9th Annual ESPAnet Conference

Sustainability and transformation in European Social Policy

Valencia, 8-10 September 2011

Stream 20: Effects of the economic crisis on inequality and poverty

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Income Inequality and Poverty in Front of and During Economic Crisis – An Empirical Investigation for Germany 1995-2009

Contribution for the ESPAnet Conference
"Sustainability and Transformation in European Social Policy"
in Valencia (Spain), September 08-10, 2011
(date submitted: 2011/07/11)

JEL: D30, D31, D60, I31, I32, P46

Keywords: Personal Income Distribution – Inequality – Welfare – Poverty Measurement – Decomposition Approach – Equivalence Scales

Stream theme: Effects of the economic crisis on inequality and poverty

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Summary

Based on data from the German Socio-Economic Panel (GSOEP), income inequality and poverty in Germany from 1995 to 2009, i. e. economic well-being of different social groups in front of and during the economic crisis in the years 2008/09, are considered. Concretely, changes of socio-demographic structures in different income areas of German income distribution are taken into account by a new method for measuring inequality and poverty. The key elements of this new method are a) well-being orientations on group-specific well-being levels and b) the usage of variable equivalence scales for the different income areas.

On this basis, results of binary logistic regressions are presented. These regressions encompass the entire population as well as age-separated groups. It is tested whether a person belongs to a certain income area or not. The units of analysis are differentiated by residential status, nationality, sex, age, household size/household type, employment status, etc. For example, the likelihood of unemployed persons for being located in the low-income area weakly increased between 2008 and 2009.

Such microeconomic calculations are contrasted with macroeconomic variables. The main variables in this macroeconomic context – defined in a broader sense – are economic growth, inflation, and general unemployment.

Additionally, in order to capture income dynamics especially during crisis, transition matrices are calculated. For instance, between 2008 and 2009 the share of persons, who stayed within the poverty area, grew by five percentage points, compared with 2007/2008.

All in all, the paper's findings and especially its comparisons produce valuable insights into cross-sectional and longitudinal effects in front of and during economic crisis in Germany.

Content

1. Introduction[1]

In general, a lot of possibilities for dispersing results concerning the personal income distribution due to methodical settings exist. This includes – in a technical sense – the choice of the inequality indicator, the income definition (or more general: the definition of the used well-being indicator), the selection of the unit of analysis, the length of accounting periods, and the standardizations in consequence of different household sizes and structures.[2]

In this paper main elements of distributional analyses will be considered: (1) different kinds of equivalence scales, (2) different inequality and poverty indicators, and (3) different income operationalisations.

The corresponding sensitivity analyses refer to a new distributional framework as reference, i. e. to an integrated approach insofar as the complete income area is divided into three areas which can be (approximately) interpreted as social classes. In this context the income limits of the different areas are fixed by (reference) income-dependent equivalence scales since, according to welfare considerations, this seems more appropriate for distributional purposes than determinations for the whole spectrum of incomes. The income-dependent equivalence scales will be called *variable* equivalence scales – in opposite to income-independent equivalence scales which will be named as *constant* scales.

For analysing aspects corresponding with the economic crisis 2008/09 the time period between 2005 and 2009 (2010) seems to be especially relevant. The macroeconomic framework during this period was as is sketched in the following.[3]

In the time interval between 2005 and 2010 in Germany at first the inflation rate – starting with +0.8 % in 2005 – rose between 2006 and 2008 from +1.8 % in 2006 and +2.3 % in 2007 to +2.8 % in 2008. Then it dropped from 2008 to the peak of the crisis in 2009 from +2.8 % to +0.2 %; in 2010 the German inflation rate amounted to +1.1 %.

The decline in the macroeconomic price level between 2008 and 2009 was accompanied by a remarkable slump of the real gross domestic product (in prices of 2000): Between 2008 and 2009 there was a decreasing "growth" rate in the amount of -4.7 %, but already between 2009 and 2010 the German economy grew by +3.6 %.[4]

The latter development – revealing a relatively good performance of the German economy during the crisis (on a macroeconomic level) – was reflected in the development of the number of unemployed persons (in the definition of the International Labour Office, ILO) within the underlying time period from 2005 on. Starting with 4.6 Mio unemployed persons in 2005, the number of unemployed persons in Germany was reduced continuously until 2008 (2006: 4.2 Mio persons, 2007: 3.6 Mio persons, 2008: 3.1 Mio persons). Against the background of the important productivity losses between 2008 and 2009 sketched above, the number of unemployed persons rose during these years only in the amount of about 100,000 persons which was – at least to some degree – the result of an increase of short-time work.

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[1] The data of this paper rest on the German Socio-Economic Panel (GSOEP) of the German Institute for Economic Research (DIW Berlin). In this context the author would like to especially thank Professor Joachim Merz, University of Lueneburg, for granting access to this database and Paul Martin Lauer (M. A.), also University of Lueneburg, for his refinements concerning the paper's grammar and style.

[2] See e. g. Hussain 2009.

[3] The used data stem from http://www.destatis.de; i. e. from the website of the German Statistical Office, the *Statistisches Bundesamt*.

[4] The growth rates in the years before were (from 2005 on): 2005: +0.8 %, 2006: +3.4 %, 2007: +2.7 %, 2008: +1.0 %.

Between 2009 and 2010 the number of unemployed persons decreased from 3.2 Mio persons to 2.9 Mio persons. These results also confirm the relatively good performance of the German economy during the economic crisis between about 2007 and 2009 (2010).

The paper is organized as follows. After describing the methodical and data framework in Chapter 2, which includes the choice of inequality and poverty indicator as well as the choice of welfare variable, the issue of equivalence scales, and the description of the database, in Chapter 3 corresponding empirical findings for Germany 1995-2009 are presented. This comprises basic calculations, the differences between variable and constant equivalence scales, different inequality and poverty indicators, and the confrontation of the concepts of monthly versus yearly household net incomes. Chapter 4 exemplarily uses the findings of Chapter 3, generated by the new approach for measuring (income) inequality and poverty, with respect to structural aspects of the German income distribution. Finally, concluding remarks are the topic of Chapter 5.

2. Methodical and data framework

In this section the used inequality and poverty indicators are presented (Section 2.1) as well as the relevant welfare variable (Section 2.2). Furthermore, the difference between the usage of variable versus constant equivalence scales in distributional analyses is discussed (Section 2.3). Last but not least in Section 2.4 the database of this paper – the German Socioeconomic Panel (GSOEP) – is described.

2.1 Inequality and poverty indicators

a) Inequality

For sensitivity analyses the usage of a general class of inequality indicators is convenient. A very popular class of indicators is the family of Generalized Entropy (GE) measures (in which groups' population shares serve as weighting factors as well as groups' income shares):

(1) $$GE = \frac{1}{(\lambda^2 - \lambda)\cdot n} \cdot \sum_{i=1}^{n}\left[\left(\frac{Y_i}{\mu}\right)^{\lambda} - 1\right] \qquad \text{for } \lambda \neq 0 \wedge \lambda \neq 1;$$

$$GE = \frac{1}{n} \cdot \sum_{i=1}^{n} \ln\left(\frac{\mu}{Y_i}\right) \qquad \text{for } \lambda = 0;$$

$$GE = \frac{1}{n} \cdot \sum_{i=1}^{n}\left[\frac{Y_i}{\mu} \cdot \ln\left(\frac{Y_i}{\mu}\right)\right] \qquad \text{for } \lambda = 1$$

[GE = General Entropy index, λ = parameter with respect to inequality preferences, n = population size, Y_i = income of person i, μ = mean income].

The parameter λ reflects the social perceptions of inequality. If λ is greater than 0, the upper income area receives a relatively high weight with respect to inequality (increasingly with higher λ-values at that). The opposite is the case if λ is less 0. For λ = 0 the GE measure represents the mean logarithmic deviation, for λ = 1 Theil's measure of entropy is the result,

and for λ = 2 the GE measure corresponds with the normalized coefficient of variation (= half the square of the coefficient of variation).[5]

In the following I will primarily focus on the normalized coefficient of variation, but, for sensitivity purposes, I will also examine the inequality effects of the two other GE indicators mentioned.

b) Poverty

In the context of poverty I will rely on popular poverty indices which can be decomposed into K group-specific values what is a prerequisite for applying the decomposition approach sketched below:

(2a) the headcount ratio: $H = \frac{p}{n}$,

(2b) the poverty gap ratio: $I = \frac{Z - \mu_p}{Z} = 1 - \frac{\mu_p}{Z}$, and

(2c) Foster, Greer, and Thorbecke's (FGT) indicator: $P_{FGT}(\beta) = \frac{1}{n} \cdot \sum_{o=1}^{p} \left[\frac{(Z - Y_o)}{Z} \right]^{ß}$, ß > 0,[6]

[p: number of poor people, n: population's number, Z: poverty line, μ_p: poor persons' mean income, Y_o: poor person's income, ß: sensitivity parameter in the sense of poverty aversion].

2.2 Welfare variable

The analysis of individual welfare either rests upon individual resources (like income, wealth, or consumption[7]) or upon individual circumstances (concerning nutrition, clothing, habitation, health, education, transportation, communication, legal protection, etc.). Ultimately, both approaches represent individual, non-measurable utility. Despite the fact that the latter approach has received a lot of attention in the recent past – not least since Sen's much-noticed capability approach[8] –, I will analyse welfare only on the basis of resources. In this context I will concentrate myself on income inequality since income is a suitable predictor for other welfare categories.[9]

Typically, income analyses are grounded on household net incomes. The reason for this is that this concept includes transfers and tax payments, and thus it represents individual well-

[5] A more comprehensive consideration of the class of GE measures can be found in Faik 1995, pp. 326-330, which is primarily based on Cowell 1980, Shorrocks 1980, Mookherjee and Shorrocks 1982, and Jenkins 1991; see also Faik 2010a, pp. 6-14.
[6] For a more intensive consideration of these indicators see e. g. Faik 1995, pp. 317-321.
[7] See e. g. Faik 1995, pp. 36-39.
[8] See Sen 1999.
[9] This was even recognized by Townsend 1979, an apologist of a multidimensional welfare concept based on circumstances.

being much better than e. g. gross incomes. In order to compare incomes for different household types, the household net incomes must be divided by "normalizing" values called equivalence scales (see the following considerations in Section 2.3). The resulting variable is named as equivalent household net income. Since individuals and not households achieve well-being,[10] the equivalent household net incomes are weighted by the number of persons in each household.[11]

2.3 Variable equivalence scales

a) Inequality

Since the millennium a lot of studies have discussed aspects of the German personal distribution of equivalent incomes.[12] Typically, these studies only utilized a single equivalence scale in order to adjust the different incomes for household size and household structure effects. Explicit exceptions are Biewen (2000), Becker and Hauser (2004), and Faik (2008). While Biewen and Becker and Hauser based their calculations on only two alternative scales, Faik applied – like Faik (1995) and in principle with the international studies of Coulter, Cowell, and Jenkins (1992), Figini (1998), Cowell and Mercader-Prats (1999), Lancaster, Ray, and Valenzuela (1999), Creedy and Sleemann (2004), and Bönke and Schröder (2008) – a broad set of equivalence scales derived from the Buhmann et al. scale formula.

