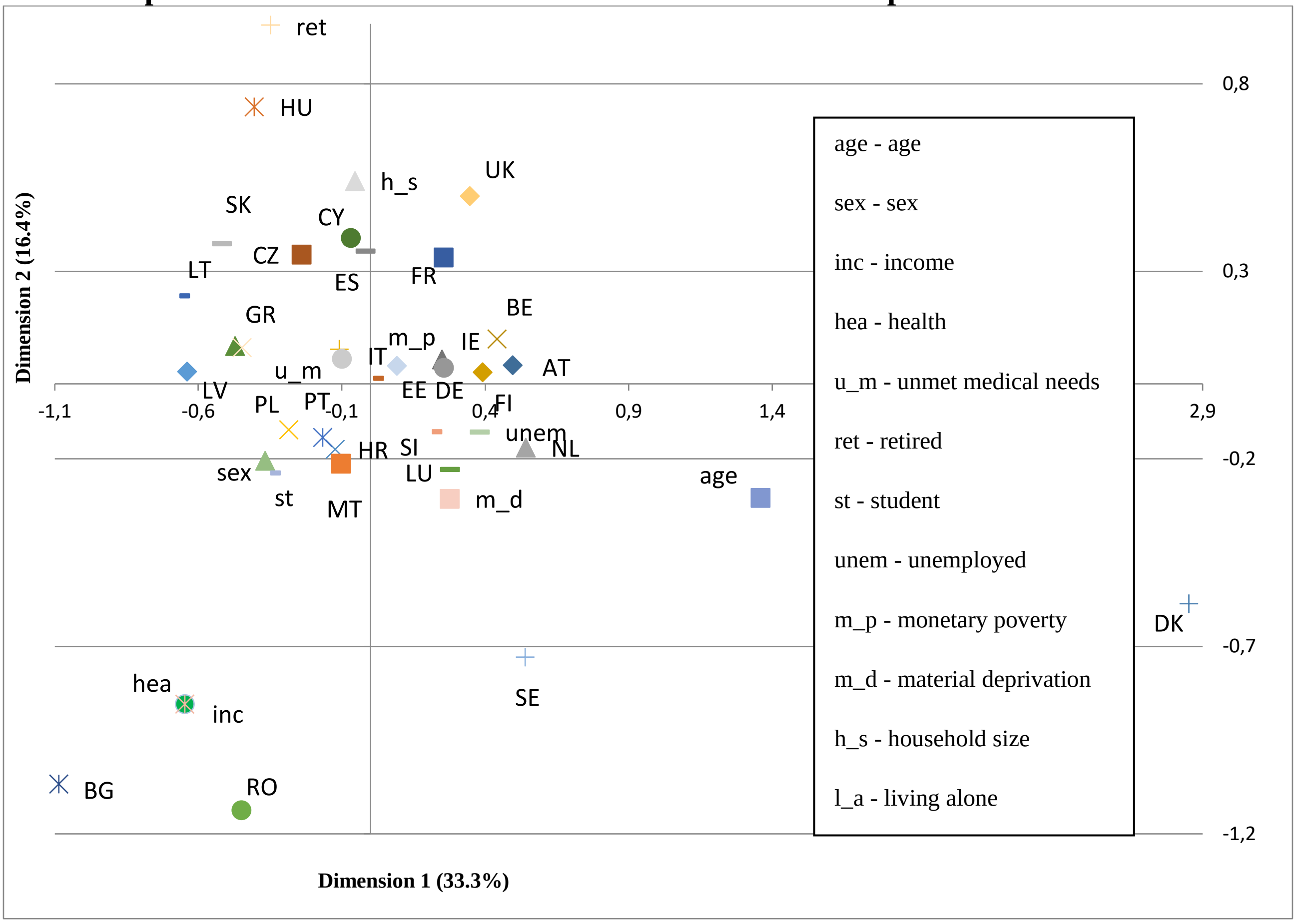
Bulgaria, which is the only element of the third cluster, has the lowest level of subjective well-being of all EU-28 countries although its level of negative experienced well-being is the second lowest of the four clusters.

The fourth cluster consists of countries with the second lowest average values of evaluative and positive experienced well-being and the highest average levels of negative experienced well-being. The level of subjective well-being in these countries can therefore be described as relatively low.

2.7 Determinants of SWB

Self-perceived health and material deprivation proved to be major determinants of subjective well-being (see Table 2.2). In order to identify any outliers, we conducted a correspondence analysis of coefficients from the formative part of the MIMIC model. Figure 2.12 presents the resulting plot. Although the first two factors determined in the correspondence analysis account for only 49.7% of the total inertia of the data set, the points representing equivalised income and age are approximated to a satisfactory degree. Their quality of display is 0.82 and 0.86 respectively. It turned out that equivalised income proved to be a relatively important determinant of SWB in Bulgaria and Romania. At the same time SWB levels in these two countries seem to be less affected by the status of being retired in comparison with the other countries. Compared to the other countries, age determines SWB to a larger extent in Denmark and Sweden.

Figure 2.12. Configuration of points representing countries and estimates from the formative part of the MIMIC models in two-dimensional factor space.



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

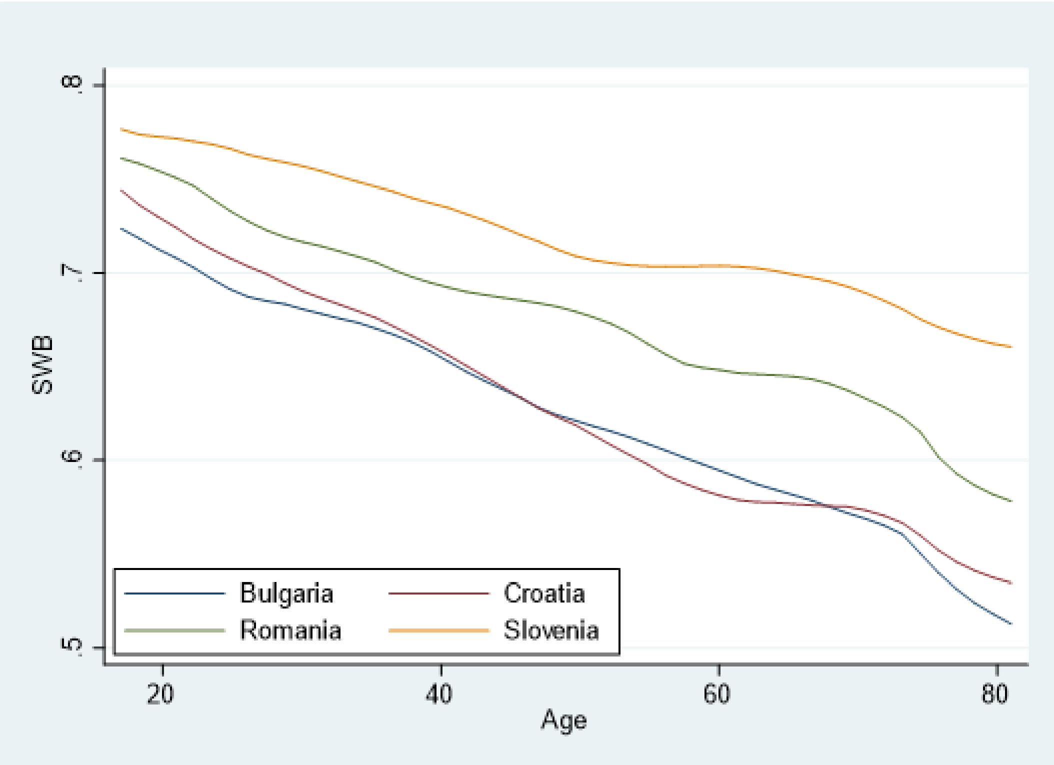
2.8 The relationship between subjective well-being and determinants

2.8.1 The relationship between subjective well-being and age

A series of comparisons were conducted to analyse interdependencies between SWB values and age. Figures 2.13-2.17 present kernel regressions of SWB on age in the populations of the EU countries, which are divided into groups of four based on their geographical proximity to facilitate the presentation.

