

**Time, Income and Subjective Well-Being –
Interdependent Multidimensional Polarization:
20 Years in Germany**

Joachim Merz and Bettina Scherg

FFB-Discussion Paper No. 109

February 2022



Fakultät W – Wirtschaftswissenschaften

Postanschrift:
Forschungsinstitut Freie Berufe
Postfach 2440
21314 Lüneburg

ffb@uni.leuphana.de
www.leuphana.de/ffb
Tel: +49 4131 677-2051
Fax: +49 4131 677-2059

**Time, Income and Subjective Well-Being –
Interdependent Multidimensional Polarization:
20 Years in Germany**

Joachim Merz and Bettina Scherg*

FFB-Discussion Paper No. 109

February 2022
ISSN 0942-2595

* Univ.-Prof. Dr. Joachim Merz, Dipl.-Vw. Bettina Scherg , LEUPHANA University Lüneburg, Department of Economics, Former Research Institute on Professions (Forschungsinstitut Freie Berufe (FFB)), Scharnhorststr. 1, 21332 Lüneburg, Institute of Labor Economics (IZA), Bonn (Merz), Email: merz@uni.leuphana.de, scherg@uni.leuphana.de, URL: www.leuphana.de/ffb

Time, Income and Subjective Well-Being – Interdependent Multidimensional Polarization: 20 Years in Germany

Joachim Merz and Bettina Scherg

FFB-Discussion Paper Nr. 109, February 2022, ISSN 0942-2595

Abstract

Society drifts apart in many dimensions. Economists focus on income of the poor and rich and the distribution of income, however a broader spectrum of dimensions is required to draw the picture of multiple facets of individual life. In our study of multidimensional polarization we extend the income dimension by time, a pre-requisite and fundamental resource of any individual activity. We consider genuine personal leisure time as a pronounced source of social participation in the sense of social inclusion/exclusion and Amartya Sen's capability approach. With an interdependence approach to multidimensional (IMD) polarization compensation between time and income, parameters of a CES-type subjective well-being function, is evaluated empirically by the German population and based on German Socio-Economic Panel (GSOEP) and detailed time use diary data from the three German Time Use Surveys (GTUS) 1991/92, 2001/02 and the actual 2012/13. The focus is on the working poor and rich self-employed and employees. The background of IMD polarization incidence (risk) and intensity (magnitude) is estimated by a two-stage selectivity controlling approach.

Main result: Time, additional to income, is a significant subjective well-being and polarization dimension. Its interdependence/compensation is of economic and statistical significance. Over 20 years IMD Polarization-incidence (risk) is about 20% (self-employed getting poorer compared to employees). Polarization-intensity (magnitude), however, increased significantly by 22% (stronger polarization of the self-employed), a distinct polarization drift to the tail ends of the distribution of time and income.

JEL: I32, D31, J22

Keywords: *Interdependent multidimensional polarization, genuine personal leisure time, income, working poor and affluent, subjective well-being, minimum multidimensional polarization intensity gap (2DGAP), social participation, two-stage Heckman estimates of polarization incidence (risk) and intensity (magnitude), German Socio-Economic Panel (SOEP), German Time Use Surveys 1991/92, 2001/02 and 2012/13.*

Zusammenfassung

Die Gesellschaft driftet in vielen Dimensionen auseinander. Ökonomen fokussieren auf Arme und Reiche und die Verteilung des Einkommens. Allerdings ist ein breiteres Spektrum erforderlich, um das Bild der vielfältigen Facetten des individuellen Lebens zu zeichnen. In unserer Studie multidimensionaler Polarisierung erweitern wir die Einkommens- um die Zeitdimension, eine Grundvoraussetzung und fundamentale Ressource jeder individuellen Aktivität. Im Besonderen betrachten wir die genuine persönliche freie Zeit als eine hervorzuhebende Quelle sozialer Partizipation im Sinne einer Inklusion/Exklusion und Amartya Sen's Verwirklichungschancen (capability approach). Mit einem interdependenten multidimensionalen (IMD) Polarisierungsansatz erlauben wir eine Kompensation zwischen Zeit und Einkommen, Parameter einer CES-Typ Zufriedenheitsfunktion, empirisch bewertet von der deutschen Bevölkerung auf der Basis des Sozio-oekonomischen Panels (GSOEP) und detaillierte Zeitverwendungstagebuchdaten der drei deutschen Zeitverwendungsstudien (GTUS) 1991/92, 2001/02 und aktuell 2012/13. Der Fokus richtet sich auf arme (working poor) und reiche Selbständige und abhängig Erwerbstätige. Der Hintergrund von IMD Inzidenz (Risiko) und IMD Intensität (Ausmaß) wird mit einem zweistufigen selektionskorrigierenden Ansatz geschätzt.

Hauptergebnis: Zeit, ergänzend zum Einkommen, ist eine signifikante Zufriedenheits- und Polarisierungsdimension. Seine Interdependenz/Kompensation ist von ökonomischer und statistischer Signifikanz. Über 20 Jahre liegt die Polarisierungs-Inzidenz (Risiko) bei 20% (mehr ärmer werdende Selbständige). Jedoch, es steigt die Polarisierungs-Intensität (Ausmaß) signifikant um 22% (stärkere Polarisierung bei den Selbständigen), eine ausgeprägte Polarisierungstendenz zu den Verteilungsenden von Zeit und Einkommen,

JEL: I32, D31, J22

Keywords: *Interdependente multidimensionale Polarisierung, genuine persönliche Freizeit, Einkommen, arme und reiche Erwerbstätige (working poor), Zufriedenheit, minimale multidimensionale Polarisierungsintensitätslücke (2DGAP), Soziale Partizipation, zweistufige Heckman-Schätzungen der Polarisierungsinzidenz (Risiko) und -intensität (Ausmaß), Deutsches Sozio-oekonomisches Panel (SOEP), Deutsche Zeitbudgetstudien 1991/92, 2001/02 and 2012/13.*

*Univ.-Prof. Dr. Joachim Merz, Dipl.-Vw. Bettina Scherg, LEUPHANA University Lüneburg, Department of Economics, former Research Institute on Professions (Forschungsinstitut Freie Berufe (FFB)), Scharnhorststr. 1, 21332 Lüneburg, E-Mail: merz@leuphana.de, scherg@leuphan.de, URL: www.leuphana.de/ffb

Time, Income and Subjective Well-Being – Interdependent Multidimensional Polarization: 20 Years in Germany

Joachim Merz and Bettina Scherg¹

February 1, 2022

1 Introduction

Individual well-being and its distribution in society is of particular and ongoing interest in the economic and social policy debate and scientific dispute. Thereby growing polarization is more than ever a rising social problem in society. From an economic perspective growing inequality and polarization, a drifting apart of the income scissor between the poor and the affluent, is seen as the key of lessening well-being and stagnation of standard of living of the middle class and those of the lower part of the income distribution. There is empirical evidence that individuals are less satisfied with life when income inequality is high, and that growing inequality and polarization harms economic growth and endangers social cohesion of society (see background literature).

Inequality and polarization analyses so far mainly focus on the income domain. Though income is the fundamental material resource for living, time is the immaterial companion and as elementary as income for everyday life and individual well-being. Without time there is no activity, neither to generate income, to purchase and consume market goods and services, nor to spend time with the family, to participate on social life or to follow any other activity. Both, time and income therefore are prominent dimensions of subjective well-being in pursuing happiness, the focus of our study under the polarization perspective of the poor and the affluent.