None of these studies used (reference) income-dependent, variable equivalence scales for distributional purposes, although there are good reasons for basing distributional analyses on such flexible equivalence scales. It might be argued, for example, that in the higher income ranges the reference consumption levels (e. g. concerning accommodation costs) would be fairly high so that a new household member's appearance (e. g. the "adding" of a child) would increase in a relative sense the corresponding costs only slightly, and this would culminate in low *relative* costs, that is flat equivalence scales for larger households in the upper income range compared with the lower incomes. Another reason for variable scales might be that prices of commodities can differ from each other across income groups such that members of the upper income classes obtain price advantages.[13] Furthermore, credit constraints for households in the bottom income range may shift the consumption bundles of these households towards lower expenditure shares of durables which are connected with relatively high economies of scale.[14]

In the context of utility-based, microeconomic estimations of equivalence scales especially two methods for functionalizing an equivalence scale by a reference income level exist: the Barten und the Translating approach.[15]

In Barten's approach[16] it is assumed that higher good-specific scale values m_j represent higher household needs for the corresponding good compared with the reference household

[10] See e. g. Faik 2008, p. 23.
[11] Bönke and Schröder 2008 applied an alternative weighting, the so-called needs-related weighting, i. e. weighting of equivalent incomes by equivalence scale values. In my eyes, this alternative weighting is (concerning the question of well-being receivers) intuitively less plausible than the weighting of incomes by the number of persons.
[12] For an overview see Faik 2010b, p. 8.
[13] See Schröder 2004, p. 42.
[14] See Koulovatianos, Schröder, and Schmidt 2005, p. 969. See also Faik 2010a, p. 23.
[15] Concerning both approaches see Faik 1995, Section 2.4 and Section 3.5. By the way, a synthesis of Barten's and Translating approach stems from Gorman 1976.
[16] See Barten 1964.

type. Thus, the normalized good-specific quantities q_j / m_j (j = 1, 2, …, n) in the direct utility function have the same amount for the different household types:

(3) $$u = u\left[\frac{q_1}{m_1}, \frac{q_2}{m_2}, \ldots, \frac{q_n}{m_n}\right].$$

The socio-demographic standardizations of the Translating approach result from subtractions of socio-demographically functionalized quantity elements l_j from the overall consumption quantities q_j (j = 1, 2, …, n):

(4) $$u = u[q_1 - l_1, q_2 - l_2, \ldots, q_n - l_n].$$

Unlike Barten's approach, the Translating approach can describe a situation in which the reference household does not buy a special good in contrast to other households.[17]

Faik (1995), Schröder (2004), and Koulovatianos, Schröder, and Schmidt (2005) estimated variable equivalence scales for Germany.[18] Their results were in accordance with the arguments presented above – in the sense that lower equivalence scale values were computed in the upper income range compared with the bottom income area.[19] While my equivalence scales in Faik (1995) were generated by econometric, expenditure-based methods, the results of the other studies made use of survey methods.[20]

The incorporation of variable equivalence scales into distributional studies is, generally, confronted with the initial problem of separating the upper from the bottom (and the middle) range of equivalent incomes. In order to do this, we might assume a concrete equivalence scale for the whole income range as a starting point which would be a normative decision.[21] To some degree this normative problem can be circumvented by a "decomposition approach" which – for the field of poverty – was outlined in Faik (2011b).

I will apply this approach in the following. In this context I will assume three income areas: a bottom, a middle, and an upper income area. These income areas will be *separately* generated for each household type so that no *overall* equivalence scale must be specified. My proceeding, which means an orientation of welfare levels only on the behaviour of one's *own* group of households, is based on socio-psychological approaches like Festinger's theory of social comparisons which suggest that people compare themselves with similar people.[22]

Especially, that means that people do not have (or do not want to have) complete information on society's entire income situation. Since such welfare comparisons refer to *household* incomes and since households are (very) different with respect to size and composition, it seems to be a Herculean task for each individual to consider all these aspects in the context

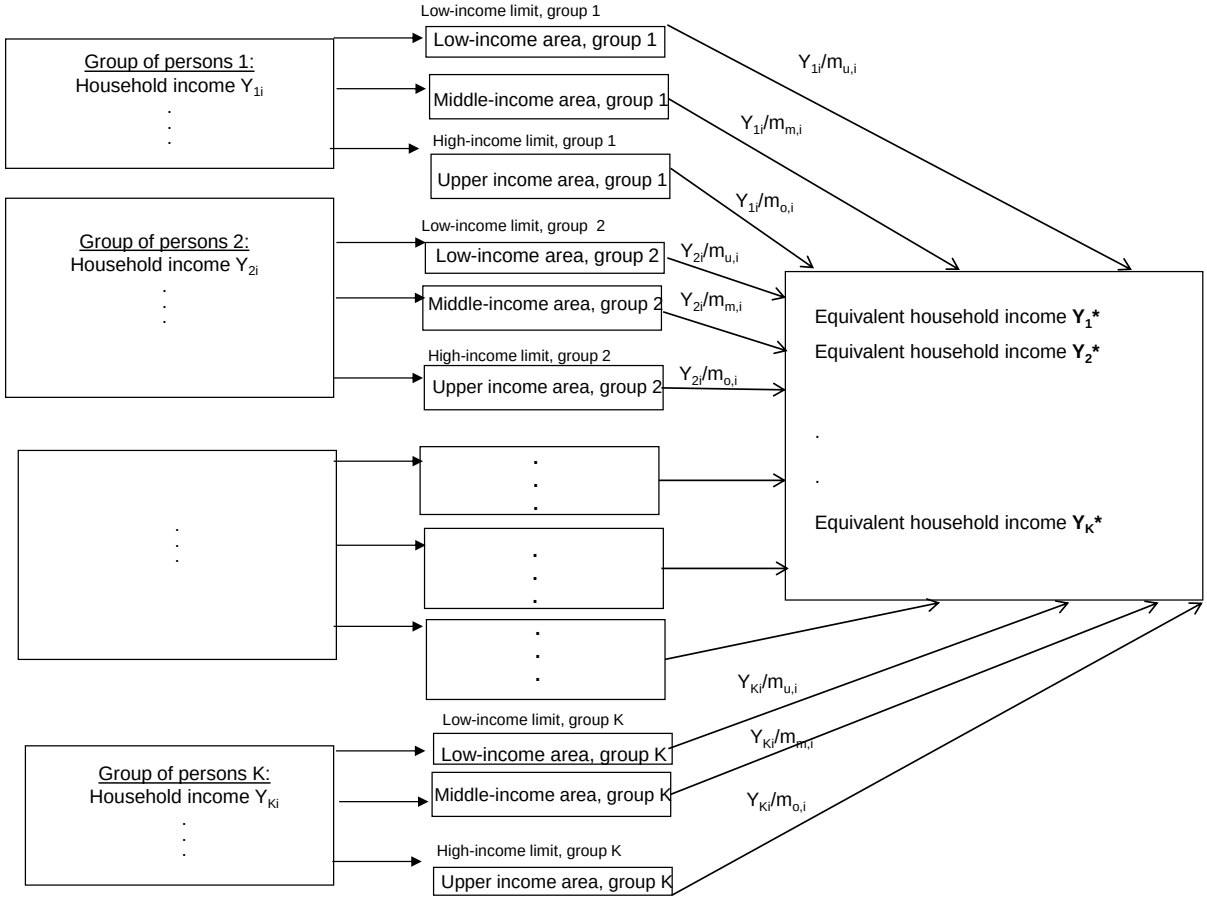
[17] See Bradbury 1992, pp.15-16.
[18] Concerning the estimation of variable equivalence scales see, additionally and among others, Fiegehen, Lansley, and Smith 1977, pp. 105-106, van Hoa 1986, pp. 97-98, Aaberge and Melby 1998, or Donaldson and Pendakur 2003, especially pp. 194-197.
[19] Obviously, the definition of variable equivalence scales used in this paper refers to income areas in the sense of discrete variables, and not to incomes in the sense of (quasi-)continuous variables (i. e.: on principle unlike Barten's or Translating approach).
[20] For an overview about the corresponding results see Koulovatianos, Schröder, and Schmidt 2005, p. 991.
[21] See Faik 1995, pp. 286-287.
[22] See Festinger 1954.

of his/her welfare rankings. In my opinion, it is rather much easier for individuals to compare themselves with household types which are similar to their own type. This implies a kind of bounded rationality.[23] As a consequence and as was already mentioned above, my proceeding is based on an orientation of welfare levels only on the behaviour of one's *own* group of households.[24] A number of empirical findings point towards this direction.[25]

According to the idea of variable equivalence scales, the scale values in the low-income area are highest and those in the upper income area are lowest, i. e.: The income values in the low-income area are divided by higher scale values than the incomes in the middle and in the upper income area (see Figure 1).

[23] Concerning this issue see e. g. Simon 1957 or Leibenstein 1976.
[24] With respect to the issue of reference groups in distributional analyses see e. g. Amiel and Cowell 1999, pp. 2-6.
[25] See e. g. Clark and Oswald 1996, or Frey and Stutzer 2002, pp. 88-90.

Figure 1: A decomposition approach for measuring income inequality



Y_{ki}: income of unit of analysis i in group k (k = 1, 2, …, K), m_u = equivalence scale value in the bottom income area, m_m = equivalence scale value in the middle-income area, m_o = equivalence scale value in the upper income area; $m_u > m_m > m_o$; $\mathbf{Y_k}^*$: vector of equivalent household incomes within group k (k = 1, 2, …, K)

Source: Present author's own illustration

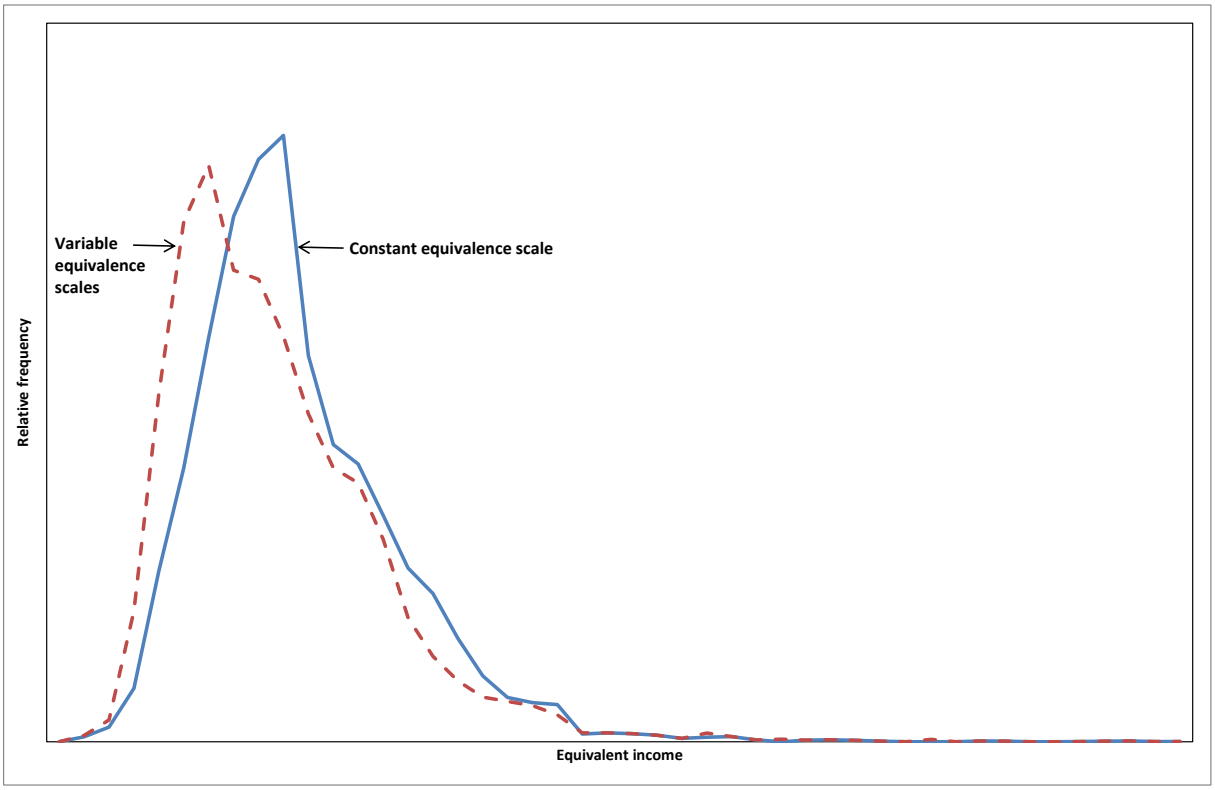
If variable equivalence scales with lower values on the equivalence scale are used for the upper income area, the differences of the equivalent incomes between the bottom and the upper income classes become larger than they would be without using variable equivalence scales. Thus, the measured inequality would probably increase.