In general, SWB in EU countries of Western Europe does not change significantly for people of different ages (Figure 2.17), while it tends to decrease with age in the countries of the Visegrad Group and in Southern Europe (Figure 2.15, 2.16). Interestingly, SWB increases with age in Northern European countries (Figure 2.14).

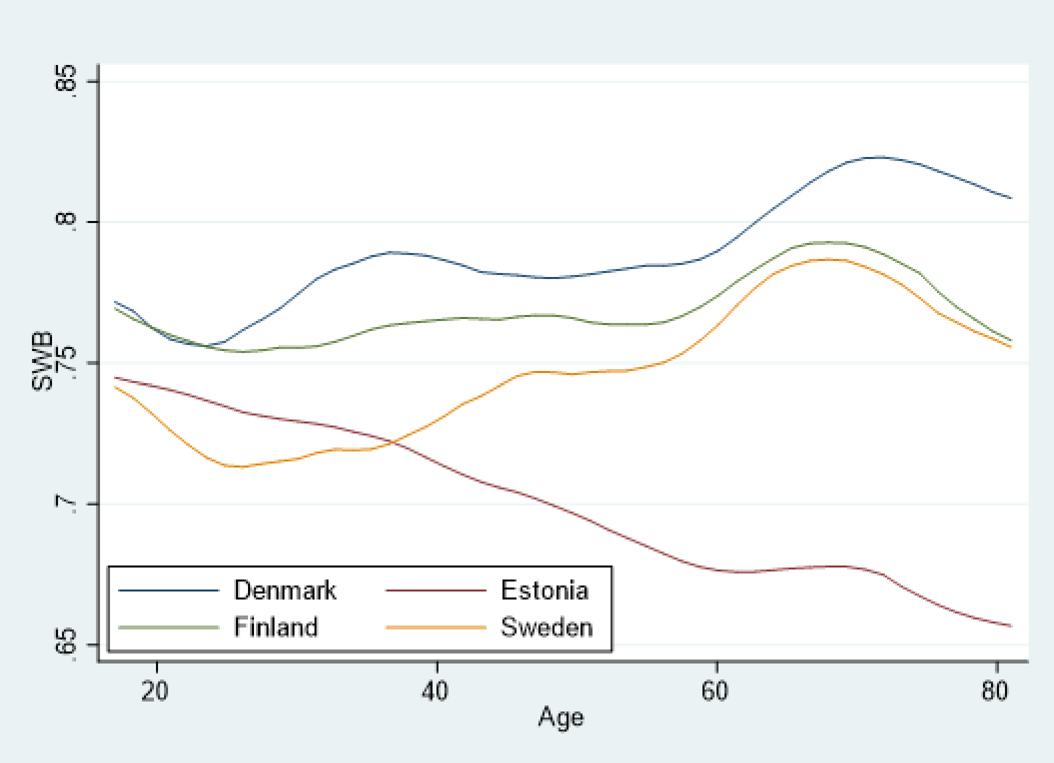
Figure 2.13. Kernel regression of SWB on age in the EU countries in the Balkans



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

For all four EU countries in the Balkans, their values of SWB decrease with age almost linearly. In Croatia and Slovenia there is a slight increase or a slower decrease in SWB values at around the retirement age (65 years), which is followed by a faster decrease at older ages (75+). It is worth noting that in Bulgaria and Romania the decrease in SWB does not change at the retirement age, unlike in the other countries, but this is consistent with the analysis of coefficients in the formative part of the MIMIC model (Table 2.2).

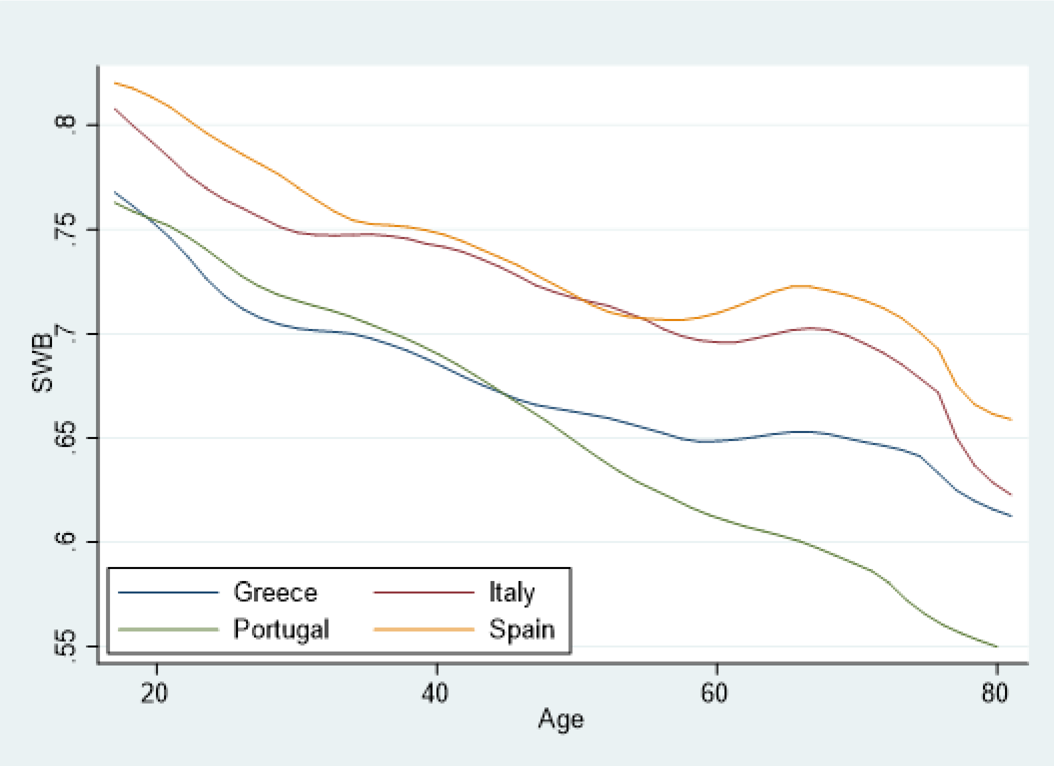
Figure 2.14. Kernel regression of SWB on age in the EU countries of Northern Europe



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

As can be seen in Figure 2.14, in Denmark, Sweden and Finland the values of SWB generally increase with age, with the exception of a slight decrease at around the age of 20 and the second one at the age of around 70. In Estonia, the pattern is similar to that observed for the countries of the Visegrad group (Figure 2.16), where SWB decreases with age almost linearly.