Since time and income involve each other, is there really a dependency, and if, how can we consider and quantify this interaction of time and income? “Time is money”, is compensation/substitution supported by the evaluation of German society’s subjective well-being? Are there regions where compensation won’t cope with the other dimension’s deficit? If there is no compensation, which multidimensional poverty and affluence regimes are affected by? Has interdependent multidimensional polarization changed over 20 years in Germany? Who are the multidimensional poor and who are the rich? Is social participation affected by polarization? Questions, we are following in our study.

This study contributes to the individual well-being and polarization discussion with a new empirical investigation of interdependent multidimensional polarization with focus on time and income in Germany over 20 years.² Time and income are bundled and evaluated by a subjective well-being function which allows an interdependent compensation of its dimensions.

Our contribution to the literature is threefold and encompasses in particular:

First, to respect polarization with its economic and social aspects time will be included and

¹ Univ.-Prof. Dr. Joachim Merz, Dipl.-Vw. Bettina Scherg, LEUPHANA University Lüneburg, Department of Economics, former Research Institute on Professions (Forschungsinstitut Freie Berufe (FFB)), Scharnhorststr. 1, 21332 Lüneburg, E-Mail: merz@leuphana.de, scherg@leuphan.de, URL: www.leuphana.de/ffb.

² Our study builds on Merz and Scherg 2017, 2014 and extends the latter by the actual GTUS 2012/13 survey and with a new microeconomic two-stage selectivity corrected estimation of socio-economic factors of risk and intensity of the polarization poles’ poverty and affluence.

specified as genuine personal leisure time in addition to the traditional income measure. Genuine personal leisure time in particular will take care of the social participation aspect in the spirit of social inclusion/exclusion and Amartya Sen's capability approach (e.g. Sen 2008, 1985). The importance of restricted social participation become painful apparent in the recent Corona Covid 19 (Corona) pandemic.

Second, the interdependence of time and income is evaluated by the German society instead of arbitrarily assigning values. Based on a CES-type subjective well-being function, the intensity of interdependent multidimensional polarization is measured by the mean minimum polarization gap 2DGAP. This unique interdependent multidimensional polarization intensity approach ensures its interdependent relations *and* provides transparency with regard to each singular attribute, an important requirement for any targeted polarization policy.

Third, the empirical investigation of interdependent multidimensional polarization incidence and intensity encompasses 20 years and is based on the German Socio-Economic Panel (SOEP) with additional detailed time use diary data from the three available German Time Use Surveys (GTUS) 1991/92, 2001/02 and 2012/13. We focus on the fulltime working individuals with their self-employed and employees as central players in the labor market, where the working poor requires increasing interest in the economic and social political discussion.

Our polarization study is embedded in many changes and disruptions in society worldwide and in Germany after the re-unification in particular over those 20 years of investigation. The results will contribute to show how the individual time and income situation and its polarization developed before that background.

The remainder of the study is organized as follows: Chapter 1 discusses the literature background of the multidimensional polarization concept and the study's methodology. Chapter 2 describes the data base, the three German Time Use Surveys (GTUS) and the German Socio-Economic Panel (GSOEP), justifies the time (as genuine personal leisure time) and income concept, quantifies the polarization poverty and affluence thresholds, presents the CES estimation results of subjective well-being, and characterizes the population under the further investigation: fulltime self-employed and employee workers. Chapter 3 comprises the incidence and intensity results of interdependent multidimensional polarization of time and income over 20 years in Germany including polarization headcount ratios in poles and regimes and 2DGAP results. Chapter 4 quantifies socio-economic influence on poverty and affluence incidence (risk/chance) and intensity (2DGAP) by a microeconomic two-stage Heckman approach with corrected selectivity. Chapter 5 summarizes and concludes.

2 Background: Uni- and Multidimensional Polarization, Methodology and Applications

2.1 Polarization and Inequality

Polarization describes structural shifts so that both the upper and the lower tail of a distribution increase while the middle part decreases. Both, inequality and polarization consider a distribution where inequality is rather about the entire distribution whereas polarization stresses the importance of both poles. Growing inequality is seen as having far reaching and harmful consequences for the individual, the economy and society concerning social cohesion and political issues (OECD 2008, Stiglitz 2015, OECD/Cingano 2014, Thewissen 2014, Osberg 2003): Empirical evidence suggests that individuals are less satisfied with life when income inequality is high (Graafland and Lous 2019, Burkhauser et al 2016,

OECD 2015, Ferrer-i-Carbonell and Ramos 2014). New OECD analyses show that income inequality has a negative and statistically significant impact on medium-term growth (“inequality hurts economic growth” OECD 2014). And, greater income inequality is significantly correlated with less cohesion of society (Bertelsmann Stiftung 2014 based on 34 countries, Berg and Ostry 2011).

There are good reasons to have a focus in particular on the lower *and* upper pole of a distribution, the poor and the rich, i.e. to have the focus on polarization. One pole, poverty, receives traditionally particular attention in policy and science. Economic, political and structural consequences of a high fraction of the poor are obvious like social stress, high social costs, lower education, poor health, lower tax revenues etc. (e.g. Mood and Jonsson 2016) and emphasize the relevance to analyze the lower pole of the income distribution. Yet, there are good arguments concerning the other pole, the affluence: different parts of the distribution are mutually dependent, high income allow power and command over multifaceted resources, the affluent have global importance and the possibility of voluntarily isolation (capacity to cop out, private provision of education, health care, gated communities) as well as direct and indirect influence to other groups of society, and, a polarized distribution of income can facilitate a sense of injustice in the population (Atkinson 2015, Atkinson and Piketty 2007, Drewnoski 1978). Both poles therefore require its special attention, at the same time a growing polarization is accompanied with the squeeze of the middle class where the middle class alike is seen as important for the stability and well-being of economy and society (Easterly 2001, Downs 1957).

First pioneering efforts of measuring polarization under the economic perspective regard the decline of the middle class (Foster and Wolfson 1992/2010) or the rise of separated income groups (Esteban and Ray 1994). In the sequence there are a number of unidimensional extensions like Wang and Tsui 2000 and Scheicher 2010 concerning the Foster and Wolfson approach, and concerning the Esteban and Ray approach like Duclos, Esteban and Ray 2004, Esteban, Gradin and Ray 2007 and Gigliarano and Mosler 2009 with a multidimensional concept. Duclos and Taptué 2015 provide a recent overview.

Though there is no doubt about the importance of the polarization issue with its many far reaching and multitude consequences for quality of life, there are comparably only a few empirical studies with focus on the poverty *and* the affluence polarization poles, but a vast number of income inequality and poverty studies international³ and national⁴. However, for Germany Goebel et al. 2010 and Grabka and Frick 2008 found a growing income polarization since the 1980s with a growing disperse of the “income scissor” where the poor are going to be poorer and the rich to be richer. Scherg 2014 confirms the result of growing income polarization in Germany since the 1990s even independently of choice of the poverty and affluence thresholds and various polarisation measurement indices. Long-term polarization analyses for Germany since the beginning of the 20st century provides Dell 2007. With the perspective of the last 30 years (Socio-Economic Panel 1984-2012) an increase of income polarization appears with a distinctive development concerning liberal professions (freelancers) as part of the self-employed (Merz and Scherg 2016).