Figures 2a and 2b compare the application of variable equivalence scales with the alternative method which uses income-independent, constant equivalence scales. It becomes evident that for the given distributions both are right-skewed in the two Figures (which is in accordance with a huge number of empirical facts).

In Figure 2a the overall equivalence scale in the income-independent case is set to the same level as in the upper income area in the case with variable equivalence scales. This congruence leads to more inequality because of a more right-skewed income distribution in the latter variant of measuring inequality. The reason for this result is that in the variant with variable equivalence scales the incomes of multi-person households in the lower income area are diminished by higher scale values than in the variant with constant equivalence scales.

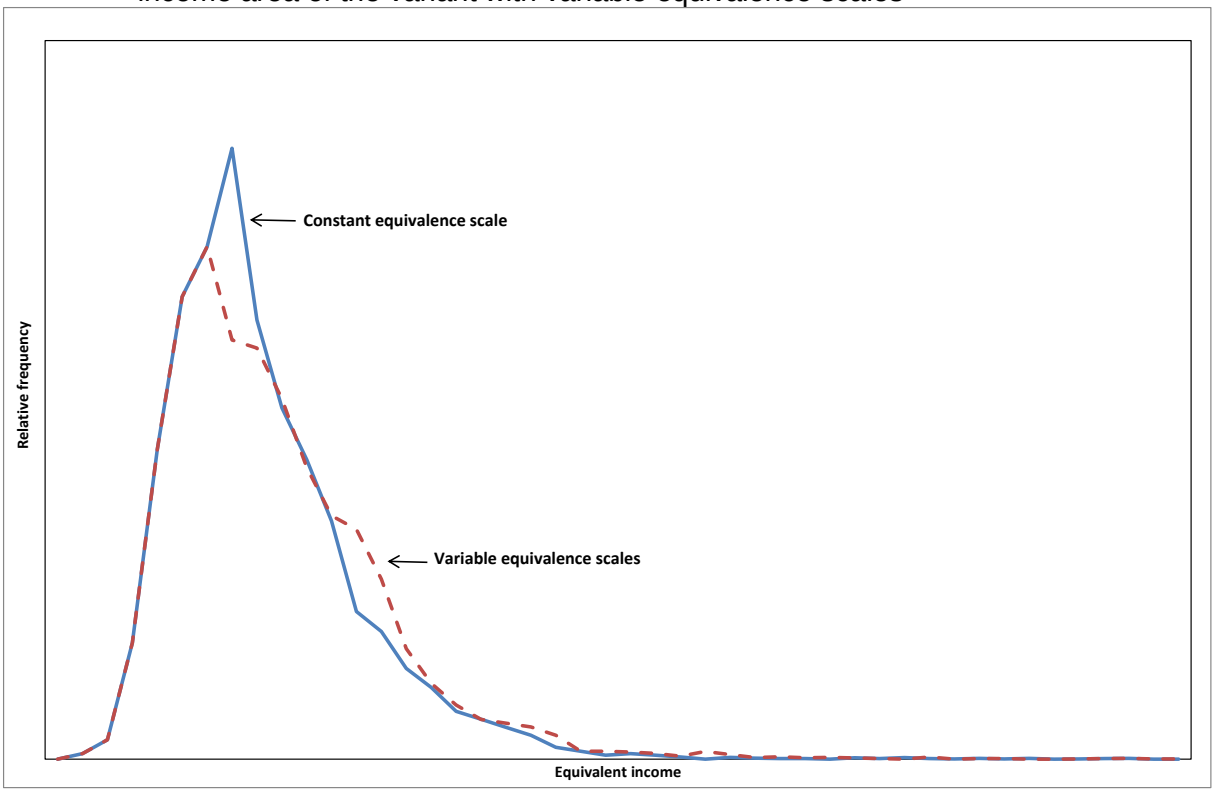
In Figure 2b an alternative assumption is made: The equivalence scales in the income-independent case and in the lower income area of the variant with variable equivalence scales shall equal each other. This corresponds with higher equivalent incomes of the multi-person households in the upper income area in the case with variable equivalence scales and generates a higher degree of income dispersion.

Figure 2a: Constant versus variable equivalence scales
and their impact on the distribution of income – idealized illustration,
same scale values both in the income-independent case and in the upper income area of the variant with variable equivalence scales



Source: Present author's own illustration

Figure 2b: Constant versus variable equivalence scales
and their impact on the distribution of income – idealized illustration,
same scale values both in the income-independent case and in the lower income area of the variant with variable equivalence scales



Source: Present author's own illustration

b) Poverty

Furthermore and traditionally, poverty studies also refer to (reference) income-independent, constant equivalence scale values which are applied to the entire income distribution, although there are good reasons for basing distributional analyses on variable equivalence scales which means different equivalence scale values for the various income areas – as already mentioned above.

According to my regression results on the basis of the Functionalized Extended Linear Expenditure System (FELES) in Faik (2011b), there seems to be an empirically based low-income limit at 70 percent of single-person households' mean net incomes. Alternatively, in the following the poverty line will be fixed at 50 percent of single-person households' mean net incomes; this approximately corresponds to the level of social-assistance payments to single-person households in Germany.[26] For multi-person households,[27] the low-income

[26] The percentage value stated above (50 %) is based on calculations of Becker and Hauser 2009, p. 223.

[27] The calculations of the paper are restricted to single- to six-person households since the number of cases for household sizes with seven and more persons is too low for statistical reasons, as can be seen by Table A.1 in the Appendix.

limits are computed on the basis of the (approximate) old OECD scale, i. e.: on the basis of θ = 0.8 (in the Buhmann et al. formula[28]) since this approximation also corresponds to German regulations on social assistance fairly well (in this case for multi-person households).[29]

Figure 3 illustrates the analytical framework of the decomposition approach in the field of poverty.[30] It becomes evident that for each group of persons separate poverty lines are relevant. Persons, whose (unadjusted) incomes are below their group-specific poverty lines, are counted as poor persons. Thus, within each of the K groups a group-specific level of poverty is calculated. In a next step, these group-specific poverty levels are summed up to the overall amount of poverty.[31]

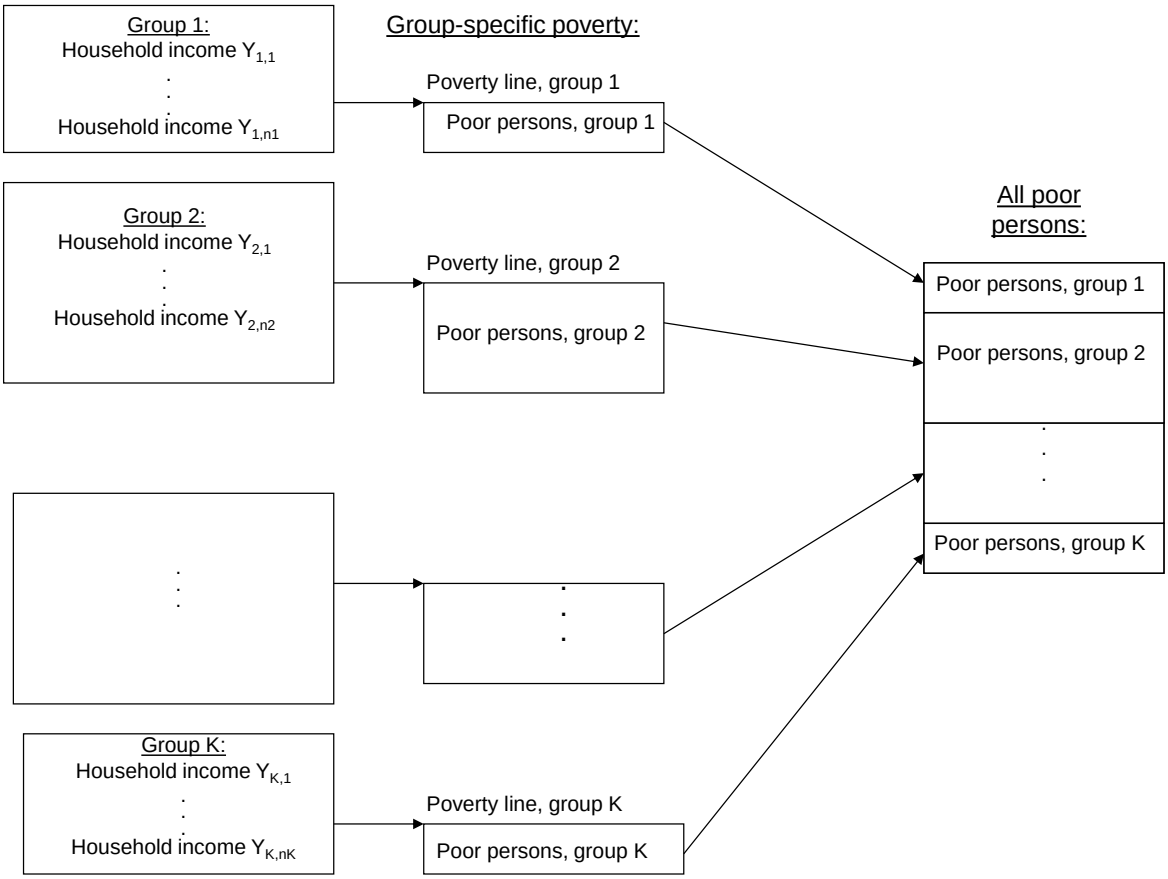
Figure 3: The decomposition approach of poverty measurement

[28] Buhmann et al.'s very prominent general equivalence scale formula only depends on household size: $m_h = S^\theta \quad (0 \le \theta \le 1)$; see Buhmann et al. 1988, p. 119. The symbols have the following meaning: m_h is the abbreviation for the equivalence scale value of household type h (with respect to the reference household type, in this case a single-person household), S represents household size, and θ is the elasticity of the equivalence scale with regard to household size, and therefore it also reflects the degree of economies of scale. The extreme cases θ = 0.0 and θ = 1.0 correspond with a per-household and with a per-capita scaling of household incomes.

[29] With respect to this issue see Faik 1997.

[30] Obviously, Figure 3 is an extract of Figure 1 with a more detailed illustration of the low-income area.

[31] For illustrative purposes, in Figure 3 exclusively *cases* are depicted (by the way, the same was valid concerning Figure 1). On principle, it is also possible to refer e. g. to the income levels of poor persons by considering the incomes of poor persons within the several groups in order to consider other aspects of poverty like the so-called poverty gap.



Please note: In each of the K groups there are n_k units of analysis (k = 1, 2, …, K); Y: household income.