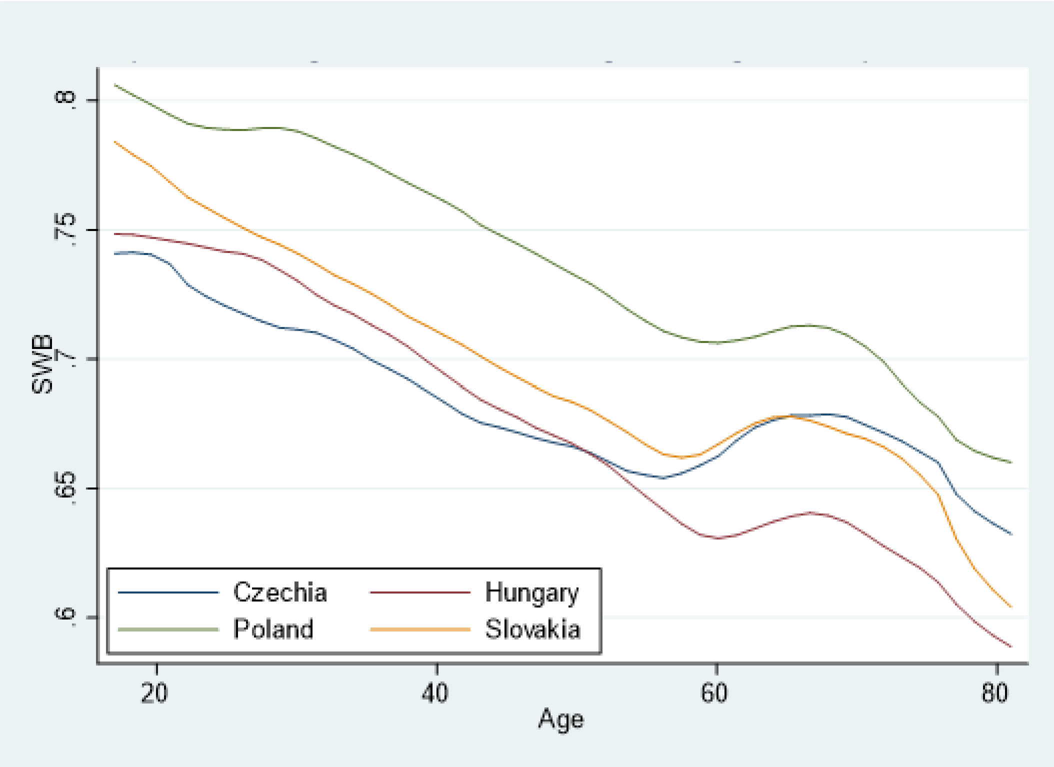
Figure 2.15. Kernel regression of SWB on age in the EU countries of Southern Europe



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

As regards the four countries of Southern Europe (Figure 2.15), values of SWB generally decrease with age. A marked increase in SWB can be seen at around the retirement age for Greece, Italy and Spain, in contrast to Portugal, where SWB of older individuals is relatively the lowest.

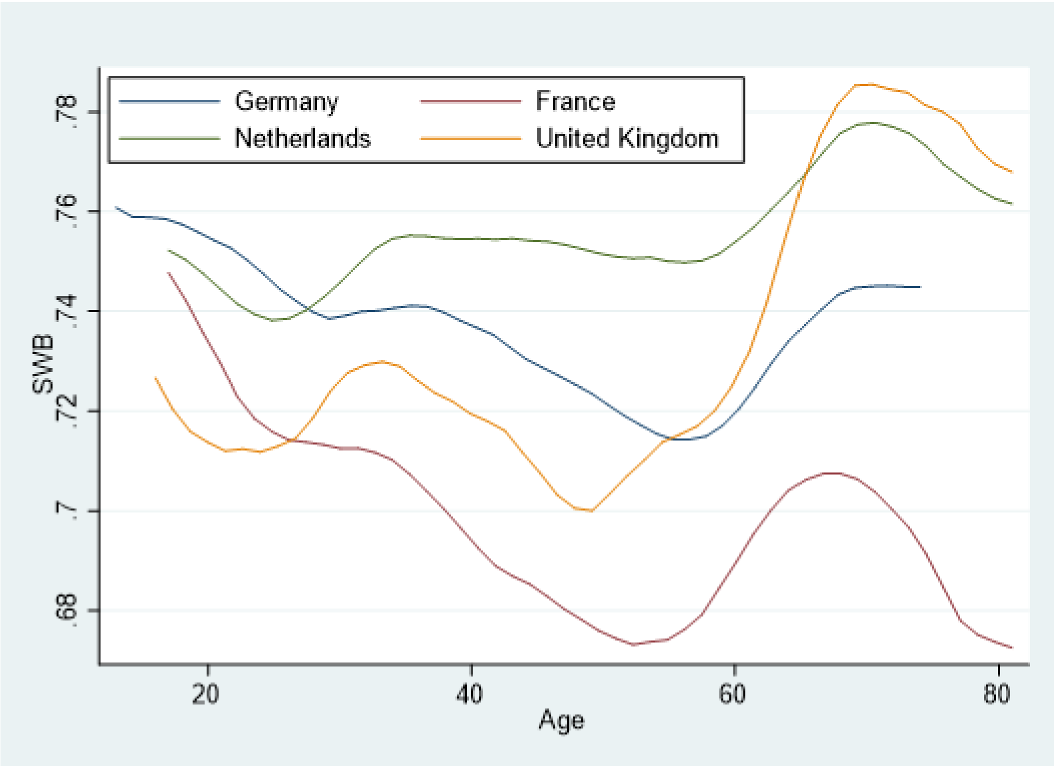
Figure 2.16. Kernel regression of SWB on age in the Visegrad group countries



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

In the Visegrad group countries (Figure 2.16), like in the Southern European countries, the level of SWB declines with age except for an upturn at around the retirement age (60-65 years), which can be observed in all four countries.

Figure 2.17. Kernel regression of SWB on age in the EU countries of Western Europe



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

When analysing the regression results for the Western European countries (Figure 2.17), it can be noticed that the pattern for the Netherlands and the United Kingdom is similar to that observed for the three Scandinavian countries (Figure 2.14), with SWB increasing with age. In both countries the level of SWB goes up at around the retirement age (60+ years), but the increase is much larger for the UK as people who experience lower levels of SWB during their productive years are comparatively better-off during their retirement than the Dutch. In contrast, SWB decreases with age in France and Germany, although a sharp increase around the retirement age can also be observed.

Table 2.5. Average values of SWB in age groups by country.