³ World Inequality Report Alvarado et al. 2018, Atkinson and Bourguignon 2015 for inequality evidence, concepts and approaches.

⁴ Inequality analyses for Germany with focus on poverty provide e.g. Grabka et al. 2019, Fratzscher 2016, Merz and Rathjen 2014a,b, Hauser and Becker 2003, with focus on the affluent Peichl and Scheicher 2010, Merz et al. 2005, German Federal Poverty and Affluence Reports (Bundesregierung 2002, 2004, 2011, 2013) and with focus on the self-employed Merz and Rathjen 2016, Merz 2006.

2.2 Multidimensional Well-Being and Polarization

Though income is an important resource for many goods and services, however, there are many further attributes of life which constitute its quality, and are the focus of the multidimensional perspective. Multidimensional polarization started with analyses on poverty and inequality and has proven to be important in various multidimensional poverty studies (see the overview on multidimensional poverty and inequality by Aaberge and Brandolini 2015 and the contributions of Merz and Rathjen 2014b, Atkinson 2003, Bourguignon and Chakravarty 2003, Chakravarty and Silber 2008).

To understand poverty in a broader sense, empirical multidimensional poverty studies incorporate various poverty attributes. An example is the European Union Laeken social inclusion/exclusion indicator set with educational disadvantages, health inequalities, unemployment and worklessness as poverty dimensions (Atkinson 2003) or the UNDP Multidimensional Poverty Index (MPI) based on the Alkire and Foster 2011 proposal.

Multidimensional well-being as developed by many institutions is characterized by a set of living condition indicators which forms dimension-wise well-being indicators (like the OECD's Better Life Index, OECD 2015). The counting and the composite index approaches aggregate with or without weighting the dimensions to bundle the single indicators (Atkinson 2003, Bossert et al. 2013). See Chakravarty 2018 about multidimensional analyses of well-being in general.

The importance and need to respect the *interaction* of well-being dimensions to describe well-being intensively emphasized already Sen 1985 with his capacity approach and Stiglitz et al. 2010 with focus on targeted policies. Higher interdependence of dimensions means higher concentration of deprivations which could make overall poverty even be worse, a result of Garcia-Gomez et al. 2021. They analysed the dependencies of single dimensional distributions in a joint well-being distribution with copula functions. Their multidimensional poverty study (with dimensions income, material needs and work intensity) found, that EU countries (2008-2014) “with a high poverty incidence tend to experiment also a higher degree of dependence between the dimensions of poverty” Garcia-Gomez et al. (2021, p. 193). Bayesian Network analysis (Ceriani and Gigliarano 2020) is another recent approach to disentangle the structure of the dependence among the well-being dimensions. Still other approaches focus on the interaction of dimensions within econometric specifications of subjective well-being (Clark 2016), or recently on defining the middle class by multidimensional quantiles of a well-being index based on a principal component approach (Edo et al. 2021). Respecting the dimensions' interdependence in an explicit functional form of subjective (social) well-being characterizes the multidimensional poverty approaches by Lugo and Maasuomi 2009 and Merz and Rathjen 2014a,b. The Merz and Rathjen approach is the basis we are now following for the multidimensional polarization case in our study. Altogether, there are many studies on multidimensionality with focus on poverty, but only rarely on interdependent multidimensional polarization with focus on the poor and the affluent (but e.g. Gigliarano and Mosler 2009, Merz and Scherg 2014).

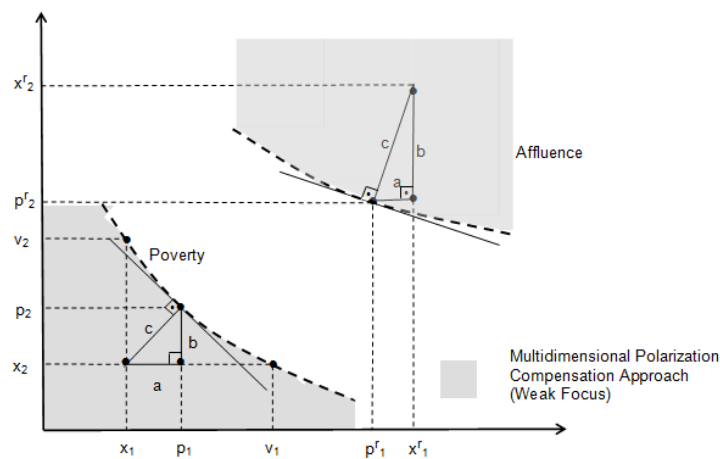
2.3 Multidimensional Polarization – Methodology of the Present Study

The methodology of the present multidimensional polarization study is developed and discussed in Merz and Scherg 2014 and extends the multidimensional poverty approach by Merz and Rathjen 2014a. The focus is on the interdependence of the multidimensional approach with a possible compensation of polarization dimensions (e.g. time and income).

The identification of interdependent multidimensional (IMD) polarization and the measurement of compensation by a subjective well-being CES function is discussed there. In

particular, the minimum 2DGAP, a new measure of IMD polarization intensity, a multidimensional distance (gap) to escape poverty respectively to leave affluence by a shortest way, is proposed there and used here. Minimum 2DGAP measures the shortest distance between an individual two-dimensional situation and the projected well-being CES contours at the poverty and affluence thresholds. It spans a rectangular triangle (Figure 1) with 2DGAP (c) as the hypotenuse and its belonging income (a) and time (b) triangle components which reveal the single dimensional contributions and ensures their interdependence.

Figure 1: Multidimensional Polarization: Minimum 2DGAP



Source: Merz and Scherg 2014.

The empirically based importance of the singular dimensions time and income in our application allow singular time and income targeted anti-polarization policies taking into account its multidimensional interdependence. It tells a policy maker how the population evaluates the relative importance of and interdependence of these dimensions to lift an individual out of poverty/affluence.⁵

3 Data Base, Time, Income and Subjective Well-Being Concept and Definition and Population Under Investigation

3.1 Data Base

The German Socio-Economic Panel (GSOEP)

The German Socio-Economic Panel (GSOEP) provides representative individual longitudinal data for all persons older than 16 years living in German households. The representative panel study started in 1984 and provides subjective as well as objective information about the individual living conditions in Germany (Goebel et al. 2019).

Since appropriate subjective well-being data are only available within the German Socio-Economic Panel we use GSOEP for the CES well-being estimation. Although in principle we could use GSOEP for our further analyses we prefer to use in addition time use diary data from all three available German Time Use Surveys (GTUS) (with no appropriate well-being

⁵ The detailed methodological background is gathered in the discussion paper behind this study (Merz and Scherg 2021).

information available) since the time use diaries provide more additional in-depth information. The CES well-being estimation 2012/13 finally uses 10,831 individuals.

The German Time Use Surveys (GTUS) 1991/92, 2001/02 and 2012/13

The German Federal Statistical Office conducted three large representative time use surveys, the German Time Use Surveys 1991/92, 2001/02 and 2012/13 (Ehling, Holz and Kahle 2001, Ehling 2003, www.forschungsdatenzentrum.de). Therein all respondents older than 11 years in a household note their daily routines in diaries using their own words for two working days and a Saturday or Sunday. Person and household questionnaires provide socio-economic background information. The final available data comprise 1991/92: 6,774 households with 15,366 persons and 30,732 diaries; 2001/02: 5,144 households with 11,908 persons and 35,685 diaries; 2012/13: 4,774 households with 10,705 persons and 32,103 diaries.