Source: Faik 2011b, p. 300

2.4 The database

The database used in this paper is from the German Socio-Economic Panel (GSOEP) for the years 1995 to 2009; the most recent GSOEP – conducted in 2010 – is not yet available for scientific purposes. The GSOEP is collected since 1984 in yearly intervals. It comprises roughly between 5,000 and 10,000 households and currently more than 30,000 persons. The participants of the surveys give detailed information on their incomes, household composition, earnings' and family's biographies, health, life satisfaction, etc.[32]

In order to capture population's dynamics adequately, a lot of subsamples have been drawn over time. As a consequence, the GSOEP consists of the following eight samples:

- *Sample A:* German households in the Federal Republic of Germany since 1984,
- *Sample B:* households of foreigners in the Federal Republic of Germany since 1984,
- *Sample C:* private households in eastern Germany (German Democratic Republic) since 1990,

[32] See Frick and Krell 2009, p. 11.

- *Sample D:* households of immigrants in Germany since 1994/1995,
- *Sample E:* complementary sample of households in Germany since 1998,
- *Sample F:* complementary sample of households in Germany since 2000,
- *Sample G:* sample of high-income receivers (households) in Germany since 2002, and
- *Sample H:* complementary sample of households in Germany since 2006.

The GSOEP contains income information in two central variables: Monthly household income of the current year and yearly household income of the previous year. For the latter variable, the query is retrospective. With regard to the monthly income the respondents are interviewed during one month; since 1995 these interviews contain the most important income elements (like earnings, capital gains, transfers, etc.).

Until 1995 there was only a global query concerning monthly household net income. Because of this – and because of the fairly overcoming of great economic distortions in eastern Germany in the mid-1990s, approximately five years after German (re-)unification – the analysis of this paper starts with the year 1995. In contrast to the yearly income of the previous year, the monthly income of the current year does not comprise imputed rents.[33]

Nevertheless, I decided to primarily use the monthly, current household net income in my analyses below instead of the yearly, retrospective household net income. The main reason for this decision was that the corresponding current income levels are “fresh” in memories of interviewees so that the information on monthly income appears more precise than that on yearly, retrospective income.

[33] See Goebel et al. 2008, pp. 86-101.

3. Empirical findings for Germany 1995-2009 on the basis of a new method for measuring inequality and poverty

The empirical findings for Germany 1995-2009 presented in this chapter are divided into three sections: Section 3.1 contrasts results generated by constant equivalent scales with results yielded by variable equivalence scales, Section 3.2 analyses the sensitivity effects of different inequality and poverty indicators, and Section 3.3 focuses on the differences between current monthly income and yearly income of the previous year.

3.1 Constant versus variable equivalence scales

a) Inequality

As was mentioned in Section 2.3, in my following analyses with regard to variable equivalence scales I divide the whole income range into three areas, the bottom, the middle, and the upper income class. According to my regression results on the basis of the Functionalized Extended Linear Expenditure System (FELES) in Faik (2011b), there seems to be an empirically based low-income line at 70 percent of single-person households' mean net incomes (as was mentioned in Section 2.3b). For multi-person households, the low-income limits are computed on the basis of the (approximate) old OECD scale, i. e.: on the basis of $\theta = 0.8$ (in the Buhmann et al. formula; see also Section 2.3b).

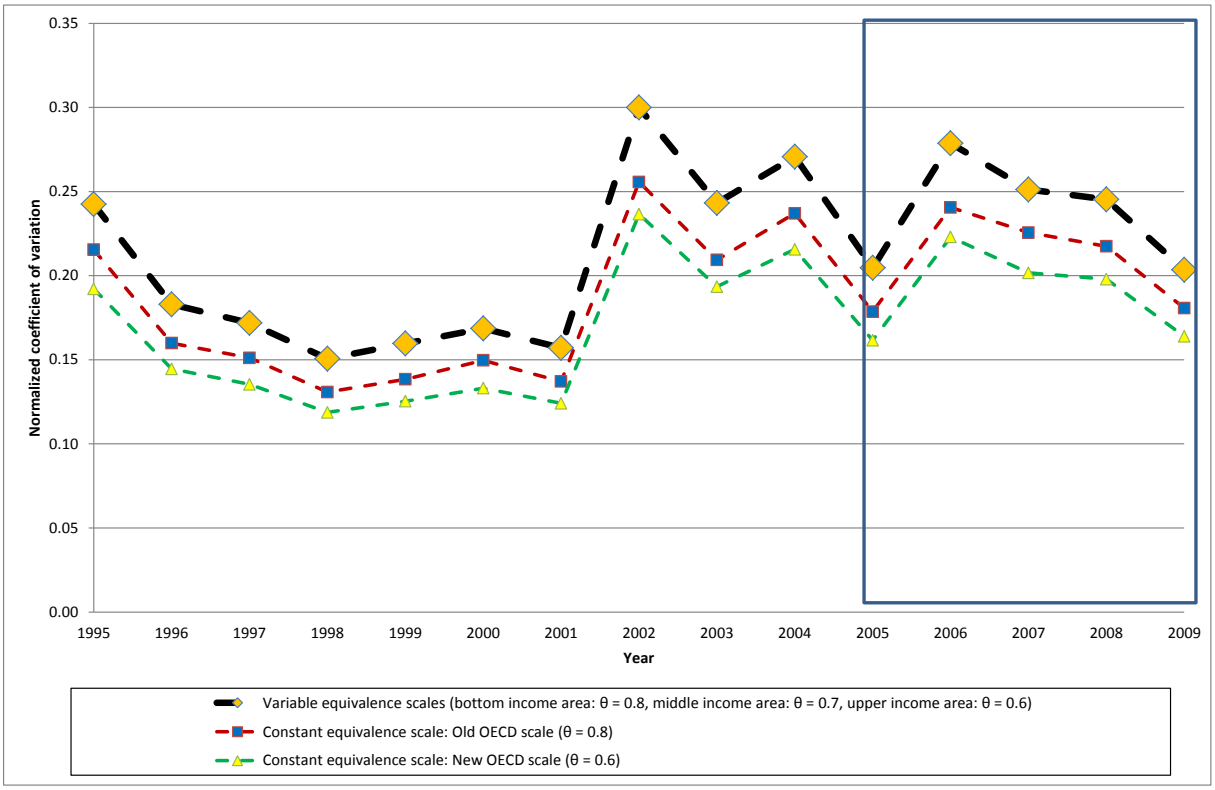
The widespread new OECD scale (i. e.: $\theta = 0.6$) is applied within the upper income area for computing the high-income limits of the multi-person households. In this context the basic high-income line, that for single-person households, is determined – in accordance with other studies[34] – as twice the arithmetic mean of single-person households' net incomes. For the middle-income area, a "medium scale" between old and new OECD scale is used, namely the Buhmann et al. scale with $\theta = 0.7$.

The basic inequality results for Germany 1995-2009, arising from the presented concept, are shown in Figure 4.[35] Between 1995 and 2001 the income inequality in Germany decreased by tendency, and since 2002 the measured income inequality has been at a higher level of the normalized coefficient of variation than before. At least partly this seems to be the result of a sampling effect since for the transition from 2001 GSOEP to 2002 GSOEP high incomes were captured to a higher degree (by sample G; see Section 2.4). Because of the relatively large high-income sensitivity of the normalized coefficient of variation this sampling effect might explain at least part of the (measured) rise of inequality between 2001 and 2002. Moreover, the mentioned increase of income inequality might be partly caused by socio-economic developments in Germany at the beginning of the 21st century, e. g. by the increase of low-paid jobs or by a possible rise of individual incomes' homogamy (with respect to partner relationships in Germany).[36] Especially from 2006 to 2009 a tendency towards decreasing income inequality occurred in Germany as a whole. Perhaps (at least partly and by tendency) this was a reflection of the diminished unemployment rates in Germany during this period (reported in the introduction of this paper). With respect to the economic crisis 2007-2009 (2010) this means equalizing effects in Germany in front of and during crisis.

[34] See e. g. Grabka et al. 2007, pp. 60-61.
[35] The bootstrap estimates in Table A.2 in the Appendix give (strong) evidence to the thesis that my estimates of income inequality are statistically significant (at a 95-percent level of significance).
[36] See Faik 2011a, p. 24.

For the cases with constant equivalence scales, Figure 4 shows the same pattern of income inequality as in the case with variable equivalence scales but at lower inequality levels. Referring to the case with variable equivalence scales, the measured value differences of the normalized coefficients of variation are in the ranges of 11 to 17 percent (compared to the case with a constant equivalence scale and θ = 0.8) and of 24 to 27 percent (compared to the case with a constant equivalence scale and θ = 0.6).

Figure 4: Variable and constant equivalence scales in Germany as a whole 1995-2009
GSOEP on the basis of the normalized coefficient of variation
(Buhmann et al. scale, monthly equivalent household net income)



Source: Present author's own calculations

b) Poverty

Figure 5 shows higher headcount ratios in the framework of the decomposition approach compared to the conventional approach. The corresponding differences are between about five and approximately eight percentage points. The pattern of headcount ratios over time is nearly the same in both cases: At first, poverty decreased by tendency until the millennium. Thereafter, in the centre of the first decade of the 21st century, poverty increased. It must be

mentioned that this remarkable increase in poverty between 2001 and 2002 might result from a sampling effect – at least partly. As was mentioned above (in Section 2.4), in 2002 the GSOEP was filled up with high-income receivers which caused mean income's increases and thereby jumps in poverty lines.

Since 2006 again a tendency towards diminishing poverty has occurred. This latter tendency was much more pronounced by the decomposition than by the conventional approach. Interestingly, this means a tendency toward diminishing poverty – according to the headcount ratio as a poverty index – in Germany in front of and during crisis.

Figure 5: Headcount ratios in Germany 1995-2009 GSOEP based on the decomposition and on the conventional approach (Buhmann et al. scale with θ = 0.8, poverty lines: 50 percent of mean (equivalent or single-person households') net income)

Source: Present author's own calculations

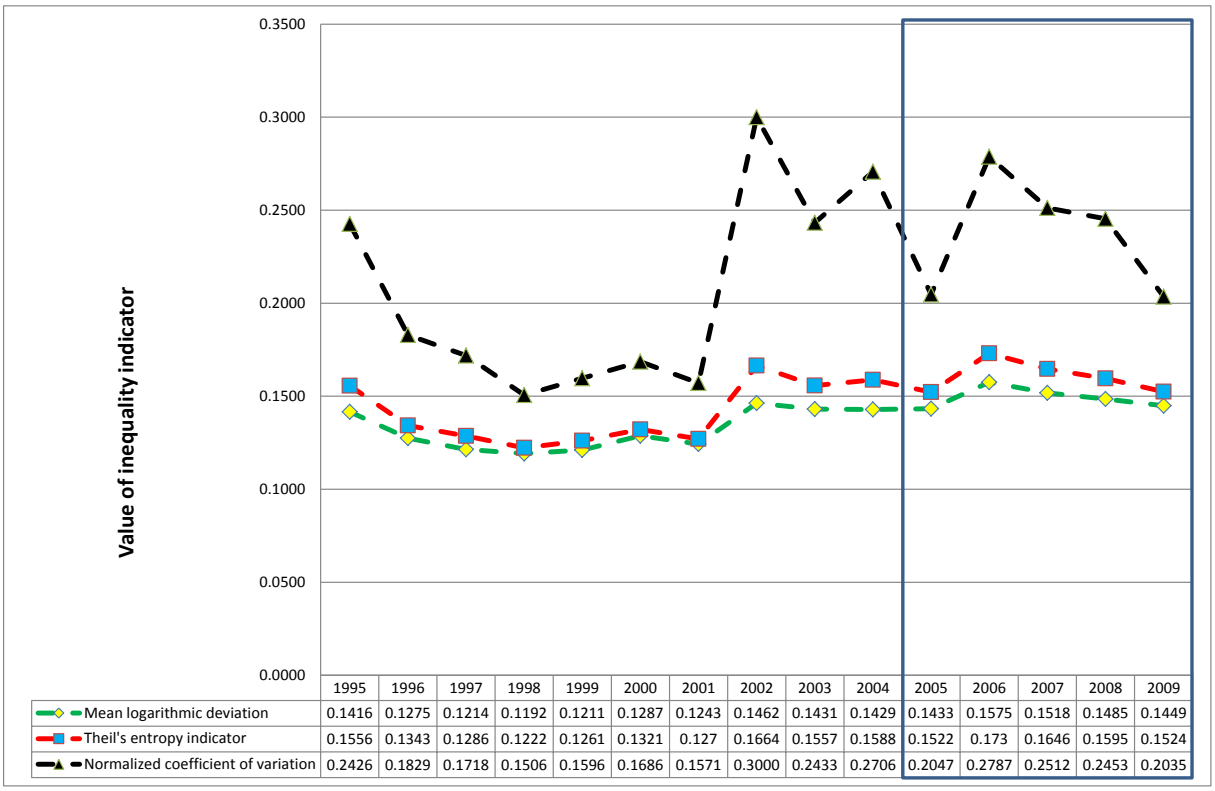
3.2 Different inequality and poverty measures

a) Inequality

Figure 6 shows the inequality consequences of different inequality measures (mean logarithmic deviation, Theil's measure of entropy, and normalized coefficient of variation) for Germany 1995-2009. As was mentioned in Section 2.1, these three inequality indicators disagree with respect to their sensitivity on changes within different income regions. Compared with the largely high-income sensitive normalized coefficient of variation, the mean logarithmic deviation and Theil's measure of entropy – both not as sensitive to changes in high-income regions as the normalized coefficient of variation – reveal a rather smoothed "inequality curve" over time.