Country	Age group <20	20-39	39-60	60+
AT	0.790	0.782	0.769	0.754
BE	0.782	0.756	0.734	0.748
BG	0.744	0.679	0.623	0.558
CY	0.774	0.722	0.691	0.691
CZ	0.750	0.707	0.666	0.663
DE	0.760	0.743	0.722	0.740
DK	0.772	0.774	0.784	0.812
EE	0.755	0.730	0.695	0.669
EL	0.778	0.708	0.663	0.637
ES	0.824	0.773	0.722	0.698
FI	0.776	0.759	0.765	0.781
FR	0.752	0.711	0.679	0.695
HR	0.770	0.688	0.615	0.564
HU	0.752	0.729	0.664	0.622
IE	0.817	0.796	0.787	0.805
IT	0.809	0.754	0.718	0.670
LT	0.736	0.699	0.634	0.596
LU	0.785	0.767	0.754	0.773
LV	0.754	0.715	0.642	0.597
MT	0.761	0.741	0.716	0.717
NL	0.757	0.748	0.753	0.767
PL	0.807	0.783	0.731	0.696
PT	0.774	0.717	0.650	0.580
RO	0.768	0.719	0.676	0.622
SE	0.750	0.716	0.746	0.774
SI	0.785	0.754	0.713	0.685
SK	0.789	0.742	0.683	0.659
UK	0.726	0.722	0.710	0.770
Average	0.771	0.737	0.704	0.691
Std. Deviation	0.024	0.030	0.048	0.073

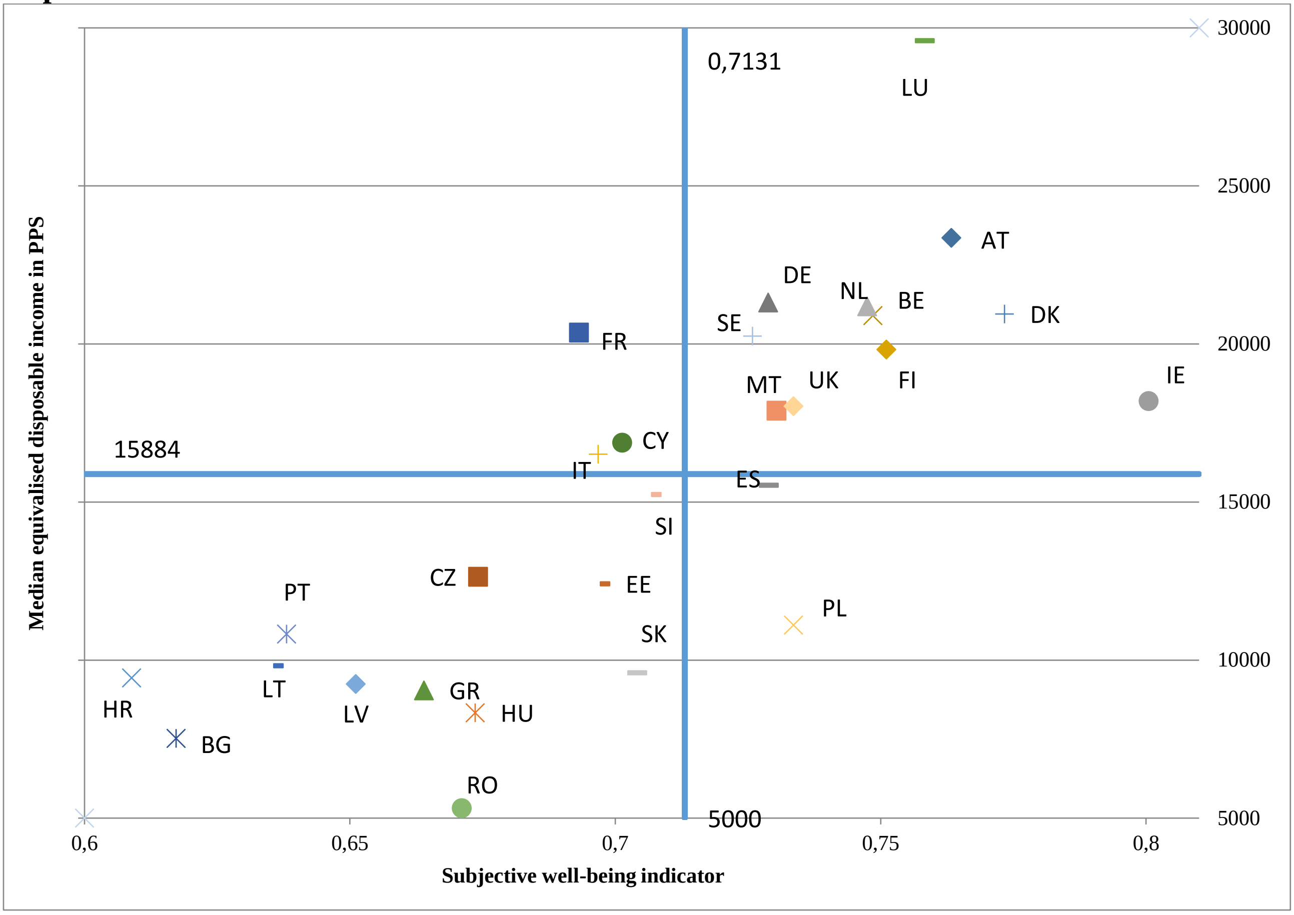
Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors.

Table 2.5 summarizes the differences in SWB between four age groups in each country. The two bottom rows contain the mean SWB values and standard deviations for each age group. In general, average values of SWB decrease with age but their standard deviations are higher in the older age groups, meaning that the differences between the countries are bigger for older age groups. This is mainly due to the differences between the Northern and Western European countries and the remaining ones, as SWB values in these two groups of countries do not decrease with age as is the case in the Eastern and Southern European countries.

2.8.2 Relation between subjective well-being and income

Figure 2.18 illustrates the relationship between the mean of subjective well-being (SWBI) and median of equivalised disposable income distribution of households in the EU-28 countries in 2018. Coordinates of the points representing the EU countries are the mean of SWBI and the median of equivalised disposable income distribution of households. The points lying in the upper-right quadrant represent countries in which both the median of equivalised disposable income distribution of households and the average of subjective well-being are higher than their average values in investigated group of countries. This group of countries includes old member countries (Nordic countries, Central and West Continental countries and countries on the British Isles). The only exception is Malta, which become a member of the EU only in 2004. France, Cyprus and Italy are countries which, although belong to the group of richer nations, are characterised by the value of SWBI less than in the EU-28 countries (the upper-left quadrant). The only countries in the group of poorer nations with subjective well-being indicator values higher than the EU-28 average were Poland and Spain (the bottom-right quadrant). In 2018 the worst situation in this aspect was recorded in all new EU members, apart from Poland, and in Portugal and Greece (the bottom-left quadrant). These countries belong to the group of poorer nations and at the same time have SWBI values lower than the mean in the countries concerned.