Population Under Investigation – Fulltime Working Self-Employed and Employees

The *fulltime working* will be the population under the further investigation because the active population experiences work and leisure and therefore, rather than others, are affected by the trade-off between the two dimensions time and income. Moreover, the working poor gained increasing attention at least in Germany. Recent German 2020 data show for them even an 8% risk of poverty of the active population above 18 years, i.e. about 3.1 Mio. working individuals are poor (destatis.de 2021), a remarkable number of being poor despite working. The situation of the other pole, the working affluent is rather unknown. Thus, we will provide results for both distributional poles and focus on fulltime workers, on the full economic active (with more than five working hours a day).

Self-employed and employees are the two main groups in the labor market. Furthermore, because the self-employed in principle have a different time sovereignty with possible different polarization pattern than that of employees' we explicit investigate the situation of these two important population groups. In addition, though there are a multitude of studies about employees, empirical studies about the self-employed are rare. Yet, there are studies of the self-employed: international, e.g. Parker 2004; national, e.g. Merz 2017, and self-employed, freelancer and entrepreneurs studies of our Research Institute on Professions (Forschungsinstitut Freie Berufe, FFB, Leuphana University Lüneburg, www.leuphana.de/ffb).

3.2 Time, Income and Subjective Well-Being – Concept, Definition and Poverty and Affluence Thresholds

Income and its poverty and affluence thresholds

Income as the material resource is in the focus of traditional well-being analyses and is the central dimension in various poverty studies. Since the affluent are commonly defined in monetary terms and (among others) as controlling a large amount of material resources, in particular income and wealth, income is a natural and our candidate as a polarization dimension for both poles, the poor and the affluent.

Income poverty studies commonly use monthly household net equivalence income with equivalence scales like the OECD scale⁶ and identify a person as income poor if her net equivalence income is below 60% of the median income of all households (Bundesregierung

⁶ With a weight 1 for a household head, a weight of 0.5 for additional household members aged 15 years or older, and a weight of 0.3 for all others.

2004, XV). The 60% median line of the monthly household net equivalence income is therefore adopted in this study as the *income poverty line* (threshold) (Table 1). For the sake of comparison, all subsequent income information for 1991/92 and for 2012/13 is adjusted to 2001/02 price levels.

Whereas there is common agreement about the income poverty line, there is a longstanding and still open discussion about a respective affluence line. The German government explicitly focused for the first time on affluence in addition to poverty in their first “Poverty and Affluence Report” (Bundesregierung 2002). From that period on, top incomes gained increasing attention not only in Germany (Atkinson and Piketty 2007, Dell 2007, Merz, Hirschel and Zwick 2005). Several affluence lines were proposed in this literature, including affluence lines as a multiple of an income fraction, such as 200% or 150% of mean median income, or as a top income percentile. As a pragmatic approach, we are choosing 150% as the cut-off for the median monthly household net equivalence income affluence threshold line. This affluence threshold is also used by the income polarization studies of Goebel et al. 2010 or Grabka and Frick 2008. Table 1 provides the empirical time, income and subjective well-being thresholds.⁷ Remarkably, the median income behind increases in the first ten years from 1991/92 to 2001/02 and then decreased till 2012/13 but to a higher level than 20 years ago.

Time and its poverty and affluence thresholds

Without time neither income is realised nor spent for consumption and leisure. With intensified labor market conditions as well as squeezed leisure, not income but rather time will be a scarce resource and phenomenon like time stress, time poverty or speed-up of all day living circumstances gain increasing importance (Linder 1970, Rosa 2005)⁸. Time, as mentioned, is the general precondition for any activity and enables and restricts – as well for the poor as to the affluent alike – all desired activities: “Die Zeit ist die formale Bedingung à priori aller Entscheidungen überhaupt (Time is the formal condition à priori of all decisions at all)” (Immanuel Kant 1724-1804). Being important, time – in different specifications – was already the subject in other multidimensional poverty studies like Goodin et al. 2008, Burchardt 2008, Harvey and Mukhopadhyay 2007, Bittman 1999 or Vickery 1977. Recently Masuda et al. 2020 explore the relationship between varying time, income and life satisfaction and identified specific well-being subpopulations.

Our study explicitly includes time but instead of a broad leisure time concept we propose *genuine personal leisure time* as being essential to the multidimensional approach (introduced in Merz and Rathjen 2014a,b). Genuine personal leisure time is a last resort of no obligations and personal leisure of freedom and accounts for social participation in particular in the sense of social inclusion/exclusion and the mentioned Amartya Sen’s (Sen 1999, 1985) capacity approach.⁹ We are convinced that social participation is of importance for the poor *and* the

⁷ The calculation of the time and income thresholds uses the total German population to ensure comparisons with other studies (like the German Federal Poverty and Affluence Report, Bundesregierung 2002) and its thresholds.

⁸ ”Harried lifestyle, by hurried time, use more natural resources, generate more waste, and leave less time to care for the Earth we all share“, Gaylord Nelson, Earth Day founder and former U.S. Senator (cited in: de Graaf 2003, backpage).

⁹ Time in our study is genuine personal leisure time which includes activities of the main GTUS categories “Contact, Conversations, Sociality” or “Media Use, Free-time Activities” in GTUS 1991/92, the categories “Social Life and Entertainment”, “Participation in Athletic Activities e.g. Outdoor Activities”, “Hobbies and Games” and “Mass Media” in GTUS 2001/02, and “Social Life, Conversation and Entertainment”, “Participation at Sport Activities”, “Hobbies and Games” and “Mass Media” (codes 6, 7, 8) in GTUS 2012/13.

affluent and their integrated social life.

Time poverty occurs when genuine leisure time – defined as the time left after all paid and unpaid market and nonmarket commitments have been met – is below a given threshold level and does not allow or limit its social participation in society. Correspondingly, time affluence occurs when genuine personal leisure time is above a given threshold level.

Compared to income the discussion about a time poverty or even time affluence threshold (line) is still at its infancy (Bittman 1999 mentioned not 60% but 50% for the time poverty line). To be comparable to our income poverty and affluence line we chose likewise 60% of the median genuine personal leisure time for poverty and 150% of the median as the time affluence line though such lines are certainly debatable. Table 1 provides the empirical time thresholds. The time median behind increases in Germany over the investigated twenty years 1991/92, 2001/02 and 2012/13.

Why interdependent time and income polarization?

Time restricts and enables all market and non-market activities. The more time is spent for income activities the less is available for leisure and vice versa. This trade-off is well-known and is central in the microeconomic optimal allocation and Becker's 1965 household production approach. Thus, there are good reasons to suspect compensation/substitution between time and income in principle, the empirical investigation will detect its degree.