Especially – and expectedly – this is true for the transition between 2001 and 2002, i. e.: during the period of time in which the GSOEP was filled up by high-income receivers. In the other years also, the tendencies towards decreasing income inequality stated above are confirmed by applying the alternative inequality indicators mean logarithmic deviation and Theil's measure of entropy.

Figure 6: Different inequality indicators, variable equivalence scales,
and their consequences for income inequality in Germany 1995-2009 GSOEP
(Buhmann et al. scale, monthly equivalent household net income)



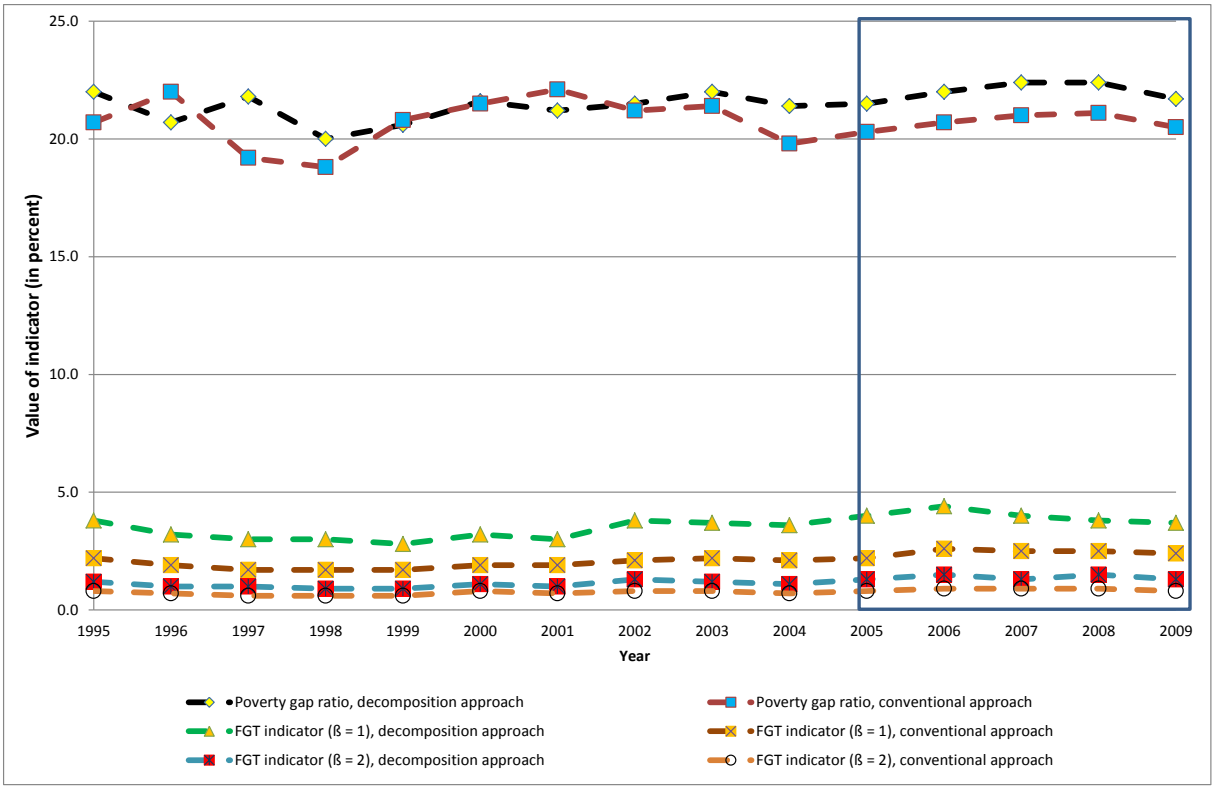
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Mean logarithmic deviation	0.1416	0.1275	0.1214	0.1192	0.1211	0.1287	0.1243	0.1462	0.1431	0.1429	0.1433	0.1575	0.1518	0.1485	0.1449
Theil's entropy indicator	0.1556	0.1343	0.1286	0.1222	0.1261	0.1321	0.127	0.1664	0.1557	0.1588	0.1522	0.173	0.1646	0.1595	0.1524
Normalized coefficient of variation	0.2426	0.1829	0.1718	0.1506	0.1596	0.1686	0.1571	0.3000	0.2433	0.2706	0.2047	0.2787	0.2512	0.2453	0.2035

Source: Present author's own calculations

b) Poverty

Similar to the headcount ratio, due to the indicator poverty gap ratio, the measured poverty was also higher – with three exceptions (1996, 1999, 2001) – within the context of the decomposition approach than within the framework of the conventional approach (see Figure 7). However, these differences were not very large. Continuously positive differences between decomposition and conventional approach became also evident in case of FGT indicators (ß = 1 and ß = 2). This is not very surprising since (in every year) both FGT indicators are based – at least widely – on the arithmetic product of headcount ratio and poverty gap ratio.

Figure 7: Poverty levels in Germany 1995-2009 GSOEP measured by different indicators: decomposition versus conventional approach (household net income, Buhmann et al. scale with θ = 0.8, fraction of 50 percent of mean (equivalent or single-person households') net income)



Source: Present author's own calculations

3.3 Current monthly income versus yearly income of the previous year[37]

a) Inequality

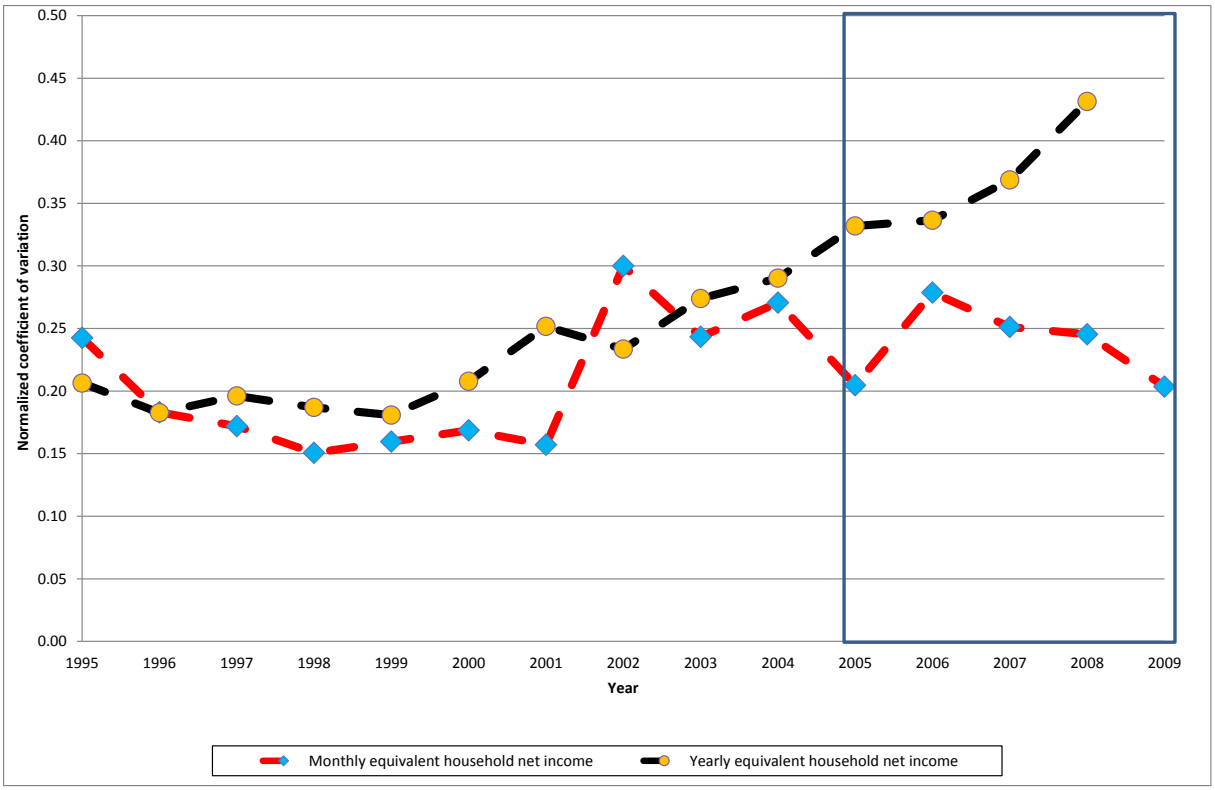
According to Figure 8 and in a qualitative sense, substantial inequality differences between the variant with current monthly incomes and the variant with yearly incomes of the previous year exist – especially in the periods since the millennium. While the concept of yearly income indicates an increase of income inequality since the beginning of the new century, the reference on monthly incomes shows a tendency towards diminishing income inequality at least since 2006.

Partly these divergences depend on methodical differences: E. g., imputed rents are not included in the definition of monthly household net incomes in contrast to yearly household net incomes (as was already mentioned in Section 2.4). Another methodical difference is the embedding of socio-demographic characteristics: In the case with monthly incomes socio-demographic characteristics belong to the same period of time as the variable "income", while in the other case both variables differ from each other by one year regarding

[37] Concerning this issue see e. g. Cantó, Gradin, and del Rio 2006.

chronological reference. Furthermore, the concept of monthly income does not include special payments like Christmas bonuses; this also contrasts to the concept of yearly income.

