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**Working Paper**

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**SOEPpapers**  
on Multidisciplinary Panel Data Research

SOEP – The German Socio-Economic Panel study at DIW Berlin

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# Quality of Life and Inequality

Peter Krause

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# Quality of Life and Inequality

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# I Multidimensional Foundations for Quality of Life - Framework and Measures

## Quality of Life – A Multidimensional Approach

The term “quality of life research” refers to a general theoretical framework rather than to a specific theory of welfare or well-being<sup>1</sup>. Most of the various definitions and conceptions of quality of life within this framework cite the multidimensional character of living conditions. In this respect, they differ from views of economic welfare that are primarily income or GDP driven. Another broadly used definition of quality of life utilizes the impact of subjective indicators to focus on the quality aspect of living conditions. The quality of life framework has laid the foundations for a large body of research on cognitive and affective dimensions of happiness and satisfaction—both satisfaction with life overall, and satisfaction with specific life domains. As such, quality of life is closely related to other (psychological) dimensions of subjective well-being such as worries, risks, attitudes, and their connections to different personality states and traits. The quality of life research is based on interdisciplinary approaches and has normative applications to the maintenance and improvement of living conditions. Quality of life approaches are therefore related on the individual level to research on inequality, poverty, and multiple deprivation; on a social level to research on advantaged and disadvantaged social groups or regions, the functioning of social and political institutions, and the preservation of living conditions; and on a national and global level to national and cross-national social and political indicators that are used widely to promote and establish fairer and better living conditions around the globe.

This article takes a micro-level, individual-based perspective on inequality and quality of life to explore how inequality within and between different life dimensions impacts the overall quality of life. Section 2 describes the conceptual background and outlines the perspective of inequality assessment using economic welfare and subjective well-being as key dimensions within a multidimensional quality of life approach. Sections 3 to 5 summarize some of the empirical results on the distribution of and relationship between economic and subjective well-being. Section 3 illustrates the overall distribution and the age profiles for the economic and subjective well-being indicators. In Section 4, the case of German reunification is used to investigate how reference levels for subjective well-being converged over time with the distribution of new economic and political standards. Section 5 points out further principles for the evaluation of living conditions, giving special attention to the distribution and inequality of economic welfare levels. Section 6 provides a short summary of the main findings and a brief discussion of the main conclusions.

### Database: German Socio-Economic Panel

The data for the empirical analysis are derived from the German Socio-Economic Panel study (SOEPv29)<sup>2</sup>, a representative scientific longitudinal survey that started in 1984 in West Germany covering about 16,000 individuals in around 6,000 households (with more than 12,000 adult respondents) (Wagner/Frick/Schupp 2007). Within the households, a personal interview is conducted with each individual aged 16 and older. In addition, a household

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<sup>1</sup> Life satisfaction and happiness refer to cognitive and affective perspectives of subjective well-being. These terms are used here synonymously.

<sup>2</sup> GSOEPv29L [SOEPlong], doi:10.5684/soep.v29..

questionnaire is completed by the head of the household or the household member who knows the most about household matters. All households and adult household members are surveyed annually. The main topics covered in the questionnaire are demographics; indicators of objective and subjective living conditions including satisfaction with life (happiness) and different life domains; and differentiated information on personal and household incomes and on housing, labor market issues, health, and leisure. All individuals and households are surveyed annually. In June 1990, even before the currency, economic, and social union became effective (on July 1, 1990) and four months before political reunification (on October 3, 1990),<sup>3</sup> the first wave of the survey was conducted with the East German sub-sample. We therefore have the unique opportunity to trace the entire transition process and the convergence of the two parts of Germany from the very beginning. Since the 1990s, new subsamples have been added to the SOEP several times to increase the sample size. The empirical analyses refer mainly to the pooled population for 2010-2012 living in private households. For the analyses of economic welfare based on household incomes, all individual observations for all household members are used (2010-2012:78,000 individuals) and the analyses on subjective well-being refer to the respondent population aged 16 and older with realized personal interviews (2010-2013: 61,000 respondents). For the period around reunification, time series based on the annual population have been used. Non-private households such as nursing homes are not included in the analysis.

### Indicators for Economic Welfare and Subjective Well-Being

The main *indicators of economic welfare* are household net equivalent incomes. In the SOEP, we collect two types of measures for household incomes, both of which are used here to check the robustness of the estimates. Annual incomes are generated from individual and household (market) incomes from the previous year using simulations of taxes and social security contributions according to the Canberra Group standards. Missing income values are imputed. The second income measure refers to current monthly household net income, which respondents are asked to report as an exact figure in a fill-in-the-blank question at the end of the household questionnaire. This so-called *income screener* ignores additional annual income components such as year-end bonuses and tax refunds. The monthly household income corresponds to the current demographic composition of the household. For the period of reunification, only monthly household incomes are available.

Due to economies of scale, all household incomes are recalculated as equivalent incomes according to the revised OECD scale. Equivalent income is applied to all individuals in the household, including children living in private households. It is assumed that the available resources within the household are redistributed in such a way that every member of the household shares the same welfare level (pool assumption). The incomes of the first wave of the East German subsample (in East German marks) were calculated as 1:1 equivalent to the West German currency (D-marks). All incomes are expressed in euros in the analysis. Since price levels in East Germany were quite different from those in West Germany immediately after reunification, and since purchasing power in the East was much higher than in the West, real incomes expressed in 2012 prices are used for the majority of the analyses. The

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<sup>3</sup> The currency, economic and social union has been established in July 1990; political unification took place on October 3 of the same year.

prices are adjusted separately for incomes in the East and in the West after reunification (1990-1997) to also control for purchasing-power differences between incomes in East and West.

*Subjective well-being* is measured first of all by life satisfaction (happiness) on a single 0-10 scale (0=completely dissatisfied, 10=completely satisfied). In addition, satisfaction with different life domains – especially satisfaction with household income – is used, along with other kinds of subjective indicators (worries).

For some parts of the analysis, the distributions of indicators for economic and subjective well-being have been rescaled to indices with range from 0-10 and 0-100. Besides the yearly short-time measures of economic and subjective well-being, medium-term and long-term measures have also been created based on the individual mean values for the last three (mid-term:  $t_0$ - $t_2$ ) or last five (long-term:  $t_0$ - $t_4$ ) available years.

## II Quality of Life: A Framework for Economic Living Standards and Subjective Well-Being

The quality of life approach taken in this article refers to a class of multidimensional theoretical concepts in which objective living conditions are observed in combination with subjective dimensions of individual well-being to analyze the welfare level of individuals, groups, and nations from cross-national perspectives (Zapf 1972; Allardt 1993; Veenhoven 1993, 2002; Michalos 2014). This *a priori* interdisciplinary framework with cross-national perspectives is closely related to the social indicator movement (Noll 2002; Maggino 2009) and has established the joint use of objective and subjective indicators in social surveys (Glatzer/Zapf 1984; Delhey et al. 2002; Schupp 2015). The meaning of subjective dimensions of quality of life has been further explored in the happiness research (Diener/Suh 2000; Strack/Argyle/Schwarz 1991; Headey/Wearing 1992; Kahnemann/Diener/Schwarz 1999; Eid/Larsen 2008; Kahnemann 2011), including variations in happiness over the life course (Baetschmann 2013). The relationship between economic and subjective well-being has also been studied in relation to happiness and economic growth (Jenkins/Kapteyn/van Praag 1998; Easterlin 2001; Clark/Frijters/Shields 2008; Headey/Muffels/Wagner 2010).

In the German context, the multidimensional quality of life approach emerged from the tradition of the Living Conditions Approach [“Lebenslagenansatz”] (Neurath 1931), a theoretical concept used to describe aspects of living conditions that also looks at the individual scope of action [“Handlungsspielraum”] and that includes elements of an implicit bottom-up perspective on social policy applications (Weisser 1971, 1972) compatible with Rawls’ (1971) seminal work on social justice. This multidimensional approach overlaps in numerous respects with the capability approach as formulated by Sen and Nussbaum (Sen 1992, 1999, 2009; Nussbaum/Sen 1993; Nussbaum 2000; Robeyns 2005; Alkire 2005; Muffels/Headey 2013). It has been used for the analysis of quality of life in the survey research on well-being, inequality, and poverty (Delhey 2014) and also for the analysis of the adaptation of living conditions after German reunification (Krause/Ostner 2010).

From this perspective, economic well-being refers to the economic resources and skills and to the political and social frameworks that determine individual welfare, whereas subjective



well-being refers to the individual's evaluation of his or her living conditions, or more precisely, of his or her ability to translate available resources into satisfying living conditions. Economic well-being may be regarded in this context as a kind of "hardware" indicating the resources and skills and the opportunities and constraints that define and determine our everyday living arrangements, whereas subjective well-being may be regarded as a kind of "software", our individual ability to navigate and make use of the options that have been generated in the past and that are given as our living conditions for our everyday life activities.

### Inequality of Well-Being: Considering Distributions and Social Cohesion

Studying inequalities in the quality of life means examining distributions in the level (and quality) of living conditions within and between different dimensions of well-being, analyzing the distributions of economic and subjective well-being, and investigating links and convergences in well-being across different dimensions. The concept of inequalities in well-being is based on a normative conception of justice. There is no clearly defined, generally accepted notion of what degree of inequality is acceptable and what degree is unacceptable. However, with the increasing awareness and public discussion of issues such as poverty and multiple deprivations, we find fairly widespread normative expectations in society that the lower ends of the distribution of living conditions should be reduced. And with regard to economic welfare, there are widespread demands to reduce the concentration of economic resources at the top of the income distribution and to work towards a fair redistribution of these resources (Stiglitz 2012). The analysis of inequalities in the quality of life is therefore integral to current discussions surrounding the improvement of living conditions and social cohesion.

With regard to economic welfare, inequality has been discussed extensively in relation to income and wealth distributions (Silber 1999; Atkinson/Bourgignon 2000; Salverda/Nolan/Smeeding 2009). Analyses of poverty and multidimensional deprivation are key indicators used in social policy reports (Alkire/Foster 2010; Besharow/Couch 2012). Multidimensional indicators of developments in economic welfare and other dimensions of well-being are crucial for national and cross-national social reporting (Stiglitz/Sen/Fitoussi 2009; Helliwell/Layard/Sachs UN World Happiness Report 2013; UNDP Human Development Report 2013; OECD 2014).

Links between inequalities in economic welfare and subjective perceptions of well-being have been discussed in relation to basic axioms of inequality measurement (Amiel/Cowell 1998; Amiel 1999). Measures of subjective well-being have been used to derive subjective poverty lines for income distribution (Van Praag/Goedhart/Kapteyn 1980; A. Hagenaars 1986; Van Praag 1993) and to calculate income-based poverty lines immediately after German reunification (Krause 1998). Over the last decade, the determinants of inequalities in happiness have also become a focus of cross-national research (Ferrer-i-Carbonell/Ramos 2010; Clark/Flèche/Senik 2012, 2014).