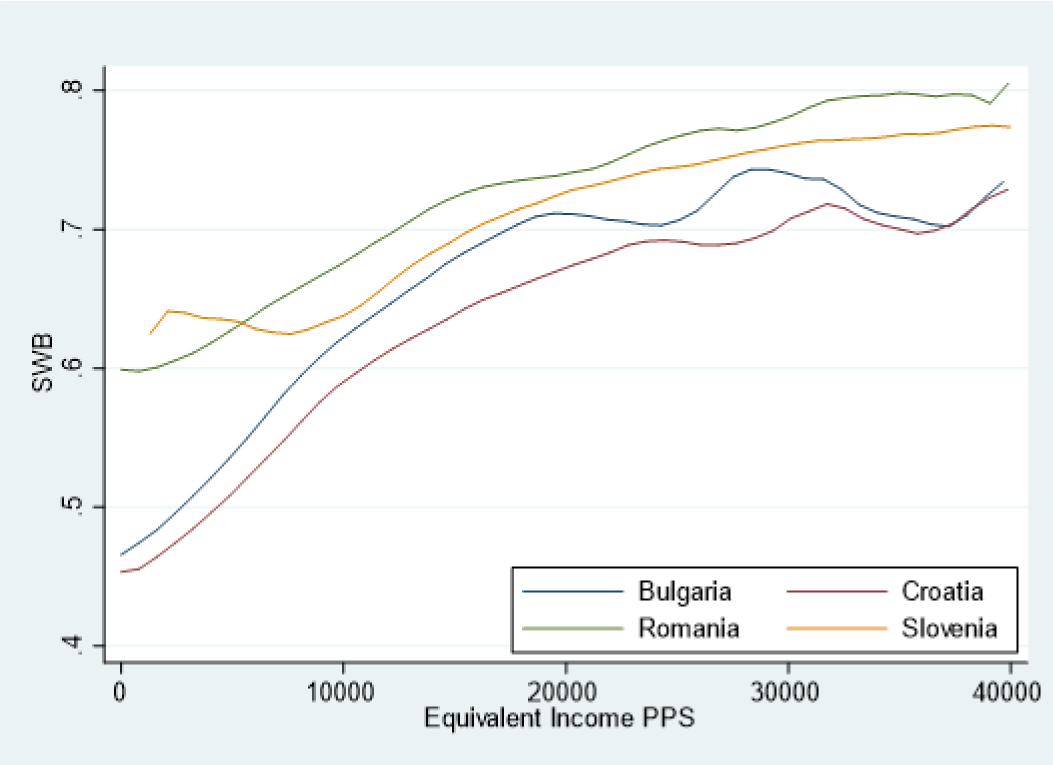
Figure 2.18. The relationship between subjective well-being and the median equivalised disposable income in the EU-28 countries in 2018.



Source: Based on data in Table A2 in the Appendix. The responsibility for all conclusions drawn from the data lies entirely with the authors.

Figures 2.19-2.23 show kernel regressions of SWB on equivalised income. Income is represented as annual equivalised income in PPS. On average, SWB rises as equivalised income grows, but there is evidence of diminishing marginal returns on income as the growth in SWB slows down as income increases.

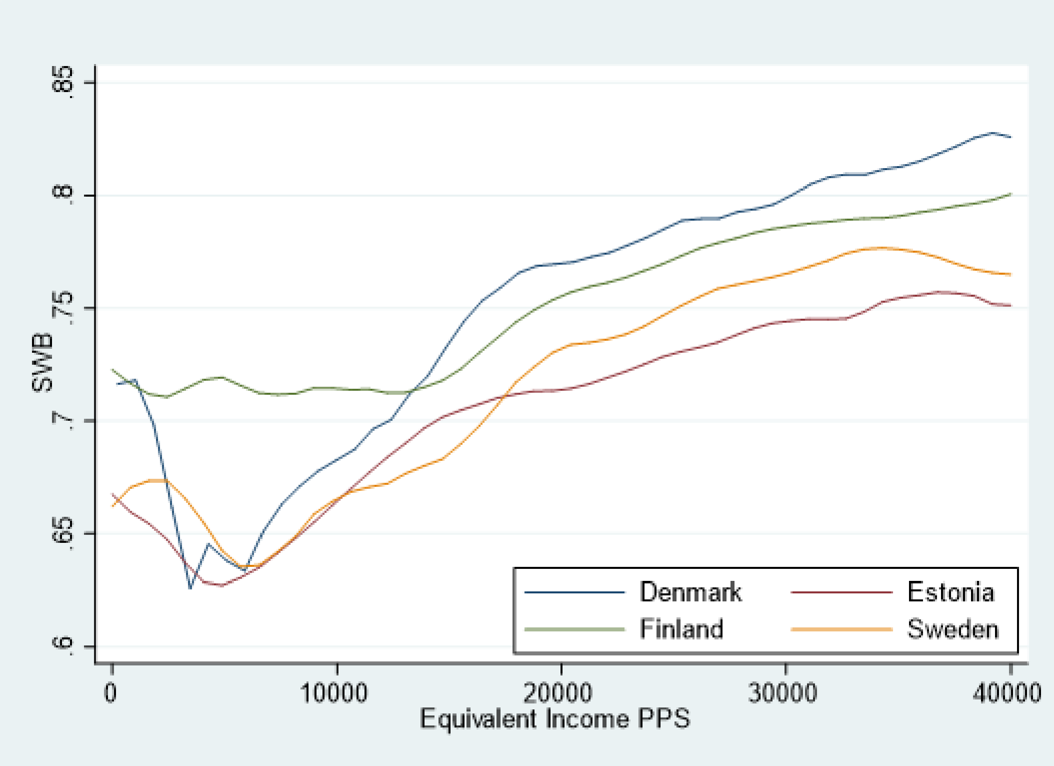
Figure 2.19. Kernel regression of SWB on income in the EU countries in the Balkans



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors..

As can be seen in Figure 2.19, SWB in the four Balkan countries increases at a decreasing rate with growing income. The average values of SWB for the lowest income groups are higher in Romania and Slovenia than those in Bulgaria and Croatia.