Table 1: Income, Time and Multidimensional Well-Being, Poverty and Affluence Lines (Thresholds) – Germany 1991/92, 2001/02, 2012/13

	1991/92	2001/02	2012/13
Median Net Equivalence Income (in € per month and prices 2002)	1,109.64	1,322.58	1,217.42
Median Personal Leisure Time (in minutes per day)	265	310	320
Income Poverty Line (=60% Median Net Equivalence Income)	665.78	793.55	730.45
Time Poverty Line (=60% Median Personal Leisure Time)	159	186	192
Well-Being Poverty $V^{\text{poor}} = f(I^{\text{poor}}, L^{\text{poor}})$	6.704	6.827	6.799
Income Affluence Line (=150% Median)	1,664.46	1,983.97	1,826.13
Time Affluence Line (=150% Median)	397.50	465	480
Well-Being Affluence $V^{\text{rich}} = f(I^{\text{rich}}, L^{\text{rich}})$	7.402	7.538	7.506

Source: GTUS 1991/92, 2001/02 and 2012/13 own calculations in 2002 prices, weighted data. The time and income poverty lines and affluence lines (thresholds) are calculated for median income by total population, for median genuine personal leisure by the available older 11 years population.

Subjective well-being and interdependent time and income polarization

As discussed above, the trade-off will be quantified by a CES well-being (utility) function with interdependent time and income as input factors. Instead of arbitrarily chosen different trade-off weights with different compensation degrees (as in Bourguignon and Chakravarty 2003, Lugo and Maasoumi 2009), we let the individual data from German society identify the

degree of interdependence and substitution between income and genuine personal leisure time.

The Socio-Economic Panel (GSOEP) is asking for satisfaction with regard to different topics, like income satisfaction as well as a general question about life satisfaction. As common in the happiness/satisfaction literature (e.g. Clark et al. 2008, Frey and Stutzer 2005) we also use the 11-point scale general life satisfaction information of the GSOEP questionnaire for our subjective (CES) well-being estimation.

An estimation of individual well-being on such a discrete scale requires rather a type of ordered response modelling. Yet, the Kmenta 1967 Taylor series approach allows a simple OLS estimator of the log transformed non-linear CES well-being function as

$$(9) \quad \ln V = \ln \gamma + \nu \delta \ln I + \nu(1-\delta) \ln L - \frac{1}{2} \rho \nu \delta (1-\delta) [\ln I - \ln L]^2 + \varepsilon ,$$

with $I = x_{i1}$ for income and $L = x_{i2}$ for genuine personal leisure time (ε is the error term) providing efficient estimates.

The estimated CES well-being function (Equation 1)¹⁰ results in

$$(10) \quad V = f(I, L) = 3.550 \cdot (0.519 \cdot I^{0.297} + 0,481 \cdot L^{0.297})^{\frac{0.108}{0.297}} .$$

Significantly estimated coefficients together with fulfilled further consistency rules quantify the relevance of the substitution/compensation between time and income. The population-based evaluation of the substitution/compensation between genuine leisure time and income yields a substitution elasticity of $\sigma = 1.422$, which indicates a slightly higher substitution, a slightly more pronounced substitution, than in the Cobb-Douglas case ($\sigma = 1$)¹¹.

The estimated input coefficients, the weight $w = 0.519$ for income and $(1-w)$ for personal leisure, indicate a certain dominance of income. However, the evaluated time contribution is not that far away from a balanced 50% situation, and reflects the importance of time. The GSOEP estimated CES parameters then are used to calculate individual well-being levels with the respective individual time and income data of the three GTUS time use diaries for all further analyses. Table 1 provides the multidimensional CES well-being poverty and affluence levels. Subjective well-being poverty and affluence lines, due to changing poverty and affluence thresholds, increase in the first ten years from 1991/92 to 2001/02 and then decreased till 2012/13 to a higher level than 20 years ago.

¹⁰ To make the evaluation of the polarization situation from 1991/92 until 2012/13 comparable we choose the estimated CES evaluation parameters at the midterm year, the respondents' data of GSOEP 2001/02 (all working) for all three analysis years. The CES estimates uses the active population because its working individuals directly experience the trade-off between income and time rather than the total population with its not working individuals.

¹¹ Perfect substitution: ($\rho = -1, \sigma = \infty$), Cobb-Douglas case with ($\rho = 0, \sigma = 1$), no substitution at all complementary input factors, ($\rho = \infty, \sigma = 0$).

4 Interdependent Multidimensional Time and Income Polarization Incidence and Intensity: Headcount Ratios and Minimum 2DGAP Results – 20 Years in Germany

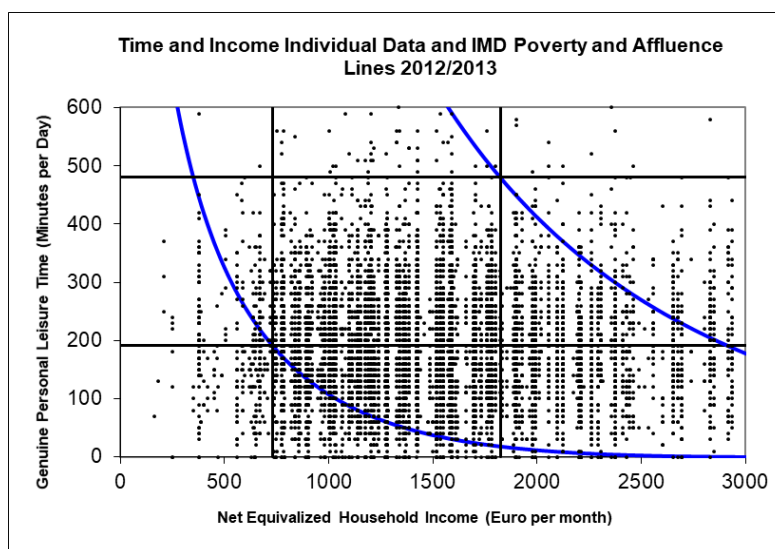
Two kinds of information are of prominent interest in distributional analyses to describe the extent of polarization, of being poor or affluent: the incidence (who is affected by) and its intensity (how large is its magnitude (severity, deepness)). We start with the incidence of IMD polarization (with headcount ratios in poles and regimes) followed by the analysis of its intensity (with well-being gap and minimum 2DGAP). All results refer to fulltime (>5 hours a day) workers.

4.1 IMD Polarization Incidence – Headcount Ratios in Poles and Regimes

The picture of all individual fulltime workers data in the actual GTUS 2012/13 is presented in the scatter plot Figure 2a together with its multidimensional poverty and affluence lines (thresholds) based on its CES population evaluation. The crossing of the presented single time and income poverty and affluence lines define the IMD poverty and IMD affluence lines, the two-dimensional projection of the respective CES subjective well-being contours. Figure 2b provide headcount ratios in single interesting polarization regimes of time and income compensation and no compensation for all three years of the analysis.

2012/13: As the overall data scatter plot 2012/13 shows the majority of individuals belongs to the “middle class”, the area between both IMD lines. However, and with the numbers of Figure 2b, almost one every five (19.1%) belongs to the IMD poles. The majority of the IMD polarization individuals are IMD poor: 11.6% of all with 7.5% IMD affluent.