### Economic Living Standards and Subjective Well-Being

The relationship between economic living standards (GDP, household income) and subjective well-being (satisfaction with life; happiness) has emerged as one of the main

topics of research in economics and related disciplines in recent decades. Can money buy happiness? Can economic growth improve subjective well-being? These are some of the basic questions that have received critical attention since the seminal article of Richard Easterlin (1974). The question of how economic growth affects subjective well-being has been the subject of lively and controversial debate in a series of empirical studies on the happiness-income paradox (also known as the Easterlin paradox or Easterlin hypothesis) (Pfaff/Hirata 2013): “at a point in time both among and within nations, happiness varies directly with income, but over time, happiness does not increase when a country’s income increases” (Easterlin et al., 2010, p.1). This repeatedly confirmed finding has also inspired further research on the roots and meanings of happiness: What makes us happy? What kind of reference schemes do we use to frame our happiness judgments? And what kinds of mechanisms are in place to adapt our subjective judgments when living conditions change? We may therefore differentiate at least four lines of further research:

- happiness and economic growth.
- judgments of happiness and measurement issues.
- *set point, absolute, and relative* comparison levels and processes of habituation.
- *autonomy, social cohesion, and social emergence.*

### *Happiness and Economic Growth*

The happiness-income hypothesis has been challenged by some authors (Veenhoven/Hagerty 2006; Stevenson/Wolfers 2008) and supported by others based on studies of data from several European countries (Clark 2012). Pfaff/Hirata (2013) confirm based on individual panel data that the Easterlin hypothesis cannot be rejected for (West) Germany, the US, and the UK, and also point out that the level of aggregation should be considered as part of the happiness-income relationship. We can summarize the empirical findings on this subject as follows: Cross-country comparisons provide log-shaped increases in happiness for increases in GDP per capita with diminishing returns for richer countries. We observe gains in happiness for poorer countries in periods of economic growth but small or no further increases in happiness levels for the richer countries, even when GDP has increased. The correlation between gains in happiness and increasing levels of GDP are lower for richer countries. A quite similar log-shaped relationship can be also observed at the individual level within countries, with diminishing returns on happiness at higher income levels. We find also stronger correlations between happiness and income in countries with lower levels of GDP than we do in richer countries. How the happiness-income relationship varies for different income levels within Germany is illustrated in Section 5.

### *The Subjective Evaluation of Happiness and Measurement Issues*

Can happiness measures possibly produce accurate results when individuals are likely to evaluate their happiness based on very different aspects of life and to associate their own living conditions with various personal life events, family or cultural backgrounds, or particular stages of the life cycle? Can we compare happiness scores between different cultures when the meanings and translations of happiness, life satisfaction, or subjective well-being differ between these cultures? Several lines of methodological discussion explore the reliability (Lucas/Donnellan 2012) and interpersonal and cross-cultural comparability of happiness scores. Schimmack et al. (2010) summarize short-term retest correlations by stating that “well-being judgments contain a substantial amount of reliable information”,

and Clark (2012: 3) notes “the predictive power of satisfaction measures with regard to life expectancy, morbidity, productivity, quits, absenteeism, unemployment duration, and marriage duration. These empirical findings thus confirm that subjective well-being must be to some extent comparable between individuals”.

Happiness questions function well in several surveys, with relatively low rates of item non-response across countries. This may be regarded as another indicator of the universal acceptance of such questions: enjoyment of giving one’s views on almost any subject seems to be an almost universal human attitude (this point is also briefly mentioned in Section 5).

An issue that has been discussed less is the measurement of economic well-being in this context – namely, the impact of nominal and real measures for GDP and income across countries and over time. Studies on the Easterlin hypothesis show that in evaluating economic welfare, people consider differences in purchasing power parities across countries as well as inflation over time. In our analyses, we use either GDP per capita based on purchasing power parities for cross-country comparisons or deflated income measures for the analysis of time series. Results from East Germany presented in Section 3 indicate that both kinds of real (or absolute) modifications of income measurement have substantial and meaningful impacts on happiness scores – and that people refer to both simultaneously in their happiness evaluations.<sup>4</sup>

#### *Set Point, Absolute, and Relative Comparison Levels and Processes of Habituation*

Another line of research addresses the mechanisms of adaptation. According to set point theory, people have a tendency to return to a relatively stable level of happiness, referred to as a ‘hedonic treadmill’, despite positive or negative life changes. This implies that “there is a stable baseline of LS (Life Satisfaction) with homeostatic forces returning it to its original level after life events or changing circumstances change it” (Fujita/Diener 2005). The idea that people can adapt to “almost any life event and that happiness levels fluctuate around a biologically determined set point that rarely changes” (Lucas 2007) has been challenged by several authors based on empirical evidence from large-scale panel studies with regard to major positive and negative life events such as unemployment, marriage and marital disruption, disabilities, childbirth, and the death of partner (Winkelmann/Winkelmann 1998; Lucas/Clark/Georgellis/Diener 2003; Lucas 2007; Headey/Muffels 2014). Five points of the highly influential set point theory have been revised based on empirical findings in a recent study: “First, individuals’ set points are not hedonically neutral. Second, people have different set points, which are partly dependent on their temperaments. Third, a single person may have multiple happiness set points: Different components of well-being such as pleasant emotions, unpleasant emotions, and life satisfaction can move in different directions. Fourth, and perhaps most important, well-being set points can change under some conditions. Finally, individuals differ in their adaptation to events, with some individuals changing their set point and others not changing in reaction to some external event” (Diener/Lucas/Scollon 2006). Personality traits (the “big five”) seem to have a substantial moderating effect on the way life circumstances and life events are individually evaluated and adapted (Soto/Luhmann 2012). The study of long-term changes in subjective well-being is now an established field of interdisciplinary research (Headey/Muffels/Wagner 2010).

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<sup>4</sup> In case of deflation, purchasing power parities are fixed at a specific point in time and space whereas cross-national ppp adaptations do not control for country-specific developments of prices over time.

Several studies use comparison strategies and look at processes of change and adaptation in subjective well-being. Clark (2012: 5) emphasizes “that individual well-being may very well depend on the ‘relative’ level of many important variables, as well as their absolute level. These relative levels might either be defined with respect to other people (social comparisons), or with respect to oneself in the past (adaptation).” Candidates for social comparison are, according to Clark (2012:7), peer groups, partners, friends, neighbours, colleagues, and expectations/aspirations. D’Ambrosio/Frick (2012) investigate absolute and relative effects together within a dynamic setting based on the relative income hypothesis (Duesenberry 1949) (also referred to as comparison income or the relative utility effect) and “differentiating further between keeping up with the Joneses, where preferences depend on current consumption, and catching up with the Joneses, where preferences depend on lagged consumption”. Pfaff (2013) describes these two types of relative comparison strategies as follows: “If a ceteris paribus increase in reference income leads to a decrease in utility, the phenomenon can be called comparison effect and is, from a psychological perspective, associated with negative feelings of jealousy or envy. If a ceteris paribus increase in reference income leads to an increase in utility, the phenomenon can be called information effect and is associated with positive feelings of ambition.” Senik (2008: 496) proposes that both the comparison and the information effect always coexist but that “the degree of mobility and uncertainty in the economic environment” determines which of the two is dominant.

D’Ambrosio/Frick (2012: 14/15) conclude therefore that “individual well-being, measured by perceived income or life satisfaction, is indeed a function of absolute, relative and dynamic components. An individual’s well-being is negatively affected by the comparison with permanently richer individuals (...) and is positively affected by the comparison with permanently poorer individuals. (...) At the same time, the presence of newly richer and poorer individuals plays the informational role described in Hirschman’s (1973) tunnel effect”. Clark (2012) concludes, taking account of results from experimental economics and neurological evidence, that there “seem to be significant comparison effects both spatially (between groups) and over time“, and emphasizes that processes of habituation resulting from comparison strategies are not only related to the field of income and GDP but can also be (partially) observed for other areas of life (like health, work life, social capital, and religion).

Regarding the dynamic mechanisms used to create and employ absolute and relative reference schemes for evaluations of subjective well-being, Ferrer-i-Carbonell (2005) reports an asymmetry in the use of absolute and relative comparison standards and concludes that “comparisons are mostly upwards”. Delhey/Kohler (2006: 128) suggest, with regard to reference group theory, that “upwards comparisons, especially the feeling of relative deprivation, have a much greater impact on how people think about their situation than downward comparisons”. Wolbring/Keuschnigg/Negele (2013:98) confirm from a basic needs perspective that “income losses have a stronger influence on life satisfaction than income gains” and mention further that “within three years people adapt almost completely to changes in income”. Loss aversion, as well as the observation that we adapt rather quickly within a period of just three to five years to new standards of living, have been discussed and confirmed by several other authors as well (DiTella/MacCulloch 2008; DiTella/Haisken-De New/MacCulloch 2010; Boyce et al. 2013).

### *Autonomy, Social Cohesion, and Social Emergence*

Another type of studies refers to direct and indirect impacts of overall inequality on individual subjective well-being. Clark/Flèche/Senik (2012, 2014) report that the highest happiness scores can be found in rich countries with low degrees of income inequality and cite strong evidence that GDP growth is associated with lower inequalities in happiness. Schneider (2011) highlights the role of social cognitions relating to income inequality in happiness evaluations. Other studies have examined cross-national differences in well-being and inequality with regard to risk aversion and trust (Rözer/Kraaykamp 2013; Gandelman/Porzecanski 2013). Frey/Stutzer (2000) report that more highly developed federal and democratic institutions, which provide the people living in a country with higher degrees of autonomy, increase happiness. Muffels/Headey (2013) discuss the impact of individual freedom on happiness in the context of capabilities, opportunities, and constraints. Wilkinson/Pickett (2009a,b) report that lower inequality in economic living conditions is related to better health and fewer social problems, including mental illness, violence, imprisonment, lack of trust, teenage birth, obesity, drug abuse, and poor educational performance. Several authors also emphasize direct impacts of social capital and social cohesion on individual happiness (Delhey/Kohler 2006; Klein 2013; Bartolini/Bilencini/Sarracini 2013; Becchetti/Massari/Naticchioni 2013). All these studies suggest that happiness judgments are impacted as well by collective and spatial (regional, national or trans-national) factors resulting from the overall distribution of economic welfare and inequality, and that they are directly affected by capabilities, autonomy, and freedom as well as social capital and social cohesion and related concepts.

Brockmann/Delhey (2013) challenge – in line with Sen (1997, 2009) – a purely utility-driven perspective on maximization as the main principle for the subjective evaluation of living conditions. Several authors also discuss utility in relation to social justice, social trust, and fairness as an important factor affecting people's subjective evaluations of happiness (Clark 2012:10 Clark/Flèche/Senik 2012; Frey/Stutzer 2013). However, it is still unknown which specific mechanisms people use to evaluate economic and social distributions of well-being and how aspects of agency and social emergence affect these judgments. Section 4 gives some empirical evidence on the impact of system change on happiness levels in East Germany after reunification, and Section 5 discusses the use of social justice as a basic principle for studying the impacts of social emergence when considering the relation and distribution of economic living standards and subjective well-being.