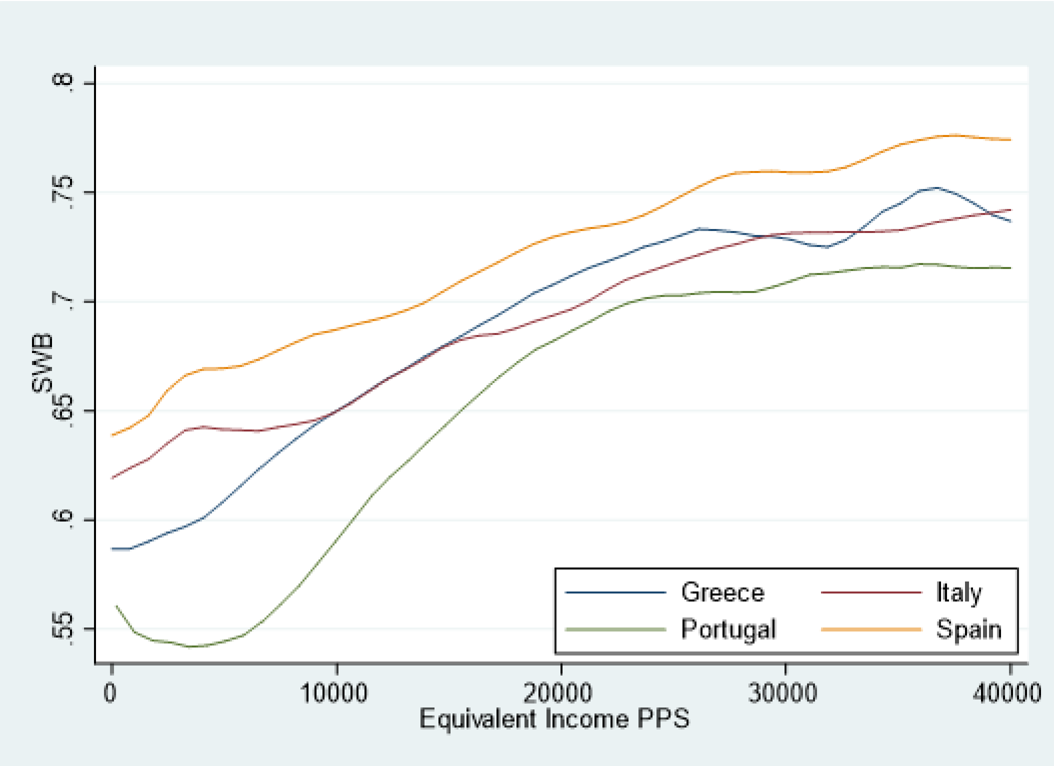
Figure 2.20. Kernel regression of SWB on incomes in the EU countries of Northern Europe



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors..

For all four EU countries of Northern Europe (Figure 2.20), their values of SWB increase almost linearly as equivalised incomes rise. Average values of SWB for people with the lowest incomes are comparatively the highest in Finland. More interestingly, SWB of Finnish people with incomes between 0 and 15000 PPS (10% of the population) remains largely unchanged.

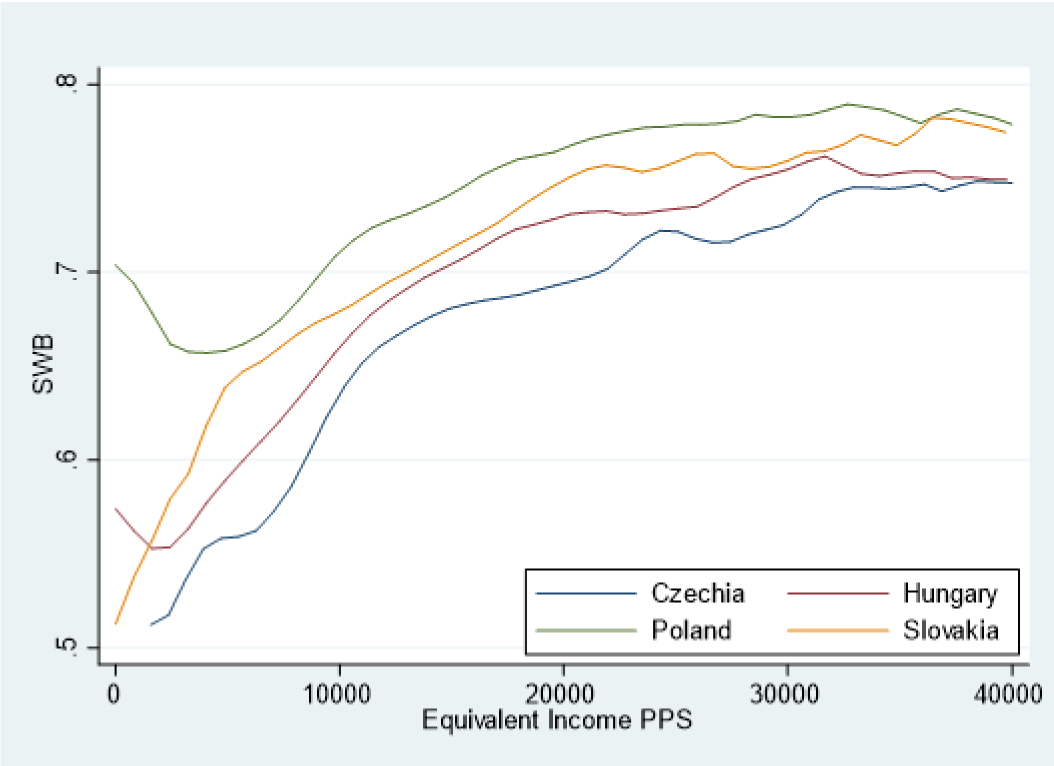
Figure 2.21. Kernel regression of SWB on incomes in Southern European countries.



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors..

As regards the four countries of Southern Europe (Figure 2.21), their WSB levels generally increase with rising income. Average values of SWB are the highest in Spain over the whole income range. The biggest differences in SWB can be observed for people with the lowest incomes.

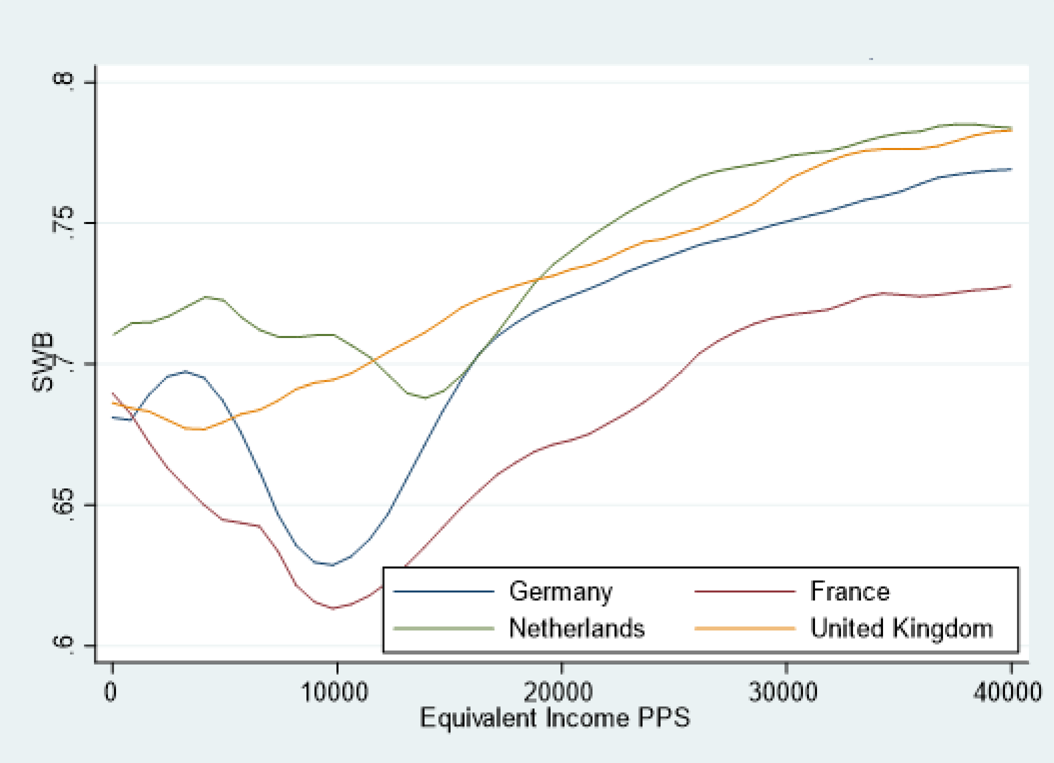
Figure 2.22. Kernel regression of SWB on incomes in the Visegrad Group countries.