Figure 8: Different income definitions, variable equivalence scales, and their consequences for income inequality in Germany 1995-2009 GSOEP on the basis of the normalized coefficient of variation (Buhmann et al. scale)



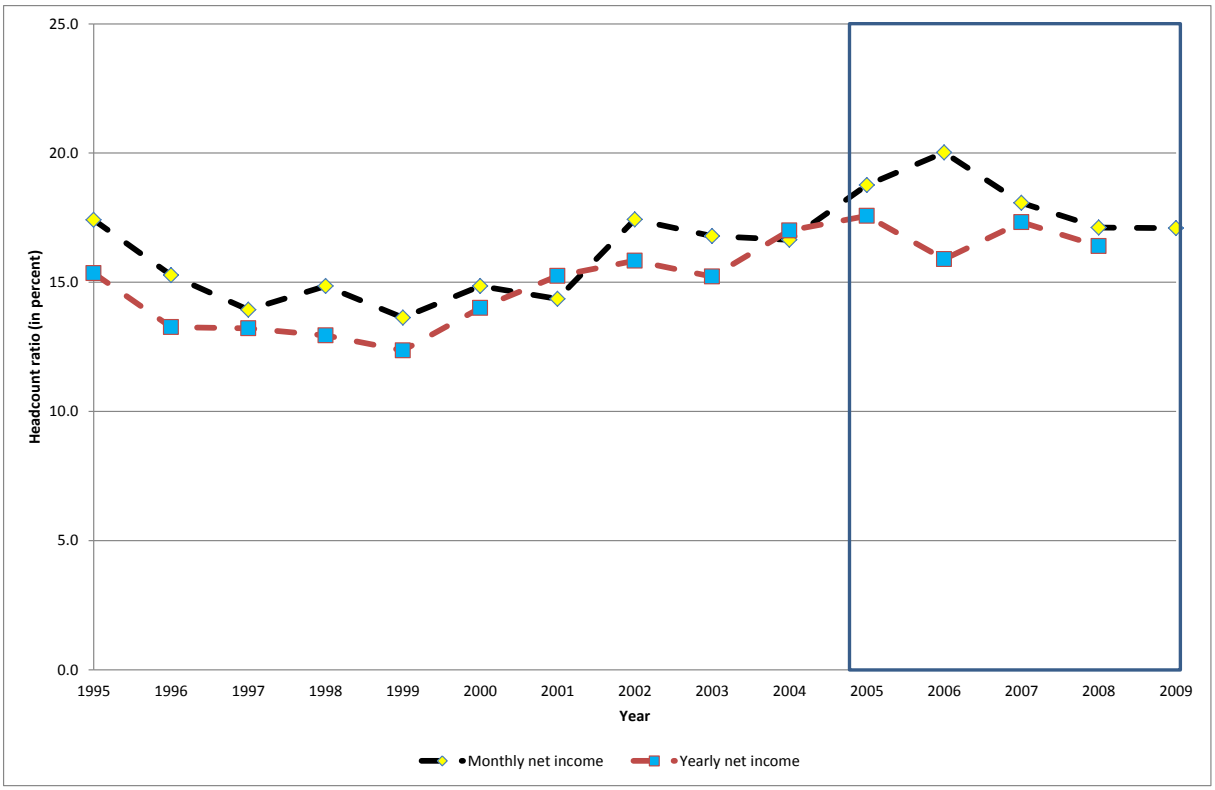
Source: Present author's own calculations

b) Poverty

According to Figure 9, with two exceptions (2001 and 2004), the "poverty curve" for monthly net income was above the corresponding curve for yearly, retrospective net income. In those years, but also in all other years, the differences between the headcount ratios of both income concepts were not very substantial; the maximum difference amounted to 4.1 percentage points in 2006. The largest difference nearest to this maximum was 2.1 percentage points in 1995 which indicates a relatively narrow range of values for the mentioned differences.

Furthermore, both “poverty curves” proceed nearly parallel to each other (at least when smoothing both curves). Thus, in the context of poverty, methodical differences between both income concepts seem to play no important role.

Figure 9: Different income definitions and their consequences for poverty in Germany 1995-2009 GSOEP on the basis of headcount ratios and of the decomposition approach (Buhmann et al. scale, θ = 0.8, fraction of mean single-person households' income = 0.5)



Source: Present author's own calculations

4. Applications of the new method for measuring inequality and poverty

One "natural" application of the alternative approach for measuring inequality and poverty proposed here is analysing the structure of the several income areas. In the following this will be realised – in a cross-sectional perspective – by processing binary logistical regressions and – in a longitudinal perspective – by computing transition matrices. In order to avoid the above sketched "bias" for the transition between 2001 and 2002 in the GSOEP the following calculations are based on 2002 GSOEP to 2009 GSOEP (and the most interesting time period in our context is 2005 GSOEP to 2009 GSOEP).

4.1 Binary logistical regressions for Germany 2002-2009

The descriptive findings of Chapter 3 are supplemented by a small binary logistical regression's model. In Table 1 it becomes evident that in that framework small households – defined as such with two persons at the maximum – have significant parameter values in all three areas with the expected negative algebraic sign in the low-income area and with

positive signs in the middle- and in the high-income area (which was expected as well). Furthermore, the estimates presented in Table 1 indicate significantly higher levels of well-being for German and for male household members as well as for persons living in western Germany. Additionally, the estimates show (at most) significantly higher levels of well-being for married persons and for very qualified persons compared with the corresponding reference groups.

Contrasting old household members ("60 years and older") and young household members ("until 29 years") against the reference (dummy) group "30-59 years", reveals that young and older persons have higher probabilities for being within the low-income area and lower likelihoods for being located within the middle- and within the high-income area.

Concerning the variable "unemployed" the parameter is strongly positive in the low-income area and strongly negative in the middle- and in the high-income area indicating – on average – a relatively low well-being level for unemployed persons in Germany 2002-2009. In front of and during the economic crisis – here i. e.: between 2005 and 2009 – the parameter of unemployed persons for belonging to the low-income area increased slightly, and their parameters for belonging to the middle- and the high-income area decreased by tendency. To some degree, we can conclude that the well-being position of unemployed persons in Germany was reduced directly before and during the economic crisis.

In the Appendix – in Table A.3 – binary logistical regressions only for the German population in working age (20-59 years) are presented. Compared to the results of Table 1, in many cases – especially in the low-income area – the parameter values of the corresponding regressions for the whole population are (as absolute values) strengthened. E. g., the parameter value for unemployed persons for being located in the low-income area increased from +1.965 to +2.070 in 2009. However, qualitatively, there are no divergences between the regressions for the two mentioned population groups.

Table 1: Binary logistical regression's parameters due to different income areas in Germany 2002-2009 (GSOEP) based on the "decomposition approach"

Covariates (0/1 dummies) and statistical information	Low-income area (dependent variable: "being a member of this income area", 0/1 dummy)							
	2002	2003	2004	2005	2006	2007	2008	2009
Absolute term	+0.145***	+0.136**	+0.349***	+0.574***	+0.467***	+1.467***	+1.149***	+1.276***
Living in western Germany	-0.572***	-0.580***	-0.590***	-0.651***	-0.584***	-0.632***	-0.619***	-0.606***
Male household member	-0.106***	-0.130***	-0.085***	-0.130***	-0.112***	-0.084***	-0.092***	-0.125***
German household member	-0.681***	-0.707***	-0.815***	-0.821***	-0.813***	-1.029***	-1.303***	-1.115***
Person living in a small household (not more than two persons)	-0.676***	-0.558***	-0.672***	-0.717***	-0.630***	-0.742***	-0.616***	-0.647***
Until 29 years	+0.643***	+0.698***	+0.652***	+0.610***	+0.631***	+0.435***	+0.398***	+0.426***
60 years and older	+0.320***	+0.238***	+0.208***	+0.189***	+0.195***	+0.209***	+0.234***	+0.239***
Unemployed household member[1)]	+1.617***	+1.557***	+1.668***	+1.829****	+1.794***	+1.832***	+1.843***	+1.965***
Married person	+0.526***	+0.497***	+0.411***	+0.364***	+0.398***	-0.028	-0.098***	-0.067*
Non-qualified person[2)]	+0.763***	+0.985***	+0.952***	+0.919***	+0.938***	+0.891***	+1.091***	+1.090***
Very qualified person[3)]	-1.424***	-1.439***	-1.387***	-1.333***	-1.354***	-1.495***	-1.389***	-1.409***
Number of observations (dependent dummy = 1)	11,329 persons	10,523 persons	10,214 persons	10,354 persons	11,097 persons	9,996 persons	8,887 persons	9,649 persons
Nagelkerke's coefficient of determination	0.148	0.150	0.164	0.174	0.163	0.196	0.178	0.187

(Table 1 continued:)

Covariates (0/1 dummies) and statistical information	Middle-income area (dependent variable: "being a member of this income area", 0/1 dummy)							
	2002	2003	2004	2005	2006	2007	2008	2009
Absolute term	-1.367***	-1.279***	-1.264***	-1.476***	-1.547***	-0.809***	-0.721***	-0.859***
Living in western Germany	+0.109***	+0.080***	+0.094***	+0.186***	+0.171***	+0.278***	+0.256***	+0.274***
Male household member	+0.027	+0.040**	+0.035	+0.057**	+0.037	+0.060**	+0.049*	+0.026***
German household member	+0.768***	+0.750***	+0.839***	+0.838***	+0.891***	+0.823***	+0.849***	+0.950***
Person living in a small household (not more than two persons)	+0.355***	+0.347***	+0.381***	+0.397***	+0.391***	+0.386***	+0.278***	+0.311***
Until 29 years	+0.067**	+0.003	-0.090***	-0.042	-0.077**	-0.437***	-0.387***	-0.438***
60 years and older	+0.002	+0.075**	+0.038	-0.003	+0.011	-0.088**	-0.106***	-0.107***
Unemployed household member[1)]	-0.895***	-0.896***	-1.031***	-1.161***	-1.123***	-1.532***	-1.553***	-1.677***
Married person	+0.518***	+0.516***	+0.427***	+0.510****	+0.460***	-0.024	+0.033	-0.004
Non-qualified person[2)]	-0.184*	-0.498***	-0.532***	-0.510***	-0.428***	-0.729***	-0.916***	-0.927***
Very qualified person[3)]	+0.556***	+0.584***	+0.438***	+0.550***	+0.590***	+0.376***	+0.288***	+0.352***
Number of observations (dependent dummy = 1)	16,261 persons	15,509 persons	15,048 persons	14,017 persons	14,702 persons	14,132 persons	13,679 persons	14,339 persons
Nagelkerke's coefficient	0.070	0.080	0.078	0.089	0.089	0.085	0.073	0.085

of determination								

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(Table 1 continued:)

Covariates (0/1 dummies) and statistical information	High-income area (dependent variable: "being a member of this income area", 0/1 dummy)							
	2002	2003	2004	2005	2006	2007	2008	2009
Absolute term	-6.015***	-6.240***	-6.031***	-6.459***	-6.106***	-5.591***	-5.590***	-5.715***
Living in western Germany	+1.455***	+1.501***	+1.565***	+1.537***	+1.501***	+1.399***	+1.510***	+1.453***
Male household member	+0.046	+0.012	-0.021	-0.060	-0.020	-0.017	+0.055	+0.056
German household member	+0.880***	+0.939***	+0.699***	+1.084***	+0.692***	+0.727***	+0.568***	+0.509***
Person living in a small household (not more than two persons)	+1.169***	+1.133***	+1.042***	+1.152***	+1.039***	+1.031***	+1.040***	+1.120***
Until 29 years	-0.013	+0.018	+0.060	-0.073	+0.058	-0.083	-0.208***	-0.120
60 years and older	0.426***	-0.336***	-0.227***	-0.256***	-0.300***	-0.302***	-0.317***	-0.361***
Unemployed household member[1)]	-1.324***	-1.377***	-1.315***	-1.740***	-1.420***	-1.742***	-2.284***	-2.323***
Married person	+0.540***	+0.463***	+0.491***	+0.440***	+0.594***	+0.297***	+0.284***	+0.364***
Non-qualified person[2)]	-1.957***	-0.933**	-0.824**	-0.843**	-1.439***	-0.959**	-1.036**	-1.049**
Very qualified person[3)]	+1.729***	+1.827***	+1.925***	+1.892***	+1.838***	+1.732***	+1.750***	+1.798***
Number of observations (dependent dummy = 1)	2,131 persons	1,755 persons	1,802 persons	1,600 persons	1,716 persons	1,744 persons	1,615 persons	1,571 persons
Nagelkerke's coefficient of determination	0.194	0.192	0.202	0.207	0.192	0.184	0.196	0.198

*: significant at 10-percent level; **: significant at 5-percent level; ***: significant at 1-percent level

[1)] unemployed and non-working, [2)] no school-leaving qualification achieved, [3)] university degree (or the like) achieved
Source: Present author's own calculations

4.2 Transition matrices for Germany 2002-2009

Behind all cross-sectional findings presented hitherto the longitudinal perspective is concealed. However, the consideration of temporal transitions between the different income areas is instructive to cover income dynamics. Thus, in Table 2 year-to-year transitions between 2002 and 2009 are reported.