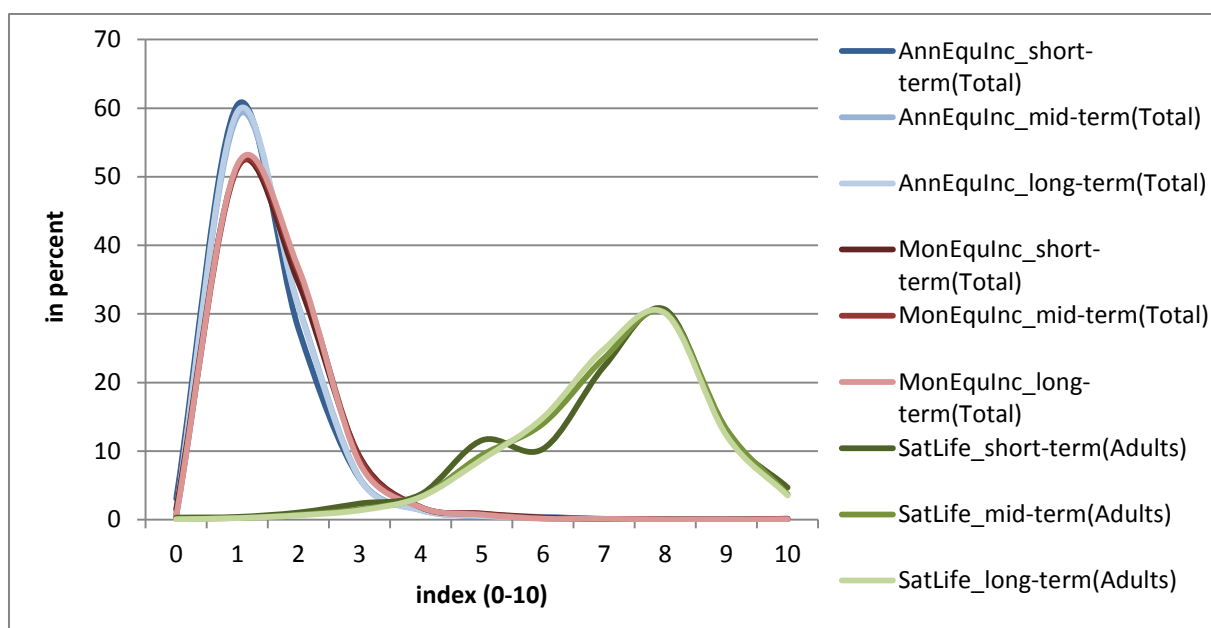
### **III Distribution of Economic and Subjective Well-Being**

Income may be regarded as one of the key indicators of individuals' objective economic performance, and household equivalent income is usually used as the main indicator of economic welfare. All income-based poverty indicators use this measure. Life satisfaction, on the other hand, is the most frequently used indicator of happiness and of the individual's evaluation of his or her living conditions. It is therefore used as the main indicator of subjective well-being. The distributions of these measures for different dimensions of quality of life reveal remarkable differences in several aspects.

## Short-term, Medium-term, and Long-term Distributions of Well-Being

Equivalent income as the main indicator of economic welfare typically shows a left-biased distribution. That means that the majority of the population is in a weaker economic position than a minority of the population, or that a minority of individuals and households have substantially more command over economic resources than the majority. The distribution of life satisfaction, on the other hand, as a subjective indicator of people's overall evaluation of their living conditions, is typically right-biased, meaning that most individuals evaluate their own overall living conditions positively. Taking both results together raises the question of how individuals succeed in using the – usually limited – economic resources at their disposal to arrange their lives in a subjectively comfortable manner (figure 3.1).

Figure 3.1: Distribution of Economic and Subjective Well-Being



Database: SOEP v29

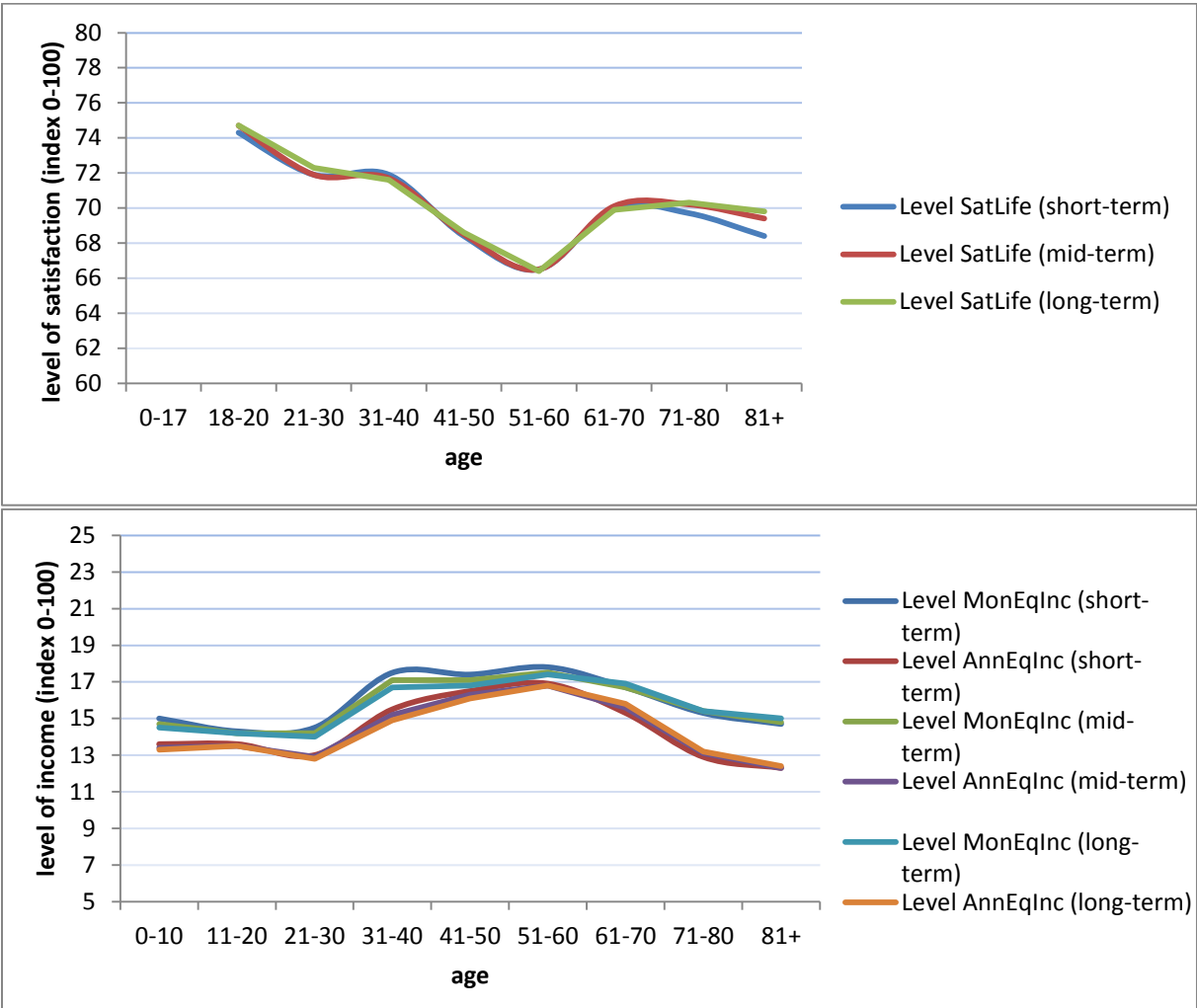
These differences in the distribution prove to be remarkably stable when using alternative indicators of incomes and taking short-term, medium-term, and long-term perspectives. The distribution of subjective well-being is even more pronounced in the medium-term and long-term perspectives.<sup>5</sup>

## Age Profiles of Well-Being

Another remarkable difference between quality of life indicators, with lower mean levels for economic well-being and higher mean levels for subjective well-being, can be seen in the variations over the life cycle (figure 3.2).

<sup>5</sup> From a short-term perspective, we find some higher rates of satisfaction at the value “5” on the 0-10 scale, as the middle value may be used as a kind of anchor point.

Figure 3.2: Levels of Economic and Subjective Well-Being over the Life Cycle



Database: SOEP v29

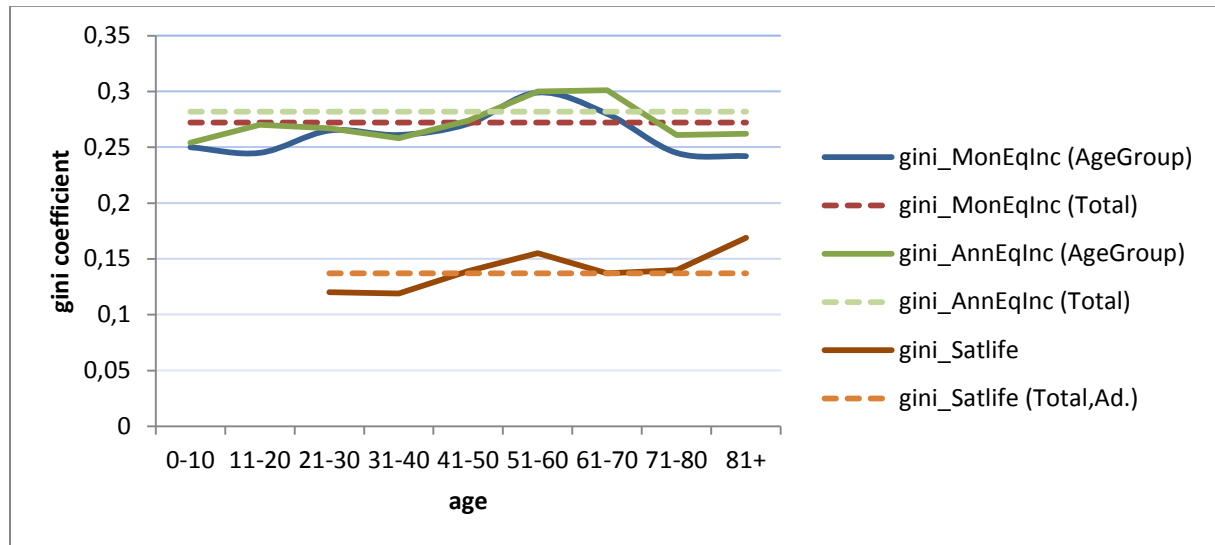
Following the mean levels of subjective well-being for age profiles over the life cycle, we observe the familiar u-shaped pattern, with higher means at a young age, followed by a decline at prime age, and a renewed increase at the end of working life. Short-term levels show a decline in the last age period, which corresponds to findings of a decline in subjective well-being towards the end of life. Medium-term and long-term observations seem to be more stable in this regard.

The age profiles for the lower levels of economic welfare instead follow an inverse u-shaped pattern. Children and young adults living with their parents share the common income resources of the household. At prime age, the mean levels of economic welfare rise compared to other age groups, decline steadily as people reach the end of working life, and decline further to much lower level in old age.<sup>6</sup> Changes in the distributions of economic welfare and subjective well-being therefore move in opposite directions over the life cycle –

<sup>6</sup> The perspective of age profiles is overlapped by cohort effects, which are not yet considered here. Therefore the individual development of incomes after retirement may remain more stable than suggested by the age profiles, as the highest age group covers cohorts with lower economic standards at their individual prime age periods, than later cohorts.

with the lowest level of subjective well-being being reached at prime age, when the mean economic welfare levels are highest.

Figure 3.3: Inequality of Well-Being over the Life-Cycle



Database: SOEP v29

If we shift the perspective to the patterns of inequality across age groups (figure 3.3) we find generally higher degrees of inequality in economic welfare distributions than in subjective well-being. With regard to age profiles, among the elderly we observe a decrease in inequality in income-based economic welfare and an increase in inequality of life satisfaction due to increasing health risks. At prime age, inequality is higher in both subjective well-being *and* economic welfare. The mean gains seen with increasing income and economic welfare at working age, and the mean losses in happiness in that age period, which may be related to imbalances in work-life arrangements and the social demands of caring for children or elderly parents coincide with higher rates of inequality in living conditions and economic welfare *and* a more acute desire for, subjective well-being in that period of life.