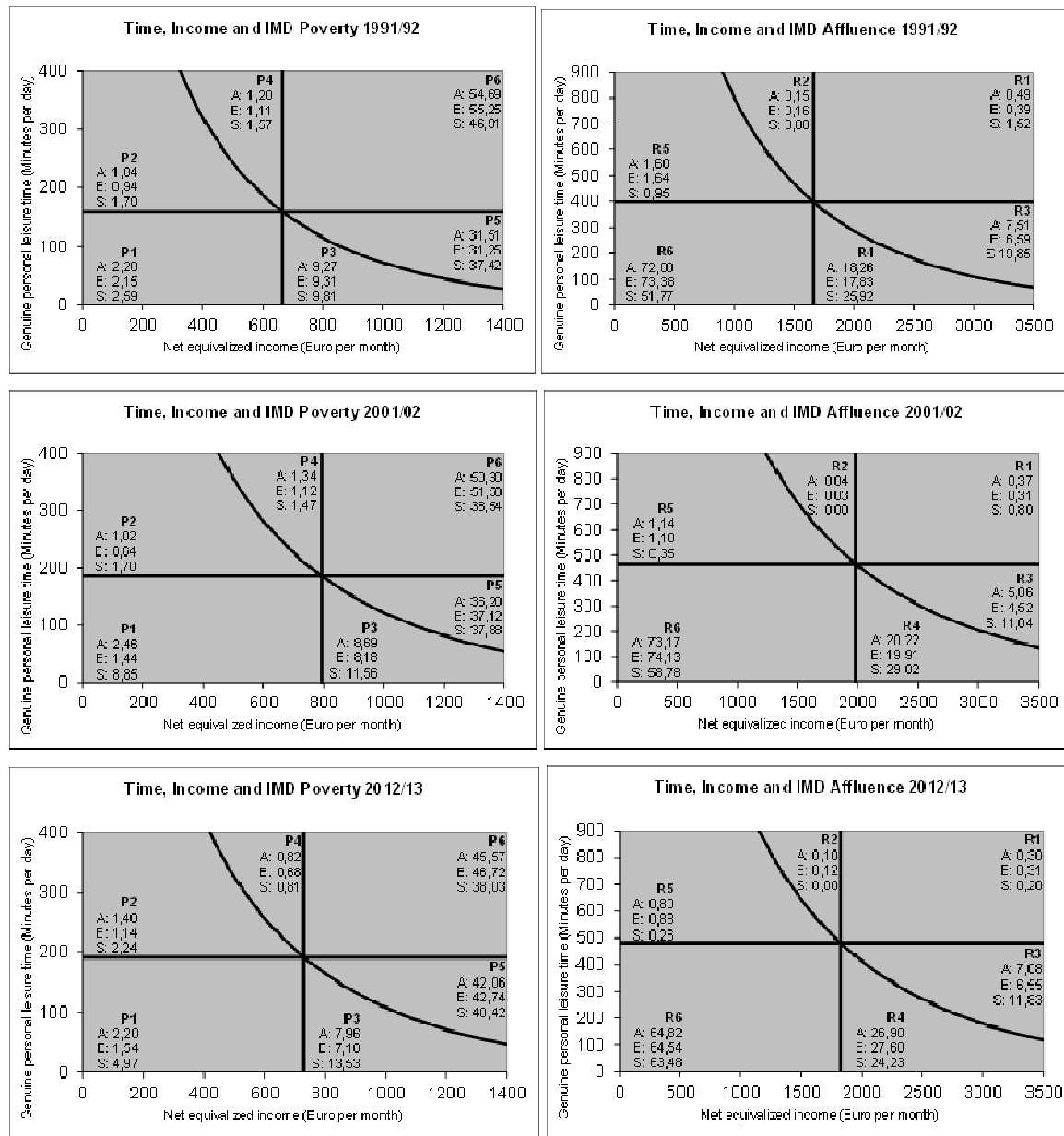
Figure 2a: Survey Time and Income Individual Fulltime Workers Data and Interdependent Multidimensional (IMD) Polarization Lines – Germany 2012/13



Source: GTUS 2012/13, fulltime workers survey data and estimated CES well-being contours, own representation.

Distinct IMD polarization differences are obvious between the self-employed and employees in 2012/13 (Table 2, Table 2a for all three survey years is available on request): the IMD polarization incidence (headcount ratio) of the self-employed (32.77%) is about twice as much as that of the employees (16.84%) in 2012/13. That is, almost every third fulltime

Figure 2b: Multidimensional Polarization Incidence: IMD Headcount Ratios in Poverty and Affluence Regimes – All Fulltime Workers (A), Employees (E) and Self-employed (S) – Germany 1991/92, 2001/02, 2012/13



Source: GTUS 1991/92, 2001/02 and 2012/13, A=all, E=employees, S=self-employed, own presentation.

working self-employed is assigned to be in both IMD poles. In other words, the “middle class” is comparably more pronounced for employees than for the self-employed.

In all three survey years there is a similar picture: a remarkable higher IMD polarization incidence of the self-employed compared to that of the employees in both IMD poles as well as with respect to the majority of unidimensional time and income dimensions (Figure 2b, Table 2).¹²

¹² The exception is unidimensional time 2001/02 and 2012/13 of the affluent.

Over 20 years, IMD polarization incidence decreases from 20.74% to 19.04%, a slight decrease only, however, a decrease of high significance (Table 2, Figure 2c). Yet, it is not a steady decrease, from 2001/02 IMD incidence increased showing some u-shaped development over 20 years (Figure 2c). More distinct IMD polarization differences are visible for the subgroups: The incidence of poverty and affluence not only is remarkably higher for the self-employed than the employees in all three survey years (roughly twice as much higher), but the *IMD polarization development* in the respective poles is remarkably different as well: Whereas employee poverty decreases by 20% (index 79.5, 1991/92=100, Table 2) self-employed poverty even increased by 47% (index=147, 1991/92=100), an eminent rise of self-employed poverty. The IMD affluence fraction in contrast decreases for both groups, however, by far more pronounced for the self-employed with 44% against 2% for employees.

So, over 20 years in Germany IMD polarization incidence declines slightly but significantly, i.e. we face a slightly rising share of the fulltime working middle class (stronger for employees than self-employed). In particular, the self-employed show a strong and eminent incidence tendency to the lower end of the distribution, from a strong diminished affluence pole to the middle class, and from the middle class to a strong growing poverty pole.

Are the multidimensional results different to the unidimensional time and income picture? Yes, whereas *multidimensional* polarization incidence decreased the *unidimensional time* and *unidimensional income* polarization incidence increased – in other words, the unidimensional middle class declined, the multidimensional middle class increased– over those 20 years with a pronounced level of time poor headcount ratios (Table 2).¹³ Yet, the unidimensional result is not always different to the multidimensional evidence: for instance, self-employment income decreases which corresponds to an IMD incidence decrease over 20 years. Neglecting the interaction of polarization dimensions when looking with unidimensional eyeglasses thus would deliver a misleading polarization picture with respective ineffective enhanced economic and social policies.