I differentiate between five income classes with the corresponding income limits and equivalence scale "inflators" (expressed by Buhmann et al.'s θ):[38]

- "poverty area":]0; 0.5 times mean of single-person households' net incomes[and θ = 0.80,
- "low-income area": [0.5 times mean of single-person households' net incomes; 0.7 times mean of single-person households' net incomes[and θ = 0.75,
- "middle-income area": [0.7 times mean of single-person households' net incomes; 1.5 times mean of single-person households' net incomes[and θ = 0.70,
- "wealthiness area": [1.5 times mean of single-person households' net incomes; 2.0 times mean of single-person households' net incomes[and θ = 0.65,
- "richness area": [2.0 times mean of single-person households' net incomes; +∞[and θ = 0.60.

Especially the ups and downs out of and into the lower income areas appear interesting in our context.

In this sense the ups out of the poverty area into higher well-being regions were: 2002/2003: 34.8 %, 2003/2004: 29.5 %, 2004/2005: 26.3 %, 2005/2006: 25.8 %, 2006/2007: 30.5 %, 2007/2008: 30.8 %, 2008/2009: 25.8 %.

The ups of the low-income area were: 2002/2003: 28.4 %, 2003/2004: 26.1 %, 2004/2005: 22.6 %, 2005/2006: 26.9 %, 2006/2007: 30.8 %, 2007/2008: 25.5 %, 2008/2009: 24.6 %.

Furthermore, the following downs out of higher well-being regions into the poverty area were observed: 2002/2003: 19.5 %, 2003/2004: 17.6 %, 2004/2005: 23.4 %, 2005/2006: 22.4 %, 2006/2007: 18.4 %, 2007/2008: 19.1 %, 2008/2009: 18.2 %.

The downs into the low-income area were as follows: 2002/2003: 12.1 %, 2003/2004: 11.5 %, 2004/2005: 15.6 %, 2005/2006: 12.4 %, 2006/2007: 18.4 %, 2007/2008: 9.7 %, 2008/2009: 11.7 %.

In our context the ups and downs between 2007 and 2009 are particularly important. Concerning the ups, during this time period decreases of shares occurred, and concerning the downs into the poverty area a diminishment and with respect to the downs into the low-income area a (contrasting) increase were observed. Thus, we can (only) conclude that during crisis an upwards movement of the members of the low-income classes was difficult.

[38] The extension from three to five income areas was made to investigate transitions in more detail.

Table 2: Transition matrices in Germany 2002/03-2008/09 GSOEP based on the decomposition approach (monthly household net incomes)

Well-being position in period t	Well-being position in period t+1				
	PA	LIA	MIA	WA	RA
2002/2003:					
PA	65.2 %	24.1 %	10.0 %	0.2 %	0.5 %
LIA	15.2 %	56.4 %	28.0 %	0.2 %	0.2 %
MIA	3.0 %	9.4 %	82.0 %	4.1 %	1.5 %
WA	0.6 %	1.7 %	36.9 %	47.1 %	13.7 %
RA	0.7 %	1.0 %	11.7 %	19.2 %	67.3 %
2003/2004:					
PA	70.5 %	20.3 %	9.0 %	0.1 %	0.1 %
LIA	14.5 %	59.4 %	25.6 %	0.3 %	0.2 %
MIA	2.2 %	10.2 %	82.2 %	4.3 %	1.1 %
WA	0.1 %	0.9 %	34.7 %	46.3 %	18.0 %
RA	0.8 %	0.4 %	15.5 %	18.4 %	64.9 %
2004/2005:					
PA	73.8 %	20.3 %	5.7 %	0.1 %	0.2 %
LIA	18.1 %	59.3 %	22.2 %	0.3 %	0.1 %
MIA	3.2 %	12.1 %	80.0 %	3.6 %	1.2 %
WA	0.8 %	0.8 %	38.0 %	47.2 %	13.2 %
RA	1.3 %	2.7 %	13.9 %	17.8 %	64.3 %
2005/2006:					
PA	74.1 %	18.8 %	5.7 %	0.5 %	0.8 %
LIA	18.6 %	54.8 %	25.7 %	0.6 %	0.3 %
MIA	2.9 %	9.0 %	82.9 %	4.0 %	1.1 %
WA	0.4 %	2.0 %	30.7 %	51.1 %	15.8 %
RA	0.5 %	1.4 %	16.0 %	16.1 %	66.1 %
2006/2007:					
PA	69.5 %	21.5 %	8.5 %	0.3 %	0.2 %
LIA	12.5 %	56.7 %	30.2 %	0.4 %	0.2 %
MIA	2.3 %	8.6 %	84.6 %	3.6 %	1.0 %
WA	0.9 %	1.5 %	32.0 %	50.4 %	15.2 %
RA	2.7 %	1.4 %	12.0 %	15.7 %	68.0 %
2007/2008:					
PA	69.2 %	22.9 %	7.7 %	0.0 %	0.2 %
LIA	15.4 %	59.1 %	25.2 %	0.2 %	0.1 %
MIA	2.4 %	8.1 %	84.8 %	3.9 %	0.8 %
WA	0.3 %	1.5 %	28.4 %	51.7 %	18.1 %
RA	1.0 %	0.1 %	11.4 %	15.5 %	72.0 %
2008/2009:					
PA	74.2 %	16.0 %	9.0 %	0.5 %	0.3 %
LIA	15.3 %	60.1 %	24.3 %	0.3 %	0.0 %
MIA	2.3 %	9.6 %	83.2 %	3.9 %	1.0 %
WA	0.2 %	1.6 %	33.1 %	51.6 %	13.4 %
RA	0.4 %	0.5 %	10.6 %	20.0 %	68.5 %

t = 2002, 2003, 2004, 2005, 2006, 2007, 2008; t+1 = 2003, 2004, 2005, 2006, 2007, 2008, 2009; PA: poverty area, LIA: low-income area, MIA: middle-income area, WA: wealthiness area, RA: richness area

Source: Present author's own calculations

As can be seen by Table 2, there is – not unexpectedly – only small dynamics in the sense of movements from bottom income areas towards upper income areas. For instance, between

2008 and 2009 only about ten percent of persons moved upwards from the poverty area into the middle-income area or higher.

5. Subjective versus objective welfare in Germany 1995-2009

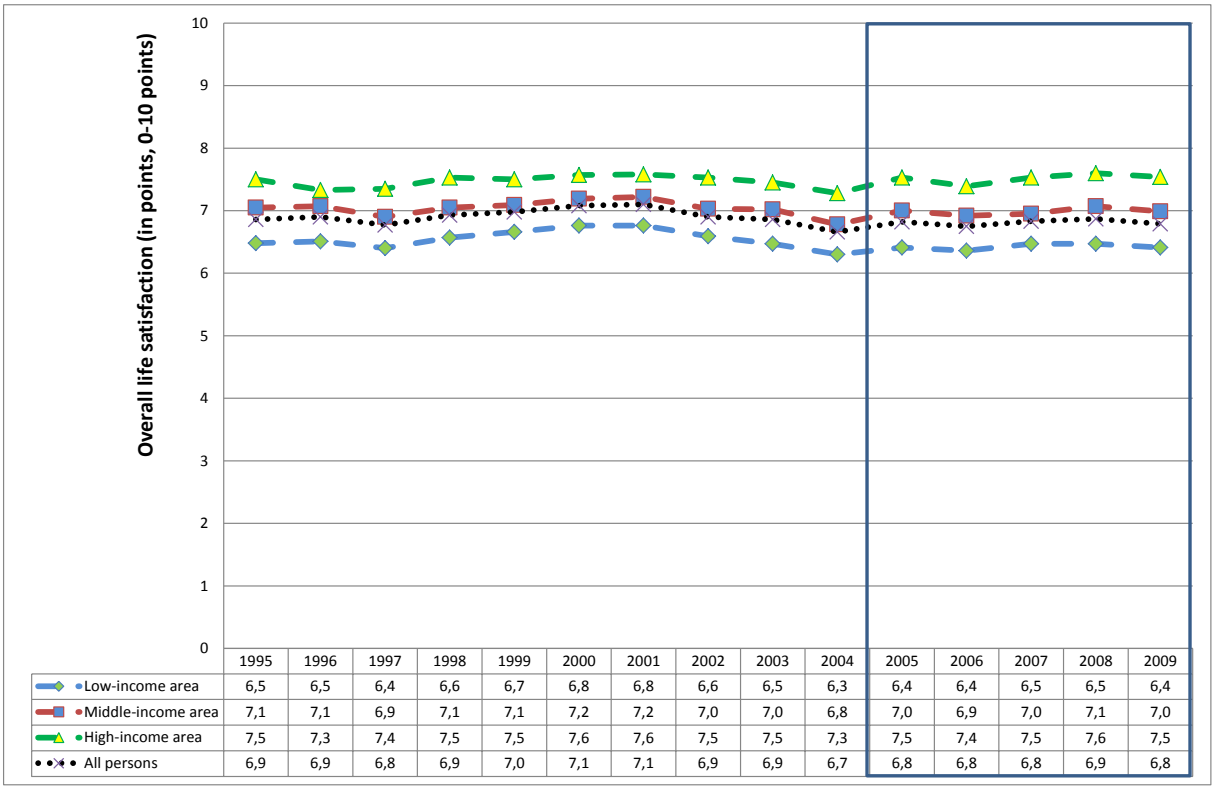
On the basis of the decomposition approach Figure 10 shows for three income areas mean life satisfactions (Germany 1995-2009). As expected, mean life satisfaction was highest in the high-income area and lowest in the low-income area in all observed years.

In the low-income area the means ranged – on a 11-points scale – between 6.30 points (2004) and 6.76 (2000 and 2001). In the middle-income area a range of values between 6.78 points (2004) and 7.22 points (2001) resulted, and in the high-income area the limits of values were 7.28 points (2004) and 7.60 points (2008). It is interesting that the maximum of the low-income area was below the minimum of the middle-income area; the same holds for the relationship between middle- and high-income areas. For all areas the minimum value was measured in 2004 so that the overall minimum was also observed in this year (with 6.7 points). The highest mean for the entire population was measured in 2001 (with 7.10 points; 2000: 7.08 points).

Since the end of the boom in the IT and in the communication line of business in 2001, in Germany a recession was observed until 2004. Thus, the reported minimum and maximum values of mean life satisfaction may have – at least to some degree – resulted from business cycle effects.

Moreover, Figure 10 reveals almost constant means between 2005 and 2009, indicating that the economic crisis at the end of the first decade of the 21st century had no (significant) effect on (mean) life satisfaction in Germany.