#### IV Adaptation to New Standards of Living: The Case of German Reunification

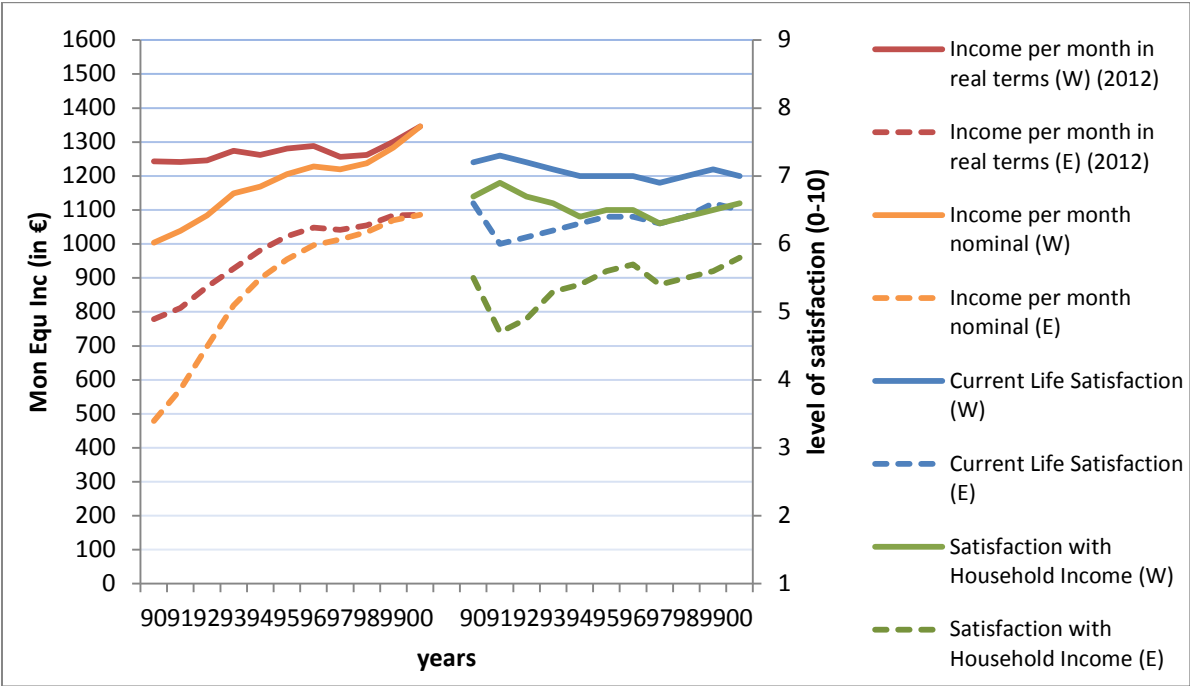
To obtain further insights into the relationship between inequality and different dimensions of quality of life, we examine the case of German reunification. The first wave of East German data still refers to a situation in which the former currency (East German mark) was in use and the entire economic and social security system still differed significantly from the West German system. By examining this period of system transformation, we can observe the changes in subjective well-being that occur when (social) policy regimes change and the rules for the distribution of economic welfare are in flux.

In 1990, the year of reunification, living conditions in East and West Germany differed significantly in almost all life domains (figure 4.1). The economic welfare level in East Germany was much lower and incomes were much less unequally distributed than in the West. Incomes in East Germany increased sharply within the first half of the 1990s, and the difference in income between the East and West German states diminished year by year



over that period. The sharp increase in inequality that might have been expected after the shift from a communist to a market-driven system did not occur, however. The new West-German social security regulations in the East were quite efficient, and income inequality rose only marginally. In line with the lower levels of economic welfare there, we also find lower levels of subjective well-being for satisfaction with household incomes and satisfaction with life in the East than in the West.

Figure 4.1: Economic Welfare and Subjective Well-Being in Germany after Unification



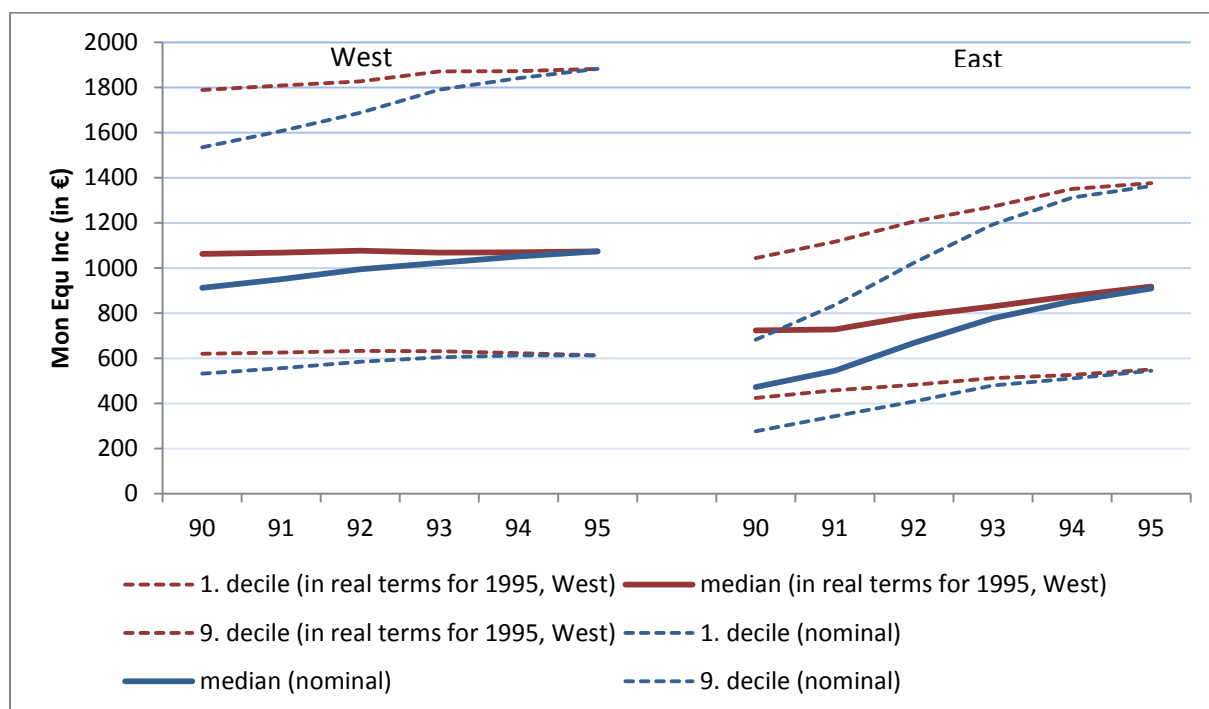
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While we observe different developments in subjective well-being during the first half of the 1990s in East and West, it looks as if the patterns converged in the second half of the 1990s. Starting in the middle of the 1990s, subjective well-being developed homogenously in both parts of Germany in line with economic developments. However, the reported levels still differed, which corresponded to the differences in economic welfare between East and West.

The First Years after Reunification

The convergence in income differences between East and West can be illustrated graphically in terms of trends for different income thresholds for middle (median), top (p90), and bottom (p10) income levels (figure 4.2). Top and bottom thresholds indicate the distance between the richest and poorest 10% of the income distribution – the ratios provide a measure of inequality (decile ratio). This approach therefore allows developments in both absolute income levels and (relative) income inequality to be documented together. As price differences are crucial for that period, we document the nominal income thresholds together with real values (referenced to prices of 1995 in West Germany, with implicit corrections for purchasing power differences for East German incomes).

Figure 4.2: Income Distribution after Unification



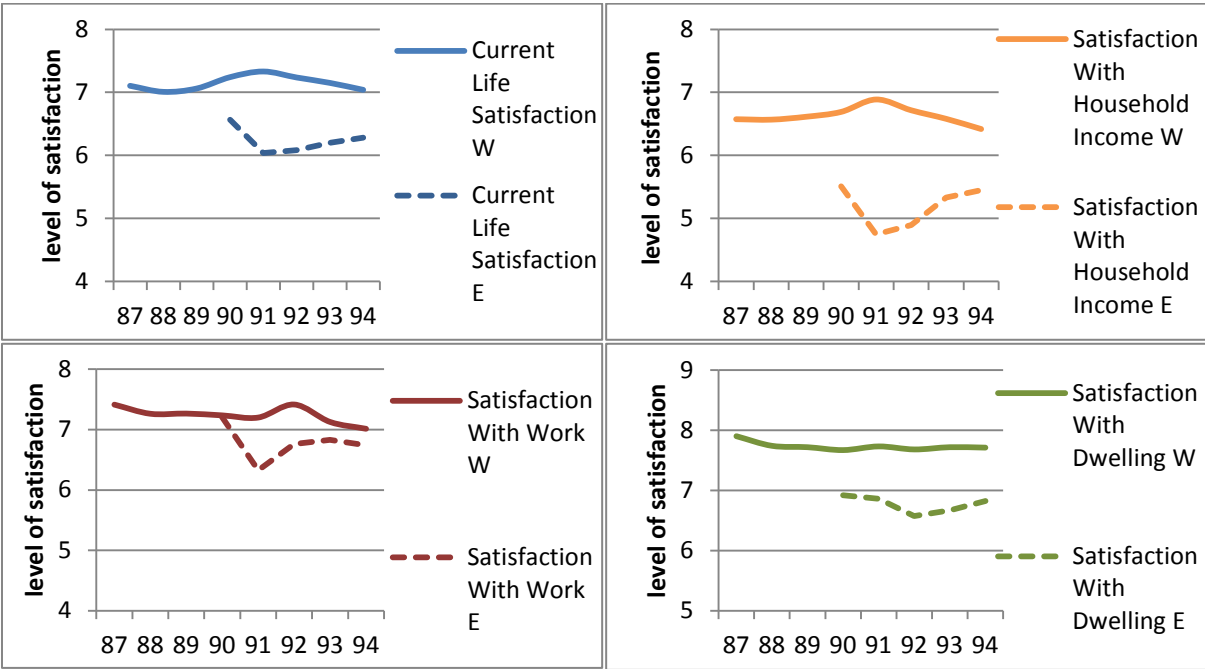
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The mean income levels for the West in the first half of the decade after reunification show some nominal increases and only marginal gains in real terms – but only for the middle and higher incomes. The income distribution in the East in 1990, the year of reunification, was below the already low western levels in nominal values almost across the board, and showed very sharp increases at all levels within the following years. Due to the existing differences in purchasing power, the real income distribution in the East initially overlapped with the bottom part of the income distribution in the West and increased steadily after reunification. The distance between mean incomes in East and West diminished within the first half of the 1990s year by year. The main difference between the income distributions in East and West was the smaller proportion of higher incomes in the East. Income inequality was – and still is – lower in the East than in the West.<sup>7</sup>

The income developments demonstrate the huge political efforts that were made to bring the economic situation in East Germany up to the higher living standards in the Western states as quickly as possible after reunification. Due to the rapid increase in incomes, we expected to see an immediate increase in people’s subjective income evaluations immediately after reunification. However, scores for life satisfaction and for satisfaction with income dropped instead in East Germany in the first year after reunification (figure 4.3), indeed to an even lower level than before, and thereafter increased only modestly towards the higher Western levels for the evaluation of satisfaction with life and income. Even the group of those who were not satisfied with their income increased in the Eastern states in the first year after reunification, despite the gains in real incomes.