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors..

In the Visegrad group countries (Figure 2.22), the general pattern is the same as that described in the previous two groups, with the exception of Poland where average SWB for people with the lowest incomes is the highest in the group.

Figure 2.23. Kernel regression of SWB on incomes in Western European countries.



Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors..

Results for the Western European countries (Figure 2.23) show the same general growing trend although in France and Germany there is a marked decline in SWB for people with lower incomes (0-10000 PPS).

Table 2.6. Average values of subjective well-being for income quartile groups.

Country	First Income Quartile	Second Income Quartile	Third Income Quartile	Fourth Income Quartile
AT	0.723	0.758	0.783	0.803
BE	0.681	0.742	0.775	0.794
BG	0.507	0.584	0.636	0.704
CY	0.636	0.697	0.724	0.745
CZ	0.621	0.673	0.689	0.722
DE	0.678	0.730	0.749	0.773
DK	0.741	0.779	0.801	0.829
EE	0.641	0.687	0.715	0.745
EL	0.612	0.651	0.678	0.718
ES	0.679	0.716	0.744	0.773
FI	0.716	0.753	0.778	0.799
FR	0.645	0.682	0.715	0.729
HR	0.510	0.593	0.638	0.684
HU	0.593	0.649	0.690	0.722
IE	0.741	0.789	0.821	0.844
IT	0.652	0.687	0.719	0.743
LT	0.543	0.605	0.649	0.711
LU	0.709	0.759	0.780	0.797
LV	0.556	0.624	0.677	0.721
MT	0.688	0.723	0.739	0.760
NL	0.703	0.747	0.772	0.795
PL	0.676	0.724	0.748	0.776
PT	0.555	0.616	0.662	0.711
RO	0.605	0.645	0.677	0.731
SE	0.676	0.730	0.763	0.786
SI	0.638	0.698	0.731	0.760
SK	0.647	0.689	0.709	0.741
UK	0.701	0.731	0.756	0.782
Average	0.645	0.695	0.726	0.757
Std. Deviation	0.065	0.056	0.049	0.039

Source: Based on Eurostat data from EU-SILC (2018). The responsibility for all conclusions drawn from the data lies entirely with the authors..

Table 2.6 summarizes the differences in SWB between four income quartile groups. The two bottom rows contain the mean SWB values and their standard deviations for each income quartile group. It is worth noting that the value of standard deviation is the highest in the lower income groups, which means that the differences between the countries are relatively bigger for people from lower income groups.

2.9. Discussion

The proposed method of measuring SWB allowed us to compare results across all 28 EU countries. Firstly, we compared general levels of SWB in the populations of the analysed countries. Generally, SWB was found to be higher in the most developed and rich countries of Western and Northern Europe. However, the phenomenon of SWB is multifaceted and income alone does not fully explain the observed differences (see Figure 2.18). This is exemplified by countries such as France, Cyprus and Italy which, despite belonging to the group of richer nations, are characterised by values of the SWBI below the average for the EU-28 countries. Conversely, values of the SWBI for Poland and Spain, which are generally regarded as poorer nations, are higher than the EU-28 average (see Figure 2.18).

The two most important individual determinants of SWB in virtually all countries, identified on the basis of coefficients in the formative part of the MIMIC models, were self-perceived health and the number of material deprivation symptoms. However, there were differences between the countries in this regard. Specifically, income turned out to be a relatively important determinant of SWB in the least developed and poorest countries (Bulgaria, Romania). When controlling for health, age was found to be positively related to SWB in two Scandinavian countries (Denmark, Sweden).

Other, less important determinants of SWB include being retired, which was found to be positively correlated with SWB, while being unemployed and impoverished was associated with lower levels of SWB in almost all analysed countries. However, in certain countries being retired does not, on average, improve SWB (Bulgaria, Romania). This may be related to low pension replacement rates in these countries.

Another part of the analysis focused on the relationships between SWB, age and equivalised income revealed by applying non-parametric kernel regressions in groups of four countries characterised by geographical proximity. Significant differences in the patterns of relationships between SWB and age were observed. More specifically, the fact that SWB in the Eastern and Southern European countries was found to decrease with age was in line with expectations. As people get older, their general health deteriorates. Similarly, their relative position on the labour market tends to get worse over time due to failing health and structural changes in the market. However, in the countries of Northern and Western Europe the values of SWB were found to increase with age and peak after retirement. This means that older, retired individuals in Denmark, Finland or the Netherlands enjoy higher values of SWB in comparison with young adults. These disparities between the countries may be due to different levels of health care, differences in pension systems and cultural differences and definitely require further research.

In all analysed countries, SWB tends to increase as income grows. It is also a common observation that as income rises, SWB increases at a lower rate and eventually the positive effect of higher incomes stops. This finding contradicts the study of Aknin et al. (2009), who concluded that the dependence of SWB on income clearly exists for higher income groups but is much weaker for poorer individuals.

More country differences in SWB levels were observed for people in lower income groups. Specifically, in some countries the level of SWB did not fall below a certain value even at zero income, as was the case for Poland and Slovakia (Figure 2.22). In Slovakia, SWB levels were relatively low at zero income (about 0.5) and increased rapidly with rising incomes. However, in Poland, average SWB never dropped below 0.65. This may be due to either a more effective social assistance system in Poland or cultural differences (or both) and requires further investigation.

In certain Western European countries (France, Germany) a reverse relation between SWB and income can be observed for individuals with lower incomes (lower than 10,000 PPS, see Figure 2.23). This again can be due to a well-developed social security system, which provides for basic needs and allows (apparently unemployed) individuals with very low incomes to benefit more from their free time in comparison with working individuals earning the lowest wages.

Conclusions

The novel method of estimating values of subjective well-being proposed in this article is based on recent EU recommendations for how to measure the quality of life and Sen's capabilities approach. Technically, the method utilises a MIMIC model, which is a special case of structural equation modelling. The method can be applied to measure SWB using relevant survey data. The proposed SWB indicators make it possible to compare results across geographical units, across time or even across different surveys.

In the empirical part subjective well-being was calculated for 28 EU countries using the proposed methodology. In general, subjective well-being was found to be higher in the countries of Northern and Western Europe and lower in the countries of Eastern and Southern Europe. The highest values were observed in Ireland, Germany, Austria and Finland. Among the countries that joined the EU in 2004, relatively high values were observed for Poland and Romania. In contrast, the lowest values were found in Croatia, Bulgaria, Lithuania and Portugal.