Figure 10: Mean life satisfaction within three income areas in Germany 1995-2009 (GSOEP) on the basis of the decomposition approach



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Low-income area	6,5	6,5	6,4	6,6	6,7	6,8	6,8	6,6	6,5	6,3	6,4	6,4	6,5	6,5	6,4
Middle-income area	7,1	7,1	6,9	7,1	7,1	7,2	7,2	7,0	7,0	6,8	7,0	6,9	7,0	7,1	7,0
High-income area	7,5	7,3	7,4	7,5	7,5	7,6	7,6	7,5	7,5	7,3	7,5	7,4	7,5	7,6	7,5
All persons	6,9	6,9	6,8	6,9	7,0	7,1	7,1	6,9	6,9	6,7	6,8	6,8	6,8	6,9	6,8

Source: Present author's own calculations

6. Concluding remarks

The findings of the paper revealed – in a methodological sense – the sensitivity of distributional results due to different methodical settings. My empirical findings showed, e. g., higher inequality and poverty levels in the context of the decomposition approach compared with the conventional approach of poverty measurement.

Socio-demographic examples were added to the afore-mentioned sensitivity analyses which were also based on the new approach for measuring income inequality (with variable equivalence scales). E. g., binary logistical regression's estimations (at most) significantly revealed different likelihoods for the several social groups for being located within the three income areas considered in this paper (low-income, middle-income, and high-income area).

Because of the normativity of the measurement of income inequality sensitivity analyses are helpful to structure judgements in this field of research. In this context there are good reasons for the usage of variable equivalence scales. Such welfare elements should be applied in distributional studies, as was done in this paper.[39] In future research the concept presented here might be refined e. g. in the direction of more than three income areas and towards socio-demographic specifications in greater depth.

Macroeconomic indicators showed that the German economy has handled the economic crisis at the end of the first decade of the 21st century relatively well. E. g., there was only a weak increase in the number of unemployed persons in Germany between 2008 and 2009 (despite a notable reduction of the real German gross domestic product).

Microeconomic considerations also confirmed – in detail – that the mentioned crisis had only slight economic effects in Germany: Inequality of (monthly) incomes decreased as well as income poverty did.[40]

Furthermore, the mean life satisfaction remained unaffected by the crisis.

I only found a few indications for distributional effects of the crisis: The well-being position of unemployed persons became worsened, and the relative number of upwards movements out of lower income areas into higher well-being classes decreased.

All in all, for Germany I have not found a large and notable influence of the economic crisis at the end of the first decade of the 21st century on important macroeconomic variables like the general number of unemployed persons as well as on microeconomic, distributional variables in the fields of inequality and poverty measurement.

[39] With respect to a rather cursory application see Faik 2010b.

[40] Obviously, the opposite effect of increasing inequality of yearly incomes is not fully generated by the crisis since this increase already started in 2002, i. e. a long time before the beginning of the crisis; additionally and unfortunately, the available data for yearly incomes end in 2008, i. e. one year before the peak of the crisis.

Appendix

Table A.1: Unweighted number of households in Germany 1995-2009 GSOEP due to household size

Year	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	8 persons and more	Sum
1995	1,443	2,121	1,431	1,250	392	99	36	20	6,792
1996	1,466	2,138	1,378	1,215	366	99	36	16	6,714
1997	1,442	2,194	1,332	1,182	364	85	33	17	6,649
1998	1,735	2,478	1,441	1,258	341	100	34	13	7,400
1999	1,692	2,470	1,356	1,193	340	94	31	11	7,187
2000	3,260	4,336	2,195	1,958	615	151	39	18	12,572
2001	2,943	3,999	1,990	1,788	579	130	39	13	11,481
2002	2,970	4,440	2,115	1,911	611	138	37	14	12,236
2003	2,912	4,238	1,961	1,750	557	122	34	14	11,588
2004	2,864	4,214	1,905	1,691	524	112	28	11	11,349
2005	2,897	4,105	1,815	1,583	494	103	27	8	11,032
2006	3,247	4,523	1,926	1,600	483	105	23	12	11,919
2007	3,100	4,273	1,926	1,600	483	105	23	12	11,262
2008	2,986	4,117	1,696	1,353	388	87	18	8	10,653
2009	3,153	4,352	1,709	1,405	391	91	20	6	11,127

Source: Present author's own calculations

Table A.2: Bootstrap estimations for mean equivalent household net income, standard deviation of equivalent household net incomes, and normalized coefficients of variations in Germany 1995-2009 GSOEP (95-percent confidence intervals)

Year	Mean (sample)	Mean (bootstrap, below)	Mean (bootstrap, above)	Standard deviation (sample)	Standard deviation (bootstrap, below)	Standard deviation (bootstrap, above)	NCV (sample)	NCV (bootstrap, below)	NCV (bootstrap, above)
1995	12,124	12,018	12,233	7,781	7,190	8,424	0.2060	0.2457	0.1727
1996	12,653	12,546	12,764	7,216	6,810	7,680	0.1626	0.1873	0.1423
1997	12,808	12,702	12,922	7,049	6,644	7,503	0.1515	0.1745	0.1322
1998	13,046	12,940	13,149	6,833	6,596	7,064	0.1372	0.1490	0.1258
1999	13,492	13,373	13,596	7,181	6,932	7,452	0.1417	0.1552	0.1300
2000	14,099	14,011	14,191	7,938	7,673	8,241	0.1585	0.1730	0.1462
2001	14,519	14,428	14,624	8,012	7,739	8,318	0.1522	0.1662	0.1400
2002	18,066	17,878	18,260	17,796	15,632	20,063	0.4852	0.6297	0.3664
2003	17,585	17,424	17,758	14,909	13,310	16,626	0.3594	0.4552	0.2809
2004	17,806	17,626	17,989	15,738	13,517	18,061	0.3906	0.5250	0.2823
2005	17,662	17,499	17,816	12,740	12,066	13,423	0.2601	0.2942	0.2293

2006	17,809	17,628	17,996	15,299	13,123	17,771	0.3690	0.5081	0.2659
2007	18,253	18,086	18,425	13,313	12,527	14,381	0.2660	0.3162	0.2311
2008	18,607	18,427	18,791	14,762	12,610	17,524	0.3147	0.4522	0.2251
2009	18,694	18,539	18,861	13,064	12,516	13,598	0.2442	0.2690	0.2202

NCV: Normalized coefficient of variation

Source: Present author's own calculations

Table A.3: Binary logistical regression's parameters due to different income areas in Germany 2002-2009 (GSOEP) based on the "decomposition approach" – subgroup of people aged 20 to 59 years

Covariates (0/1 dummies) and statistical information	Low-income area (dependent variable: "being a member of this income area", 0/1 dummy)							
	2002	2003	2004	2005	2006	2007	2008	2009
Absolute term	+1.000***	+0.936***	+1.062***	+1.337***	+1.421***	+1.261***	+1.176***	+1.379***
Living in western Germany	-0.601***	-0.605***	-0.627***	-0.668***	-0.644***	-0.652***	-0.618***	-0.651***
Male household member	-0.144***	-0.187***	-0.179***	-0.224***	-0.205***	-0.171***	-0.192***	-0.231***
German household member	-0.785***	-0.770***	-0.825***	-0.865***	-0.933***	-0.853***	-0.891***	-0.978***
Person living in a small household (not more than two persons)	-0.987***	-0.848***	-0.943***	-0.940***	-0.917***	-0.899***	-0.792***	-0.834***
Unemployed household member[1)]	+1.628***	+1.601***	+1.732***	+1.835***	+1.845***	+1.980***	+2.076***	+2.070***
Married person	+0.013	+0.016	-0.034	-0.148***	-0.158***	-0.144***	-0.230***	-0.208***
Non-qualified person[2)]	+0.596***	+0.857***	+0.885***	+0.812***	+0.947***	+1.053***	+1.163***	+1.342***
Very qualified person[3)]	-1.499***	-1.459***	-1.392***	-1.361***	-1.371***	-1.370***	-1.234***	-1.263***
Number of observations (dependent dummy = 1)	5,637 persons	5,232 persons	5,126 persons	5,274 persons	5,617 persons	5,052 persons	4,389 persons	4,807 persons
Nagelkerke's coefficient of determination	0.206	0.201	0.212	0.221	0.222	0.217	0.200	0.213

(Table A.3 continued:)

Covariates (0/1 dummies) and statistical information	Middle-income area (dependent variable: "being a member of this income area", 0/1 dummy)							
	2002	2003	2004	2005	2006	2007	2008	2009
Absolute term	-0.445***	-0.441***	-0.560***	-0.825***	-0.942*'**	-0.771***	-0.654***	-0.895***
Living in western Germany	+0.212***	+0.238***	+0.256***	+0.338***	+0.322***	+0.320***	+0.264***	+0.334***
Male household member	+0.099***	+0.133***	+0.127***	+0.189***	+0.160***	+0.130***	+0.126***	+0.156***
German household member	+0.543***	+0.548***	+0.633***	+0.632***	+0.749***	+0.646***	+0.692***	+0.804***
Person living in a small household (not more than two persons)	+0.367***	+0.352***	+0.421***	+0.441***	+0.456***	+0.417***	+0.325***	+0.380***
Unemployed household member[1)]	-1.290***	-1.329***	-1.431***	-1.544***	-1.570***	-1.688***	-1.792***	-1.782***
Married person	-0.124***	-0.088**	-0.073**	+0.049	+0.024	+0.026	+0.098**	+0.091**
Non-qualified person[2)]	-0.396***	-0.713***	-0.737***	-0.688***	-0.710***	-0.809***	-0.953***	-1.092***
Very qualified person[3)]	+0.449***	+0.475***	+0.352***	+0.478***	+0.479***	+0.440***	+0.280***	+0.347***
Number of observations (dependent dummy = 1)	9,527 persons	8,980 persons	8,641 persons	8,096 persons	8,390 persons	8,044 persons	7,775 persons	8,023 persons
Nagelkerke's coefficient of determination	0.070	0.081	0.087	0.101	0.104	0.096	0.087	0.099

(Table A.3 continued:)

Covariates (0/1 dummies) and statistical information	High-income area (dependent variable: "being a member of this income area", 0/1 dummy)							
	2002	2003	2004	2005	2006	2007	2008	2009
Absolute term	-5.503***	-5.727***	-5.568***	-6.019***	-5.607***	-5.445***	-5.556***	-5.595***
Living in western Germany	+1.208***	+1.329***	+1.300***	+1.210***	+1.197***	+1.083***	+1.214***	+1.085***
Male household member	+0.01	+0.038	+0.015	-0.049	+0.013	+0.011	+0.083	+0.112
German household member	+0.690***	+0.727***	+0.489***	+0.964***	+0.546***	+0.614***	+0.518***	+0.467**
Person living in a small household (not more than two persons)	+1.394***	+1.292***	+1.302***	+1.430***	+1.289***	+1.271***	+1.262***	+1.338***
Unemployed household member[1)]	-1.549***	-1.376***	-1.672***	-1.914***	-1.592***	-1.684***	-2.116***	-2.182***
Married person	+0.511***	+0.430***	+0.533***	+0.464***	+0.572***	+0.507***	+0.488***	+0.525***
Non-qualified person[2)]	-2.651***	-1.119**	-1.067**	-1.097*	-2.417**	-2.393**	-1.546**	-17.868
Very qualified person[3)]	+1.485***	+1.538***	+1.680***	+1.567***	+1.558***	+1.538***	+1.624***	+1.671***
Number of observations (dependent dummy = 1)	1,368 persons	1,096 persons	1,091 persons	954 persons	1,034 persons	1,031 persons	951 persons	922 persons
Nagelkerke's coefficient of determination	0.194	0.185	0.203	0.197	0.185	0.179	0.193	0.199

*: significant at 10-percent level; **: significant at 5-percent level; ***: significant at 1-percent level

[1)] unemployed and non-working, [2)] no school-leaving qualification achieved, [3)] university degree (or the like) achieved

Source: Present author's own calculations

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