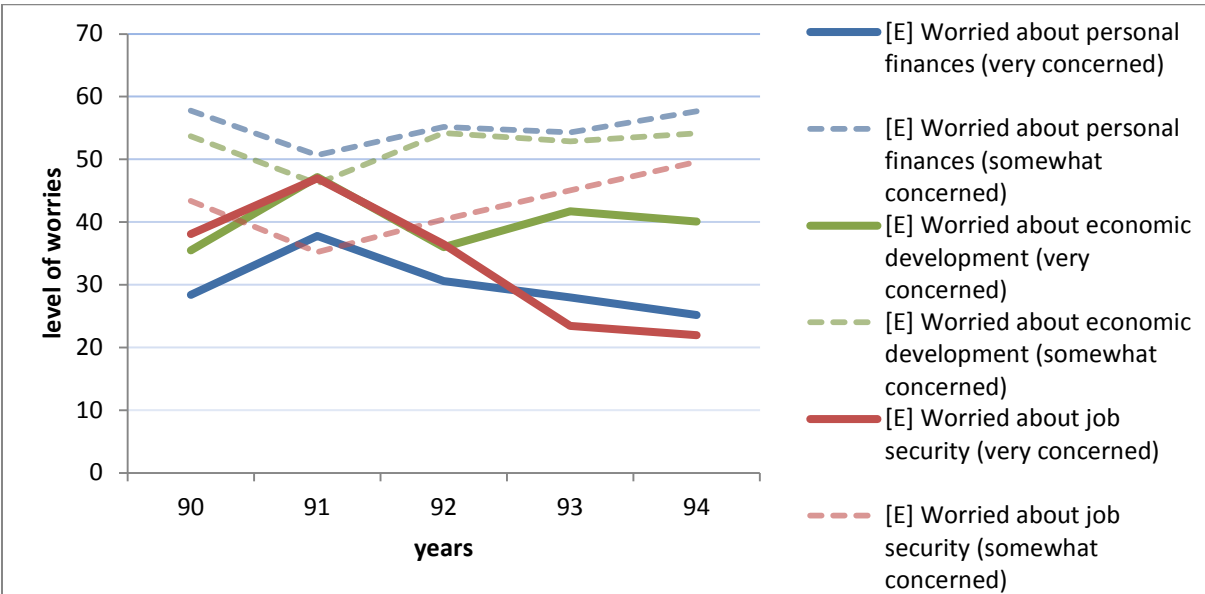
<sup>7</sup> Inequality in post-governmental or disposable incomes is still lower in East Germany compared to the West. Inequality in pre-governmental or market incomes has risen in East Germany during the 1990s is still higher than in the West.

Figure 4.3: Satisfaction with Life and Economic Domains after Unification



Database: SOEP v29

Figure 4.4: Worries about Economic Living Conditions in East Germany after Unification



Database: SOEP v29

We find these counterintuitive drops in subjective well-being in the East in several areas that are related to the abrupt transition of the economic system. Levels of well-being went down in the first year after reunification for satisfaction with income, with work, with life as a whole and in less pronounced way also for people’s satisfaction with their dwelling. These drops in well-being in the East – except in relation to housing – were accompanied by a small temporary increase in western satisfaction levels. And we also find peaks in negative indicators of subjective well-being in the East for the same areas of economic transition (figure 4.4): the percentage of respondents who were very concerned with finances,

economic development, and job security increased temporarily in the first year after reunification. These counterintuitive developments in the evaluation of living conditions indicate changes in evaluation standards within the first years after unification.

### Reference Levels for Adaptation

German reunification brought together two countries with very different standards of living. This may be regarded as a lucky coincidence in that it offers us an opportunity to analyze the mechanisms for adaptation between economic welfare and subjective well-being immediately after an abrupt transition in an economic system.

To obtain additional information about how the subjective evaluation of income changed over time, income thresholds were estimated for specific evaluation levels.<sup>8</sup> These estimates represent indifference curves of income for different subjective income evaluation levels, which correspond to scores ranging from 0 (= completely dissatisfied) to 10 (=completely satisfied) on the scale of income satisfaction. These levels, which are based on scores in subjective income evaluations, can be followed over time and compared directly with the original distribution of incomes. We follow this process of convergence in East and West Germany over the first half of the 1990s in four steps: The first and second part illustrate the use of absolute (a) and relative (b) standards for income evaluation based on nominal incomes (in €) separately for East and West (figure 4.5, a-b). The third (c) and fourth part (d) demonstrate the convergence of reference levels based on real incomes (in € at prices of 1995, West, with implicit corrections for purchasing power differences) (figure 4.6, c-d).

The first part of figure 4.5 represents the year-by-year estimates with regard to nominal income levels. Looking at these indifference curves for subjective income evaluation, it appears that subjective income evaluations became slightly more positive in West Germany. Keeping in mind the real developments in incomes (c), it becomes obvious that people take account of rising prices in their income evaluations. Looking at the corresponding indifference curves for East Germany, we observe a substantial increase in income expectations for nominal income levels in the first half of the 1990s. In this period, prices also increased much faster in the East than in the West. Again, income evaluations are overall in line with the real developments in incomes and accordingly may also signify a reaction to the differences in purchasing power parities. Furthermore, it is evident that the difference in the income evaluations between low and high incomes was very low in the East at the beginning, and that this inequality in income expectations<sup>9</sup> also increased substantially in the first half of the 1990s – without any drop in the curves.

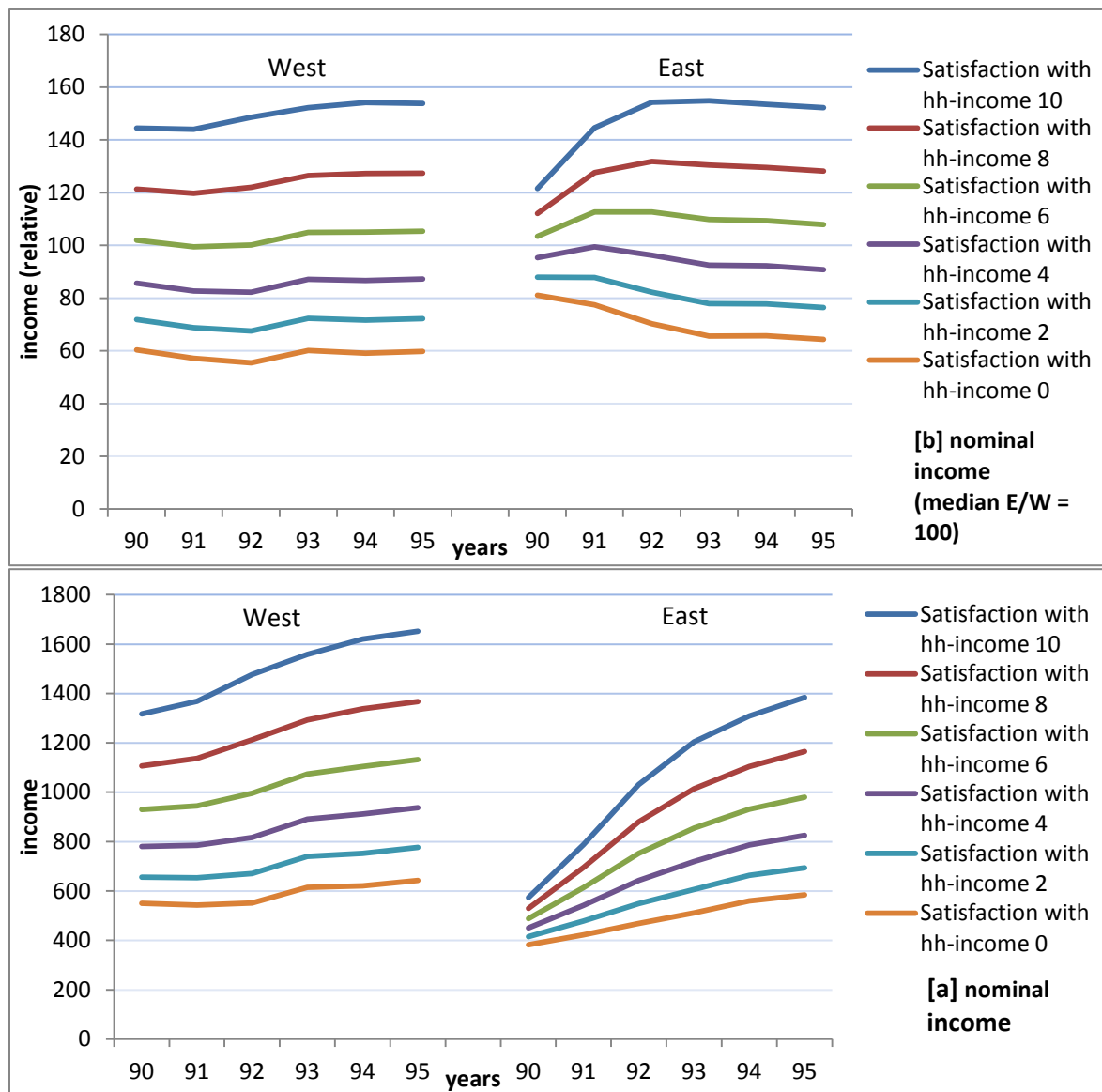
If the income values are divided by their median separately for East and West, we obtain indicators for the relative positions in equivalent incomes, which correspond to the absolute income levels shown before. The corresponding indifference curves (b) illustrate how the income evaluation has changed over time with respect to the median of the income distribution, and therefore provide a picture of relative income evaluations.

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<sup>8</sup> Technical details are described in Appendix A1.

<sup>9</sup> Expectation and evaluation are used here as synonyms in the sense that these lines represent income levels which are regarded as very good or bad on the scale, regardless of whether these levels are still achieved or should be achieved.

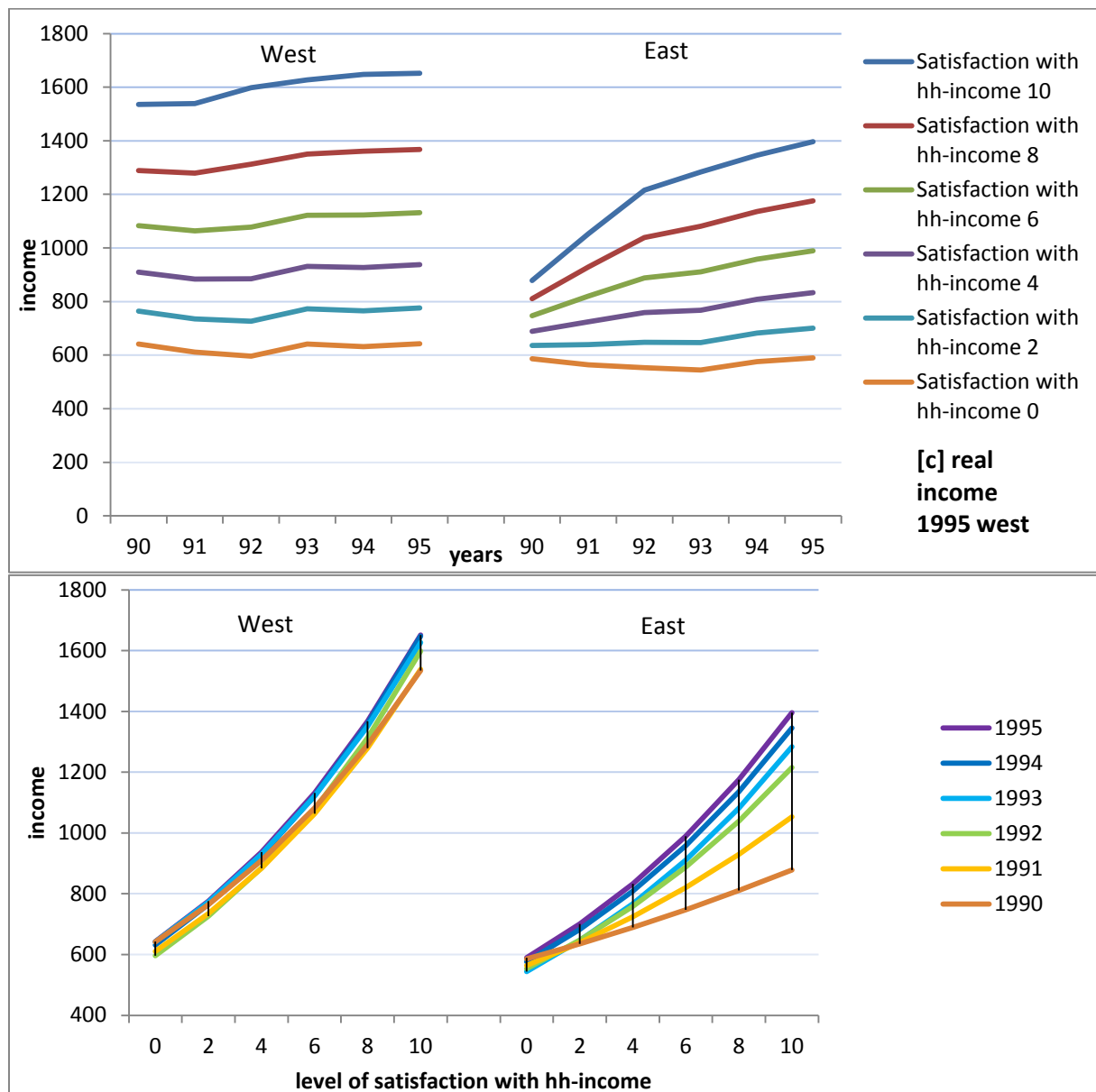
Figure 4.5 [a-b]: Indifference Curves for Income Evaluation