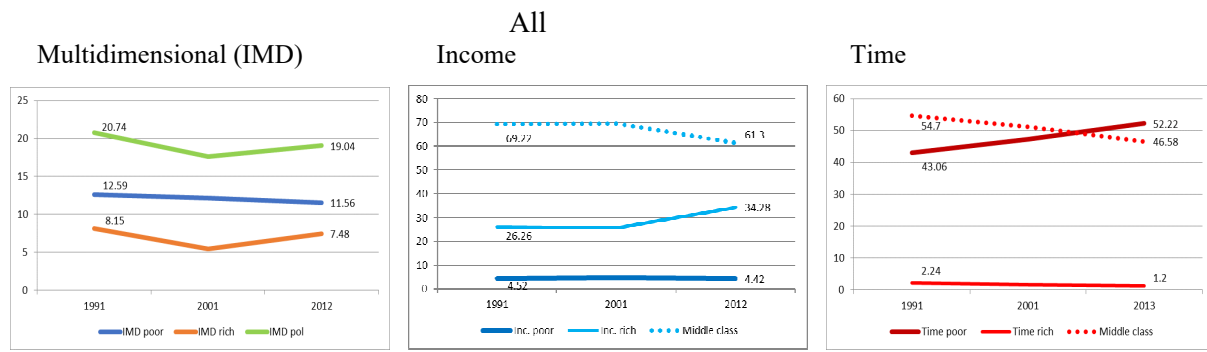
Headcount ratios in poles and regimes: Poverty

Summarizing both poles of a distribution naturally hide the relative importance of its single poverty and affluence contribution. In addition, single poverty and affluence regimes of different compensation remain undiscovered, which, however, provide interesting and striking results and developments in the single poles for both labor market groups (Figure 2b). We start with the poverty pole and its compensation situation.

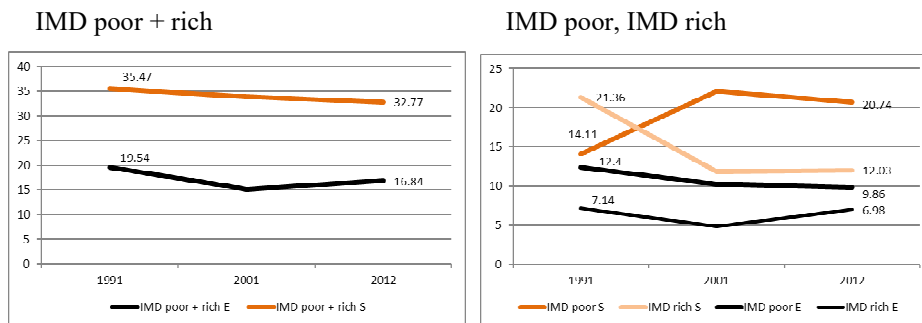
Poverty regime P1: A regime of specific interest within the poverty pole is the regime where individuals are time as well as income poor: About 2.2% of all fulltime workers are poor in both dimensions, the “hardcore” IMD poor (2012/13, regime P1, Figure 2b). The IMD headcount ratios of the two labor market groups therein develop over the 20 years with opposite direction: employees’ headcount ratio dropped from 2.15% to 1.54%, the headcount ratio of the self-employed, however, almost doubled from 2.59% to 4.97%, a remarkable difference.

¹³ The headcount ratio of the unidimensional time poor is quite high (2012/13: 53.42%) and naturally depends on the debatable activity basket respected (see footnote 7). A time poverty threshold of 50%, instead of the chosen 60%, would reduce that incidence to 35.78. In fact, this is quite a difference (16%), which is characterized by a practically change between poverty regime P5 (time poor but above IMD poverty) to regime P6 (no deficits at all). However, the multidimensional IMD poverty incidence will virtually remain at 11.6% (difference 0.19% only) and thus support the robustness of our multidimensional results concerning time deficits.

Figure 2c: Multidimensional and Unidimensional Polarization Incidence: Headcount Ratios – Germany 1991/92, 2001/02, 2012/13



Self-Employed (S) and Employees (E)



Source: own calculations, fulltime working (working hours > 5 hours per day), weighted data.

Nota bene, fulltime workers (more than 5 working hours the day) are behind that number who despite working are poor (“the working poor”). The picture is even more striking when the unidimensional time and income development is regarded (Table 2). The high incidence of time poor individuals, self-employed and employees, emphasizes the time dimension as being a particular important dimension of multidimensional poverty.

Poverty regime P3: Poverty regime P3 is of particular importance: here income even above its poverty line does not compensate time poverty to leave IMD poverty. Again, the self-employed are affected by in particular. The respected self-employed of being not income poor but with a time deficit not compensated increased from 9.81% to 13.53%, but decreased for employees from 9.13% to 7.18% in 20 years. This reveals in particular a growing not compensated time pressure of the IMD poor self-employed and again a diametral development between self-employed and dependent workers over those 20 years in Germany.

Different factors will be behind the increased number of those IMD poor self-employed with not compensated time deficits, like an increased outsourcing of certain services linked with a growing pressure to perform, a growing number of “independent” contractors (“Scheinselbstständigkeit”) and just work pressure of the self-employed in particular through a growing globalization and pressure of competition.

Poverty regime P5 detects another situation of time poverty. Here income above its poverty line compensates time poverty, yet still being time poor but not IMD poor. The headcount ratio in this regime increased from about 32% to 42% in 20 years.

Taking together the situation of those who are not income poor but time poor (P3 IMD poor and P5 IMD not poor): in 2012/13 remarkably 50%, half of the fulltime working population, are time poor even when earning an income above the poverty line. And, the increase of that

group by 22% over 20 years indeed stresses the growing importance of genuine personal leisure time for subjective well-being of the poor and the measurement of interdependent multidimensional polarization.

Headcount ratios in poles and regimes: Affluence

Are those differences between the two labor market groups also visible in the affluence pole? First, compared to the IMD poverty pole only a relatively small fraction of the self-employed and of the employees are time as well income affluent (affluence regime R1). Second, the self-employed headcount ratio in the affluence R1 regime (the “hard core” IMD affluent) decreased stronger than that of the employees supporting the discussed tendency to the lower tail of the distribution.

Affluence regime R4: One regime concerning the compensation situation of the affluent is of particular interest: Affluence regime R4. In this regime a higher income (above the affluence income line) does not succeed to compensate the time rich deficit to achieve IMD affluence. This applies to a quarter of the self-employed 1991/92 and 2012/13 and even more in between (2001/02). Though the R4 incidence of self-employed remains over 20 years, employees in contrast increased from 18% to 28%, a remarkable result of growing time pressure of the income rich dependent workers. Figure 2b and Table 2 show further details in other time and income regimes.

A word about “compensation”: compensation is an assignment according the population revealed evaluation of time and income via the estimated CES subjective well-being function. Such an assignment corresponds to assignments as common in the poverty literature and is not necessarily an expression of an individual actual or possible situation/compensation.

4.2 IMD Polarization Intensity – Minimum 2DGAP

The chapter above was about the incidence of IMD polarization. This chapter provides results about the intensity, the magnitude of interdependent multidimensional polarization. The minimum 2DGAP intensity measures the distance an individual is below the poverty line respectively is above the affluence line. The longer this distance, the deeper is polarization. In other words, the broader the gap, the nearer is the tail end of the distribution, the more intensive then is polarization.

The multidimensional polarization intensity results as a mean of individual minimum multidimensional polarization gaps (2DGAP). Table 2 and Figure 3 show the overall intensity (C) and its disentangled income (A) and genuine personal leisure time (B) triangle components for 2012/13 and the development over 20 years. Table 2 also provides results for respective poverty and affluence regimes of self-employed and employees.

2DGAP overall (C): For all fulltime workers the intensity of interdependent multidimensional polarization (2DGAP C) increased from the early nineties significantly by 22.4%, a distinct result for an intensity drift to the poles of IMD polarization. Yet, this overall drift to the poles is carried rather by the employees (+25.2%) than by the self-employed (+5.8%). Whereas there is a “steady” increase of IMD polarization intensity for employees, the intensity development for self-employed is inverse u-shaped with still a higher level than 20 years ago (Figure 3).