It was shown that for the majority of the countries subjective well-being depends mostly on two exogenous determinants – self-perceived health and material deprivation. This conclusion has straightforward consequences for social policy. The recommended course of action in order to improve SWB is to lift people from material deprivation and provide health services and policies that promote healthy lifestyles with a view to increasing SWB over the long term.

The distribution of SWB in all countries is left-skewed and leptokurtic. This is can be attributed to the presence of a certain number of individuals who feel depressed or down in the dumps and report lower values of SWB even in the absence of objective causes that could deteriorate their SWB.

In most countries SWB shows a strong dependence on age, decreasing almost linearly with age. However, the most developed and rich EU countries have managed to mitigate the effect of aging on SWB. In the Scandinavian countries the levels of SWB among retired adults were found to be even higher than those observed for younger individuals.

SWB also depends on material wealth: it grows rapidly with increasing equalised income, particularly for individuals from lower and middle income groups. In most countries, SWB does not seem to be correlated with income for upper income groups. This finding contradicts the observations made by Aknin et. al (2009), who concluded that SWB depends on income only for higher income groups.

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Appendix

Table A1. Goodness of fit measures for MIMIC models

Country	RMSEA	CFI	NNFI
AT	0.058	0.906	0.877
BE	0.065	0.886	0.853
BG	0.041	0.968	0.959
CY	0.058	0.931	0.911
CZ	0.059	0.906	0.878
DE	0.057	0.920	0.896
DK	0.058	0.911	0.885
EE	0.063	0.852	0.806
ES	0.063	0.921	0.898
FI	0.061	0.897	0.866
FR	0.072	0.857	0.814
GR	0.057	0.934	0.914
HR	0.055	0.940	0.923
HU	0.067	0.900	0.870
IE	0.042	0.953	0.939
IT	0.041	0.965	0.955
LT	0.063	0.904	0.875
LU	0.070	0.838	0.790
LV	0.065	0.891	0.859
MT	0.056	0.901	0.872
NL	0.048	0.939	0.920
PL	0.052	0.907	0.879
PT	0.067	0.916	0.891
RO	0.043	0.940	0.922
SE	0.044	0.957	0.944
SI	0.065	0.886	0.852
SK	0.054	0.924	0.901
UK	0.045	0.953	0.939

Source: Based on Eurostat data from EU-SILC, 2018. The responsibility for all conclusions drawn from the data lies entirely with the authors.

Table A2. Subjective well-being and income in the EU countries in 2018

Country	Subjective well-being	Evaluative well-being	Experienced well-being	Negative experienced well-being
Austria	0.763	0.806	0.758	0.231
Belgium	0.749	0.755	0.737	0.247
Bulgaria	0.617	0.526	0.562	0.269
Cyprus	0.701	0.711	0.663	0.257
Czechia	0.674	0.732	0.665	0.311
Denmark	0.729	0.744	0.715	0.266
Germany	0.773	0.788	0.685	0.190
Estonia	0.697	0.697	0.695	0.272
Spain	0.729	0.735	0.722	0.256
Finland	0.751	0.817	0.734	0.230
France	0.693	0.726	0.693	0.298
Greece	0.664	0.649	0.629	0.293
Croatia	0.609	0.620	0.590	0.359
Hungary	0.674	0.632	0.657	0.287
Ireland	0.800	0.806	0.751	0.175
Italy	0.698	0.706	0.668	0.282
Lithuania	0.636	0.631	0.637	0.361
Luxembourg	0.758	0.764	0.758	0.233
Latvia	0.651	0.660	0.651	0.269
Malta	0.730	0.752	0.685	0.254
Netherlands	0.747	0.769	0.733	0.231
Poland	0.734	0.771	0.728	0.248
Portugal	0.638	0.659	0.636	0.344
Romania	0.671	0.730	0.645	0.320
Sweden	0.726	0.790	0.714	0.257
Slovenia	0.707	0.717	0.692	0.263
Slovakia	0.704	0.707	0.688	0.207
United Kingdom	0.734	0.770	0.703	0.241

Source: based on data from Eurostat, EU-SILC, 2018. The responsibility for all conclusions drawn from the data lies entirely with the authors.

Table A3. Average values of subjective well-being indicators in the cluster of countries.

Indicator	Custer 1	Custer 2	Custer 3	Custer 4
Positive experienced well-being	0.726	0.684	0.562	0.633
Negative experienced well-being	0.226	0.278	0.269	0.319
Evaluative well-being	0.777	0.725	0.526	0.642

Source: based on data from Eurostat and EU-SILC, 2018. The responsibility for all conclusions drawn from the data lies entirely with the authors.

Table A4. Abbreviation of the EU-28 Member States.

Country	Abbreviation
EU (27 countries)	EU
Belgium	BE
Bulgaria	BG
Czechia	CZ
Denmark	DK
Germany	DE
Estonia	EE
Ireland	IE
Greece	EL
Spain	ES
France	FR
Croatia	HR
Italy	IT
Cyprus	CY
Latvia	LV
Lithuania	LT
Luxembourg	LU
Hungary	HU
Malta	MT
Netherlands	NL
Austria	AT
Poland	PL
Portugal	PT
Romania	RO
Slovenia	SI
Slovakia	SK
Finland	FI
Sweden	SE
United Kingdom	UK

Definitions of potential determinants of subjective well-being

The proposed MIMIC model utilises a set of determinants of SWB. These determinants were proposed taking into account the criterion of content validity the criterion of suitability. The variables included in the EU-SILC survey were analysed as potential determinants of SWB. The following determinants were used in the final MIMIC model:

Age – a person's age at the time of the interview.
Sex – a binary variable equal to 1 for females and 0 for males.

Income - total household disposable income divided by the OECD modified equivalence scale (household equivalised income). The OECD modified scale assigns a value of 1 to the household head, of 0.5 to each additional adult member and of 0.3 to each child.

Monetary poverty – a binary indicator equal 1 for individuals who lived in households with total equivalised disposable income below 0.6 of median equivalised income.

Material deprivation – the number of symptoms of material deprivation proposed in the Eurostat recommendations regarding the measurement of the phenomena. It contains information provided in answers to nine questions from the EU-SILC survey, which assess whether individuals are unable to afford:

- to pay their rent, mortgage or utility bills;
- to keep their home adequately warm;
- to face unexpected expenses;
- to eat meat or proteins regularly;
- to go on holiday;
- a television set;
- a washing machine;
- a car;
- a telephone.

Household size – the number of individuals living in the household,

Living alone – a binary variable equal to 1 if a person lives alone and 0 otherwise,

Unemployed – a binary variable equal to 1 if a person was unemployed at the time of the interview and 0 otherwise.

Retired – a binary variable equal to 1 if a person was retired at the time of the interview and 0 otherwise.

Student – a binary variable equal to 1 if the person's main activity during the period predeceasing the interview was full-time education and 0 otherwise.

Self-perceived health – a categorical variable containing a subjective assessment of the respondent's health status based on EU-SILC question on self-perceived health ('How is your health in general?'), which contains five answering categories; 1) very good, 2) good, 3) fair, 4) bad, 5) very bad.

Unmet medical needs – a binary variable equal to 1 if a person had unmet medical or dental needs.