Database: SOEP v29

The estimated curves of relative income positions for West Germany are quite stable during this period, whereas the curves of relative income positions in East Germany show a dramatic change within the first three years after reunification. The bottom level of income evaluation dropped from 90% to about 70% of median equivalent income, while the top level increased at the same time from 115% to about 140%. The evaluation standards for inequality in incomes changed at all levels within the first years after reunification. This increase in the inequality of income expectation levels was much larger than the modest increase in inequality in the East German distribution of incomes and the rise of incomes. The new relative standards for income evaluation in the East still differ from those of the West German levels, as mean incomes and inequality are also still lower than in the West, but it may no longer be appropriate to examine relative income distributions separately for East and West since the change in relative evaluation standards.

Figure 4.6 [c-d]: Indifference Curves for Income Evaluation



Database: SOEP v29

The indifference curves in the third and fourth part (figure 4.6) are based on real income levels (at prices of 1995, West). The indifference curves in part (c) echo the corresponding developments based on nominal incomes in part (a). From this picture, it seems that evaluations of lower incomes converged first, and that those of higher incomes seem to have followed later. The indifference curves have shown that evaluation standards remained quite stable in West Germany, whereas there was a significant convergence of East German to West German standards. Reunification therefore had less impact on West German income evaluations, but caused significant changes in the subjective evaluation of living conditions in the East. In the fourth part (d) of figure 4.6, the convergence of East and West German income evaluations is summarized on the basis of real income levels (at prices of 1995, West). The top and bottom points of the lines describe the range for incomes evaluated as 0 to 10 for each year since reunification. It appears that in the West, the inequality in income evaluation levels remained almost stable in terms of real incomes during the first half of the 1990s. For East Germany, in contrast, we find a large increase in income evaluations during

this period, in which incomes converged toward higher western standards. In line with differences in the distribution and the smaller spread in the higher income group in East Germany, the subjective expectations of higher incomes remained lower for the East at that period.

Within four years, the evaluation standards of the East and West German population converged almost completely. Despite the remaining differences in mean income levels and inequality, incomes are now evaluated more similarly in both parts of Germany. The mean incomes and the distributions still differ, but the underlying evaluation system is largely the same. It appears that the income expectations at the bottom converged at once, whereas the evaluation of higher incomes shifted more slowly to the new higher Western standards. It seems therefore as if the reference levels for income levels followed a bottom-up adaptation process, starting with the lowest evaluation level for incomes just above the relative poverty lines.

## **V Principles for Inequality and the Evaluation of Economic Welfare**

The results from the previous section suggest that people use both absolute and relative standards together in their evaluations of economic welfare distributions. They use absolute standards in income evaluations by taking differences in price levels and purchasing power parities into account and they use relative standards by also reacting to changes in relative parameters of the distribution. The underlying principles for the evaluation of living conditions are investigated further in this section with regard to different levels of economic welfare, the use of anchor points for the evaluation, and how these might be related to principles of social justice.

### **Income Evaluation at Different Levels of Income**

This part of the analysis addresses the question of whether people make income evaluations in the same way at all income levels. Therefore all incomes are grouped according to proportional income categories (PICs) with an increase of 30% within each group. For each income category, incomes are transformed to log incomes with the same minimum and maximum values, and similar means and standard deviations, representing all levels of the income distribution. The first two bottom categories (1, 2) describe income levels beyond the poverty line of 60% median incomes, the next two categories (3, 4) cover income levels between the poverty line and median incomes; the next two categories (5, 6) describe income levels in good economic standards from 100%-169% of median incomes, and the three top categories (7-9) document higher welfare standards up to top levels from 169-371% of median incomes (table A2).<sup>10</sup>

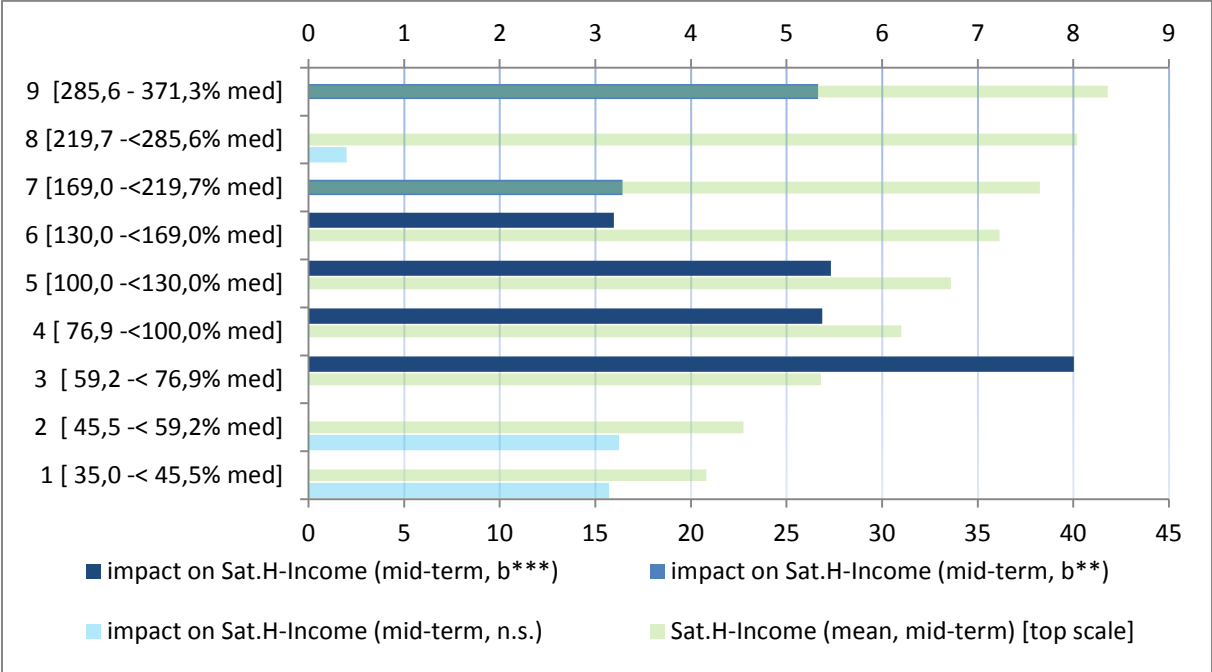
As all categories include the same amount of relative increase in incomes, we are able to show how the regression coefficients on satisfaction with incomes and life differ for constant 30% increases in incomes at all of these levels of economic welfare using an ordinary least squares (OLS) regression approach with robust standard errors based on pooled mid-term indicators for the last available years of SOEPv29 data (2010-2012). Medium-term indicators

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<sup>10</sup> Technical details are described in Appendix A2.

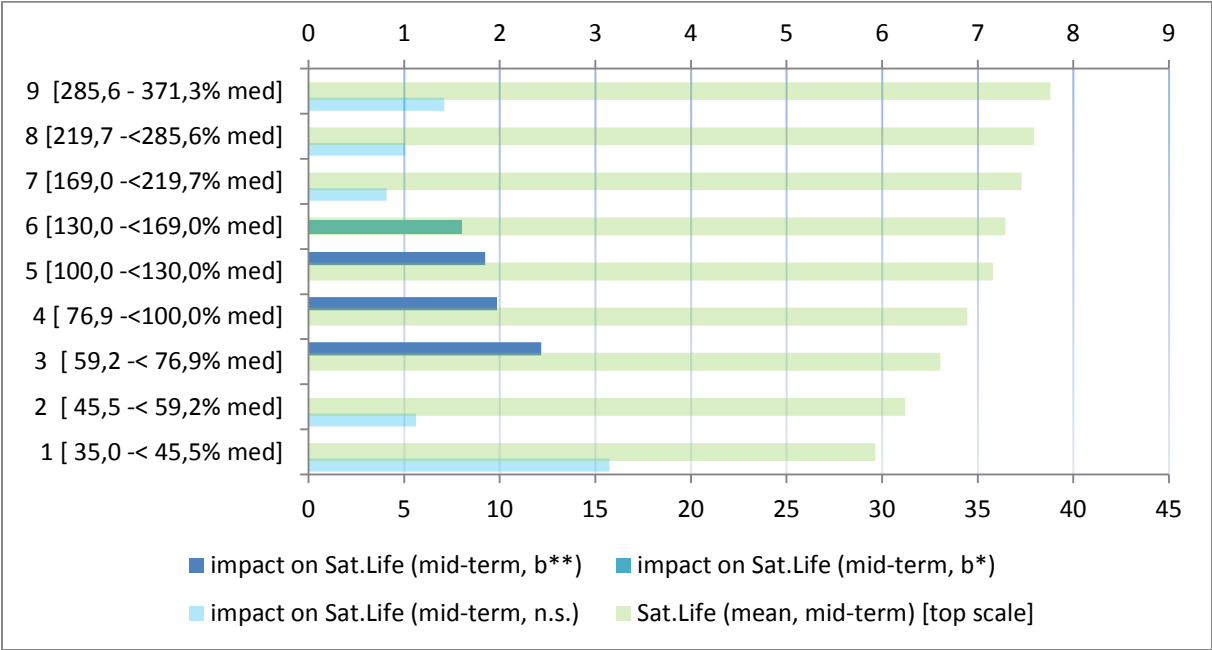
for incomes and satisfaction cover the mean values of individual scores over the last three years and therefore provide more robust results than short term-indicators in this case.

**Figure 5.1: Regression Coefficients on Satisfaction with Household Income (b) – according to proportional income categories (PIC)**



Database: SOEP v29

**Figure 5.2: Regression Coefficients on Satisfaction with Life (b) – according to proportional income categories (PIC)**



Database: SOEP v29

The background bars in figures 5.1 and 5.2 reveal the rising levels of mean satisfaction with household incomes and life at first with the increasing levels of economic welfare according



to the PICs: the higher the economic level of welfare, the higher the mean level of satisfaction. The figures confirm further that this relationship in the overall distributions is stronger for satisfaction with household incomes than for satisfaction with life. The bold bars in the foreground refer instead to the relations between incomes and satisfaction *within* different categories of economic welfare. Regression coefficients document here the increase in satisfaction with household incomes and life at each level of the proportional income categories separately. As the regressions for the PIC groups are based on log incomes with the same minima and maxima for each category, we are able to compare the coefficients directly from the poor to the rich. Significant coefficients are highlighted according to their p-values; non-significant effects are marked by high degrees of transparency.

The figures reveal – as expected – higher returns from increases in mid-term incomes for satisfaction with household incomes than for satisfaction with life, but with similar patterns across the different welfare levels. The most remarkable results are seen beyond the poverty line, where we find no significant increases in satisfaction scores within the 30% income intervals – neither for satisfaction with household incomes nor for satisfaction with life. The highest – and highly significant – gains for 30% increases in incomes can be observed for the welfare levels above the poverty line, followed by the welfare level beyond the median and the two levels above median incomes, with diminishing returns. At higher welfare levels, the returns for satisfaction with household incomes after an increase in income drop steadily and then increase again at the very top level<sup>11</sup>. With regard to satisfaction with life, we find no significant effects for further increase in incomes at the top levels of the welfare distribution, but the non-significant patterns are similar.

Summarizing, we find highly significant returns on satisfaction with life and incomes from increasing incomes at all levels of middle incomes above the poverty line and beyond the top welfare levels. At both ends of the distribution, relative increases in income seem to provide less clear patterns. In case of incomes beyond the poverty line, it may very well be that relative increases in income are too small in an absolute sense to provide significant gains in quality of life, and that for the top levels of the income distribution, absolute gains in wealth may be more relevant than relative increases in income. Top incomes seem to provide higher returns for satisfaction with income but less for satisfaction with life. Methodological aspects may also overlap with the findings, as the use of bounded scales for satisfaction does not offer many options for further increases on the scale. The top and bottom categories further included coded income values so that the real increase in incomes might be more than 30% in some cases for these two categories. Nevertheless, these findings display a clear pattern of relations between income and returns of income on subjective well-being at different levels of economic welfare. We find a clear positive and highly significant relationship between subjective well-being and economic welfare with diminishing returns on all middle-class income levels above the poverty line – and different patterns at the top and bottom ends of the welfare distribution. The evaluations of subjective well-being therefore also echo perceptions of rich and poor.

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<sup>11</sup> The higher returns at the top level are affected by the top-coding.

## Concepts for Evaluation – Evidence from Responses

The findings before support the view that when evaluating their living conditions, people make reference to both absolute and relative measures of well-being (Clark 2001). We might therefore use overlapping evaluation strategies, looking at absolute measures to capture fixed basic living conditions or real variations over time, and looking at relative measures to capture interpersonal comparisons of welfare levels or of relative differences from former levels. It is difficult to prove which types of mechanisms are operating in a particular case and how they function. Do people really use anchor points for the evaluation process, or do they use welfare functions, as suggested by the subjective poverty approach? To provide further, although not conclusive evidence on this issue, we addressed the reaction of the respondents when confronted in the survey situation with these different types of questions. We compared the amount and structure of missing values and implausible answers for questions on satisfaction with income and life on the one hand with the income evaluation questions (IEQ) that have been used to derive subjective poverty lines (van Praag, Goedhart, Kapteyn 1980; van Praag 1993) on the other.<sup>12</sup>

The interesting point in this context is that in the survey interviews, respondents usually appear to enjoy answering satisfaction questions (table 5.1). These types of questions about living conditions seem short and easy to answer; the shares of missing values are therefore rather low, and they provide meaningful results, as their broad use in several contexts of research has shown.

**Table 5.1: Item Non-Response and Incomplete or Inconsistent Response in Income Evaluation Question (IEQ) and Satisfaction with Income and Life**

	IEQ (All individuals)		Sat-Inc (Respondents)			Sat-Life (Respondents)		
	1992	1997	1992	1997	2012	1992	1997	2012
Complete Answers	51,3	62,9	99,0	97,7	96,9	99,2	99,6	98,5
Item Non-Response	4,9	5,7	1,0	2,3	3,1	0,8	0,4	1,5
Incomplete Answers	14,0	7,7	-	-	-	-	-	-
Inconsistent Answers	29,9	23,7	-	-	-	-	-	-
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Database: SOEP (v29/v\_2004)

The IEQ question, in contrast, seems to be much more difficult to answer in personal survey interviews. The item non-response for the IEQ is rather high, and not all individuals give answers for all levels. There is also a substantial proportion of inconsistent answers in that lower incomes are sometimes assigned to higher evaluation levels. Respondents seem to start either from the top or the bottom when assigning income values to the given evaluation items, and some seem to invest considerable effort in the middle to achieve consistent answers.

The reason for this might be that people use different anchor points in a multidimensional way for the evaluation of good and bad welfare levels instead of one consistent but unidimensional welfare function. As a result, they have no problem evaluating living conditions according to the satisfaction-type questions. In case of the IEQ questions,

<sup>12</sup> The original questions are described in appendix A3.

however, respondents have to answer about several economic welfare levels that differ from their own. They run into difficulties if they are forced to retrieve the answers according to the single-dimensioned IEQ type of welfare question if this does not correspond to their natural way of reasoning.

### Individual Evaluation of Own and Others' Incomes

The last question addressed is how living conditions of others are included in people's individual evaluations of their own income levels. We do so because of the previously reported typical patterns of income evaluation found across different welfare levels and the apparent consideration of the income distribution when evaluating economic welfare. But how do individuals incorporate the welfare levels of others into their own evaluation schemes, and which levels of welfare do they use as a reference point?

We differentiate three theoretical approaches: (1) Following the utility framework and the idea of maximizing utility as main forces of individual action, satisfaction scores are often characterized within the quality of life framework as gap between 'what you want and what you get'. According to this view, top levels of economic welfare might be regarded as a level of orientation for the evaluation of living conditions. (2) Regarding the relative poverty framework as a whole, in contrast, the possibility for adequate social participation and the chance to lead a life without shame is seen as essential for those who are deprived. The relative poverty line is operationalized according to European standards as 60% of median household net equivalent incomes. The reference level used in this context is the middle of the welfare distribution. (3) If we refer to the 'veil of ignorance' and the social justice framework in the tradition of Rawls (1971), the most vulnerable should receive the highest level of attention. In this view, the lowest level of economic welfare is used for orientation.

To find out whether top, middle, or bottom levels of the economic welfare distribution are more likely to be used as the point of origin for the evaluation of living conditions, we modified our main indicators of economic welfare – household net equivalent income – according to the different theoretical approaches and applied a regression approach to measure their impact on subjective well-being indicators. For the top-level perspective of maximizing utility, all *descending* individual equivalent household incomes are modified so that each household income measure represents the mean of all other household incomes that are higher than or equal to the individual's own household income.<sup>13</sup> In the social justice perspective, all *ascending* individual equivalent household incomes were modified similarly – they cover the mean of all other incomes which are less than or equal to the households own income. The third theoretical option – taking the middle incomes as references – is not explicitly operationalized here. There is some evidence supporting the middle view if the other modifications provide weaker results compared to the non-modified (original) version of the household equivalent incomes. It should be mentioned that the ranking of modified and non-modified measures of household incomes are the same, whereas the mean values and standard deviations differ substantially.

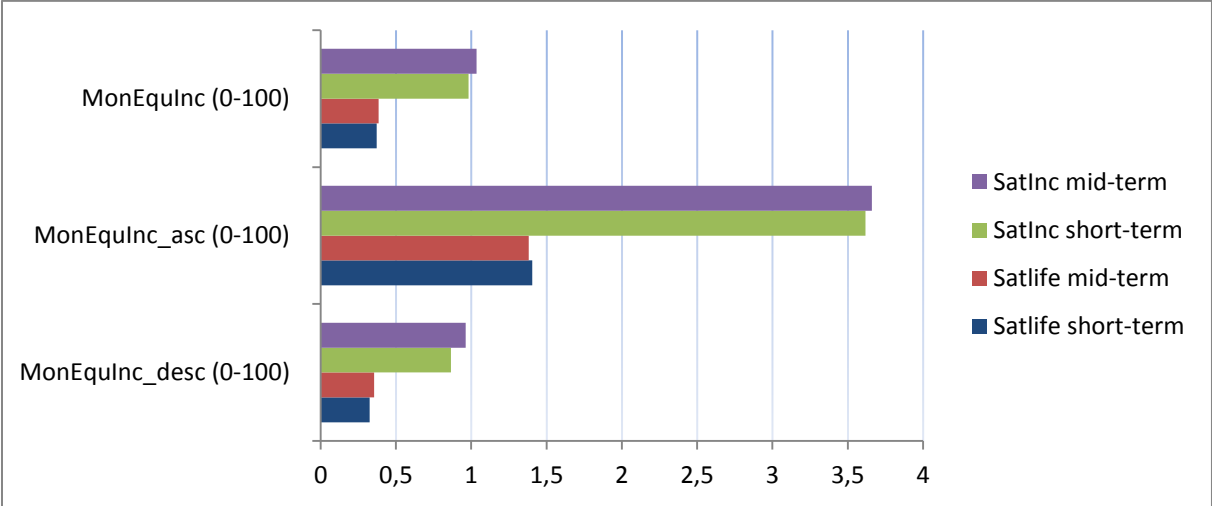
In the descending modification, where the higher incomes in the population are summarized, the best conditions are regarded as the starting point for the evaluation. The

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<sup>13</sup> Technical details are described in Appendix A4.

ascending modification, where the lower incomes in the population are summarized, supports the view of the social justice approach, which regards the lowest welfare levels as initial reference levels. Both modifications support the assertion that evaluation through income satisfaction scores depends not only on one’s own income resources, but also on those of at least part of the distribution. If both modifications show lower regression coefficients compared to the original equivalent income measure, this may be regarded as support for the relative income poverty framework in which the usual living conditions of ordinary people somewhere in the middle of the income distribution are regarded as reference levels. The regression with modifications of equivalent income can therefore be used to obtain further insights into the mechanism of income evaluation: namely, whether the top, the middle, or the bottom of the income distribution is used as a reference level for the evaluation of income and how the incomes of others are considered within the evaluation of living conditions.

**Figure 5.3: Cumulative Income Modifications – Regression Coefficient (b) on Satisfaction**



Database: SOEP v29

The empirical results (figure 5.3) are non-ambiguous: they show a clear increase in regression coefficients for the ascending modification compared to the non-modified and descending versions of equivalent incomes, supporting the bottom-up orientation for the evaluation of both income and life according to the principles of social justice. The descending modifications lead in contrast to a marginal decrease in regression coefficients compared to the original incomes. The findings of higher regression coefficients for the ascending income modification persist in the same way for short-term and medium-term incomes based on monthly or annual measures for disposable household incomes.

**Table 5.2: Correlation of Income Satisfaction with Equivalent Income and Cumulative Modifications for European Countries\***

Satisfaction with Income (range 1-5)	Correlation Coefficient		
	EqInc	EqInc (asc)	EqInc (desc)
Poland	.435	.500	.401
Portugal	.375	.401	.371
Greece	.411	.537	.401
Italy	.361	.427	.322
Spain	.375	.417	.367
Ireland	.334	.395	.322
France	.152	.395	.167
Finland	.296	.340	.258
Netherlands	.325	.354	.309
Germany	.372	.440	.333
Austria	.313	.347	.291
Denmark	.170	.248	.155

Database: CHER (Own calculations, 2004)

The results are also robust for international data (table 5.2). In all observed European countries, the correlation with income satisfaction has gone up for the ascending modifications and down in most cases for the descending modification of equivalent incomes. The ascending modification of equivalent incomes also provides a clearer picture for the evaluation of incomes across countries with different income levels: in countries with lower welfare levels, the correlation with income satisfaction is usually higher than in richer countries. The empirical results based on international CHER<sup>14</sup> data echo the results for Germany. These empirical findings also support the social justice framework, whereby the evaluation of living conditions starts somewhere at the bottom and the income conditions of other households with lower incomes are included in one's individual evaluation.

## VI Discussion

The issue of inequality has been addressed in this article for the multidimensional quality of life framework as a question of relatedness between the distributions of economic welfare and subjective well-being from an individual point of view. How do individuals succeed in gaining relatively high subjective returns from unequally distributed economic resources? The review of literature indicates that inequality and quality of life has emerged during the last decades as one of the central topics of cross-national interdisciplinary research in the behavioral, economic, and social sciences.

<sup>14</sup> Consortium of Household Panels for European Socio-Economic Research (CHER). The CHER database contains panel data for incomes and satisfaction for 15 European countries. The data were derived from ex-post harmonized national panel data including the ECHP. The subjective indicators for income evaluation are recoded from different scales. The results are taken from own former calculations and presentations.

In the empirical sections, the case of German reunification has been addressed as a kind of natural experiment to highlight how changes in the political, economic, and social structure affect the strategies people use to evaluate their living conditions and to identify inherent principles for the subjective evaluation at different levels of economic welfare.

The empirical results confirm that people consider both absolute and relative standards in their subjective evaluation of living conditions. Absolute reference standards appear to have some priority for the evaluation at lower income levels and seem to converge faster, whereas relative reference standards seem to gain more relevance at higher welfare levels. Thus, individuals at lower income levels do not pay much attention to higher-income people, whereas people of higher income and status levels may pay more attention to the welfare levels of friends, neighbors, and regional or even cross-national income levels.<sup>15</sup> There is some evidence supporting the idea that people use different reference schemes at the same time instead of just one consistent scheme to evaluate their living conditions. They may use absolute and relative reference schemes to examine their own position in the income distribution. And it may very well be that people use both principles of maximization and principles of justice and fairness to adapt their individual levels of subjective well-being to the overall distribution of economic welfare.

The use of absolute and relative standards for the evaluation of living conditions seems to follow a bottom-up mechanism, with higher weights for absolute standards at lower income levels in accordance to principles of social justice. However, the utility-driven evaluation process seems to consider first the *positive* welfare levels above the poverty line and below top income. The subjective evaluation schemes therefore seem to be related to our notions of rich and poor. The rich may be characterized as those for whom income increases do not provide any further financial returns on overall satisfaction with life, whereas the poor are those below commonly accepted economic welfare standards<sup>16</sup> that are regarded as a minimum level of living conditions in our society today.<sup>17</sup>

Within the quality of life context, the notion of inequality refers also to the multidimensional characteristics of well-being (Halleröd/Seldén 2013) and to the absolute and relative economic and social standards of where we live. We subjectively evaluate our welfare levels in relation to (minimum) affordable standards and to our own options and choices, and based on our own experiences and expectations. And we make use of our multidimensional resources to achieve what we would consider satisfying living conditions across different domains of life.

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<sup>15</sup> This result is in line with the notion that cross-country comparisons have greater impacts at higher levels of welfare (Delhey/Kohler 2006).

<sup>16</sup> Absolute income might be therefore operationalized with regard to the income poverty line instead of using implicitly zero income as point of departure – as is done by using income as such as an indicator for absolute income. The use of –relative– poverty thresholds as absolute reference points is in line with the notion of poverty by Sen (1992, 1999), whereas poverty as an absolute deprivation of capabilities may very well coincide with relative income poverty lines in the space of functionings and the distribution of economic welfare.

<sup>17</sup> This view is in line with the poverty definition of Simmel [1908] – whereas the poor are those who receive or should receive public assistance, according to generally accepted standards.

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## Appendix

### A1. Special Measures (1) – Indifference Curves of Income Evaluation

To obtain additional information about how people evaluate income, we estimated income thresholds that correspond to specific levels of evaluation. These values include further information about the level of income evaluations in relation to the overall income distribution. The resulting indifference curves can be followed over time and compared directly with the overall income distribution.

As the measures of income were based on household information assigned to all individuals living in the household, we also assign the mean income evaluation of the head of the household and of his/her partner to all household members. This procedure follows the assumption that every household is headed by one or two persons, the head of the household and his/her partner, who make the main economic decisions together and both determine the standard of living in the household. We therefore want to know which level of equivalent income corresponds to which satisfaction score immediately after reunification for the populations of East and West Germany. This analysis is based on OLS regressions of log incomes.

Subjectively evaluated income estimates are now obtained by linear modelling of the satisfaction measure within the regression equation:

*Linear modelling of income satisfaction:*

$$\text{Ln}(\text{EquInc}) = \text{const.} + b \cdot \text{IncSat} + \text{err.}$$

The estimated regression coefficients are then used to calculate the subjectively evaluated income levels for the satisfaction value (s) of 0 - 10 representing low to high evaluated income thresholds:

$$Y_{\text{SatInc}}(s) = \exp(\text{const} + b \cdot (s) + \text{RMSE}^{**2}/2) ;$$

As the income variables were converted to log incomes before regression to avoid heteroscedasticity and to get more robust estimates, the estimated values must be exponentiated afterwards. To get estimated income levels that are directly comparable to the objective income levels within the distribution, it is further necessary to control for the biased estimates produced by the logarithmic transformation of the income variable in the regression.<sup>18</sup> For this regression analysis it is only assumed that there is some correlation between both variables, without any causal determination.

The estimated results indicate the income level in the entire population that is considered somewhere between completely satisfying and completely dissatisfying, on a satisfaction scale from 0 to 10. These estimated income levels are or should be reached within the current population to achieve a specific level of economic welfare. They thus include evaluations as well as expectations related to current living conditions.

### A2. Special Measures (2) – Proportional Income Categories (PIC)

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<sup>18</sup> This can be checked easily by inserting all of the estimated values into the regression equation – without correction using the Root\_Mean\_Square\_Error-Term, the estimated income values would fit better with the median than with the mean of the income distribution.

Proportional Income Categories (PIC) is a method to obtain income categories with equal relative distances for all income levels. This grouping method is constructed such that each income category covers the same percentage increase in incomes. This procedure is derived from the dynamic representation of inequality, as inequality remains stable when all incomes increase by the same percentage.

$$\text{pic}(y_\varepsilon) = p^\varepsilon * z$$

for  $z$  = Reference level for income  $y$  { Median }

$p$  = Relative percentage increase in  $y$  { 1,30 }

$\varepsilon$  = Parameter for thresholds of categories in  $y$  { -3, ..., 4 }.  
bottom / top coding at  $\varepsilon =$  { -4 | 5 }.

Here the median is chosen as reference point with a relative increase of 30% in incomes at each level. Incomes at the top and bottom ends are recoded accordingly. The first two bottom categories (1, 2) describe income levels beyond the poverty line of 60% median incomes, the next two categories (3, 4) cover income levels between the poverty line and median incomes; the next two categories (5, 6) describe income levels in good economic standards from 100%-169% of median incomes, and the three top categories (7-9) document higher welfare standards up to top levels from 169-371% of median incomes (table A2).

**Table A2: Proportional Income Categories (PIC)**

PIC* (2010-2012)	Population		MonEquInc	Ln (MonEquInc)	Ln (MonEquInc)
	N (obs.)	In %	(mean)	(mean)	(SD)
9 [285,6 - 371,3% med]**	1.318	2,2	5573,0	0,160	0,096
8 [219,7 - < 285,6% med]	1.688	2,8	3513,5	0,110	0,070
7 [169,0 - < 219,7% med]	5.235	8,6	2711,7	0,113	0,075
6 [130,0 - < 169,0% med]	9.419	15,5	2093,5	0,117	0,074
5 [100,0 - < 130,0% med]	12.488	20,5	1628,4	0,128	0,074
4 [76,9 - < 100,0% med]	13.751	22,6	1264,0	0,137	0,077
3 [59,2 - < 76,9% med]	8.748	14,4	977,3	0,142	0,072
2 [45,5 - < 59,2% med]	5.488	9,0	751,5	0,142	0,075
1 [35,0 - < 45,5% med]**	2.799	4,6	513,0	0,101	0,098
Total	60.934	100,0	1625,0		

\*PIC-Increase of 30% in Household-Net-Equivalent Incomes at each level;

\*\* Top-/Bottom-Coding at 35,0/371,3% of median incomes.

Database: SOEP v29

$$\ln\_pinc(y_\varepsilon) = \ln(Y_\varepsilon) - \ln(z_{\varepsilon-1})$$

If we calculate the logarithm of incomes  $\ln(y_\varepsilon)$  and subtract the logarithm of the minimum (bottom value) for each category of pic, we obtain logarithmic incomes  $[\ln\_pinc(y_\varepsilon)]$  with the same minima and maxima and almost similar means and standard deviations for each level of pic.

### A3. Questions for Life Satisfaction and Income Evaluation

The satisfaction questions are directly addressed to the respondents:

**1. How satisfied are you today with the following areas of your life?**

(Please answer by using the following scale, in which 0 means totally unsatisfied, and 10 means totally satisfied.)

How satisfied are you with your...

... household income \_\_\_\_\_

**117. And finally, we would like to ask you about your satisfaction with your life in general. Please answer by using the following scale, in which 0 means totally unhappy, and 10 means totally happy.**

How happy are you at present with your life as a whole? \_\_\_\_\_

Source: Questionnaire, SOEP (Individuals, 1997): <http://panel.gsoep.de/soepinfo2012/>

For the IEQ-concept respondents are asked to call the income values corresponding to six levels of subjective evaluation from very good to sufficient to very bad. The results are used to estimate a subjective welfare function.

**53. Whether you feel an income is good or not so good depends on your personal life circumstances and expectations.**

In your case - the net household income

- |                               |       |            |
|-------------------------------|-------|------------|
| 1. A very low income?         | _____ | DM monthly |
| 2. A low income?              | _____ | DM monthly |
| 3. A still sufficient income? | _____ | DM monthly |
| 4. A just sufficient income?  | _____ | DM monthly |
| 5. A good income?             | _____ | DM monthly |
| 6. A very good income?        | _____ | DM monthly |

Source: Questionnaire, SOEP (Household, 1997): <http://panel.gsoep.de/soepinfo2012/>

#### A4. Special Measures (3) – Cumulative Incomes [ CInc(y<sub>asc</sub>), CInc(y<sub>desc</sub>) ]

To obtain further empirical information for the links between income evaluation and income inequality two modifications of equivalent incomes were created (Krause 1997). In the first modification the income measure represents for each household the mean of all *ascending* individual equivalent household incomes which are less than or equal to the household's own income, which is included. In the second modification the measure similarly represents the mean of all *descending* individual equivalent household incomes which are higher than or equal to the individual's own income.

$$Y_{cum\_t} = \frac{\sum_{s=0}^{t-1} W_{t-s} Y_{t-s}}{\sum_{s=0}^{t-1} W_{t-s}}$$

for  $Y_t \geq Y_{t-1}$  (ascending)  
and for  $Y_t \leq Y_{t-1}$  (descending);

$Y_t$  = Equivalent Income of household t;  
 $W_t$  = Weighting Factor of household t.

As these modified income measures are based on the same equivalent incomes, the individual ranking is the same, but the mean and standard deviations are quite different (table A4).

**Table A4: Cumulative Modifications (\_asc/\_desc) for Household-Net-Equivalent Incomes**

2010 – 2012 (in €)	short-term*		mid-term**	
	mean	SD	mean	SD
MonEquIncome	1.633	961	1.622	918
MonEquIncome_asc	1.023	296	1.045	288
MonEquIncome_desc	2.561	1.163	2.487	1.085
AnnEquIncome	22.203	16.830	22.236	14.853
AnnEquIncome_asc	13.554	4.094	14.040	4.047
AnnEquIncome_desc	36.531	23.231	35.476	20.644

\*short-term= $t_0$  \*\*mid-term=  $t_0-t_2$

Database: SOEP v29