Multidimensional polarization intensity is more pronounced for the rich (C_{rich}) than the poor (C_{poor}) for both, employees and self-employed (in all three years). However, the multidimensional polarization intensity scissor opened asymmetrically with a particular worsening of the poor (increase by 51.2%), for poor employees (increase by 47.1%) and poor self-

employed (increase by 32%). In other words, polarization is going to be harder in the lower time and income pole.

Table 2: Uni- and Multidimensional Polarization Incidence and Intensity: Headcount Ratios, Well-Being Index and Minimum 2DGAP – All Fulltime Workers (A), Employees (E) and Self-employed (S) – Germany 2012/13 and its development from 1991/92

	All			Employees			Self-employed		
	Measure 2013	Index 1992 =100	sig.	Measure 2013	Index 1992 =100	sig.	Measure 2013	Index 1992 =100	sig.
Income Polarization Headcount Ratio									
Income poor	4.42	97.79		3.37	80.24		8.01	136.69	*
Income rich	34.28	130.54	***	34.46	138.84	***	36.26	76.69	***
Income	38.7	125.73	***	37.83	130.36	***	44.27	83.31	***
Time Polarization Headcount Ratio									
Time poor	52.22	121.27	***	51.46	120.49	***	58.82	118.27	***
Time rich	1.2	53.57	***	1.31	59.82	**	0.46	18.7	***
Time	53.42	117.92	***	52.77	117.53	***	59.38	113.58	**
Multidimensional Polarization Headcount Ratio									
IMD poor	11.56	91.8	***	9.86	79.5	***	20.74	147	***
IMD rich	7.48	91.8	***	6.98	97.8	***	12.03	56.3	***
IMD	19.04	91.8	***	16.84	86.2	***	32.77	92.4	***
Multidimensional Polarization Minimum 2DGAP									
Income Component									
A _{poor} (€)	33.99	191.8	***	30.2	185.9	***	38.97	153	***
A _{rich} (€)	12.79	110.8	*	13.44	114.6	**	9.95	99.1	
A (€)	46.78	159.8	***	43.64	156	***	48.92	137.8	***
Time Component									
B _{poor} (Minutes)	64.31	142.5	***	60.19	138.9	***	70.59	127.9	***
B _{rich} (Minutes)	97.15	106.9		93.39	112.8	**	113.69	92.4	
B (Minutes)	161.45	118.7	***	153.58	121.8	***	184.27	103.4	
IMD 2DGAP									
C _{poor}	74.65	151.2	***	69.22	147.1	***	82.2	132	***
C _{rich}	98.37	107		94.72	112.9	**	114.45	92.5	
C	173.02	122.4	***	163.94	125.2	***	196.64	105.8	

¹ Two samples mean test with variance inhomogeneity; Significance (sig.): * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; IMD = interdependent multidimensional.

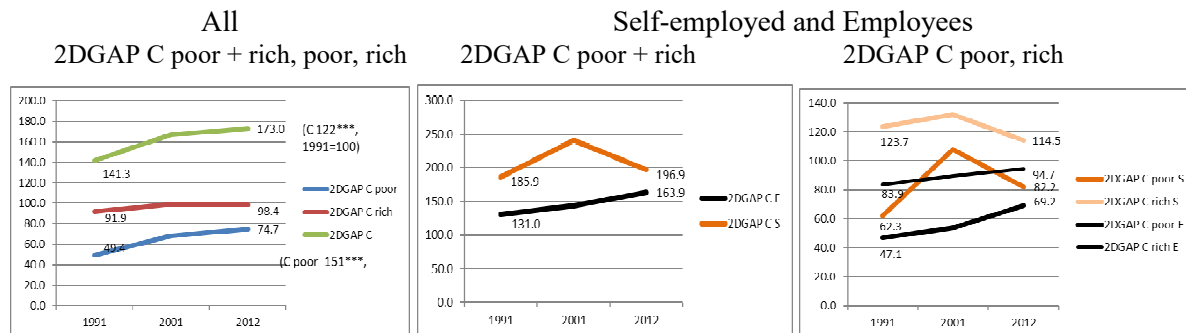
Source: GTUS 1991/92, 2001/02 und 2012/13; own computation, weighted data.

Of specific further interest are the 2DGAP single income (in €) and time (in minutes) components linked with the mean 2DGAP C measure just discussed. They detect the single components' contribution at the mean intensity gap with respect to its interdependence.

2DGAP income component (A): The aggregated mean minimum 2DGAP income component A is dominated by the income component of the poor (A_{poor}) in all three years. The monetary component increases significantly (stronger for employees (+85.9%) than for the self-employed (+53%)). There is an asymmetry (for both labor market groups) with a stronger

growth of the poverty compared to the affluence income component; the income situation is getting worse first of all for the poor.

Figure 3: IMD Multidimensional Polarization Intensity: Mean 2DGAP C (Polarization Gap) All, Self-Employed (S) and Employees (E) – Germany 1991/92, 2001/02, 2012/13



*** Significance < 0,1% Two-sample mean difference test

Source: GTUS 1991/92, 2001/02, 2012/13, own calculations, fulltime working (working hours > 5 hours per day), weighted data.

2DGAP time component (B): The mean minimum 2DGAP aggregated time component B is dominated in all three years by the time component of the rich (B_{rich}) which is in contrast to the income component dominance for the poor (A_{poor}). The time component increase by about 19%, carried by the employees' development (+53.6%), is not as strong as that of the income component (60%). In correspondence with the overall development the time as well as the income component of the poor growth stronger than that of the rich (employees and self-employed).

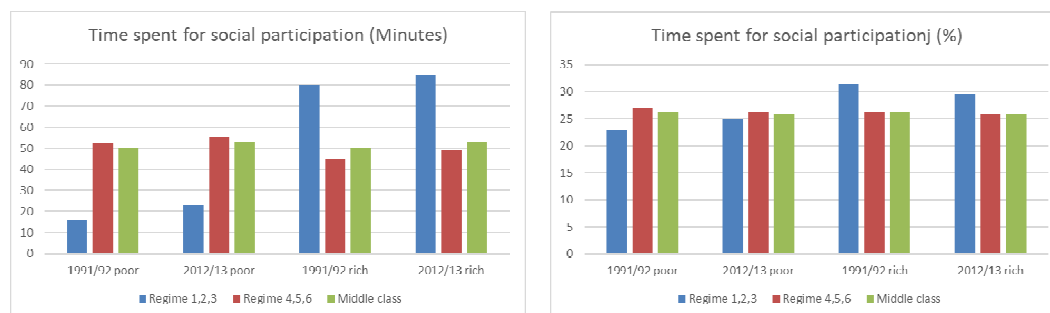
Which component, time or income, is responsible in particular for the interdependent development (1991/92 to 2012/13) of multidimensional intensity polarization? For both labor market groups it is mainly the income dimension (2DGAP A, employees +56%, self-employed +37.8%) and therein the particular growth of the income poverty component.

Differences between the two labor market groups concern the affluence gap: For self-employed the time and income components do not change but for employees they change and increases significantly (2DGAP A_{rich} , 2DGAP B_{rich}) over 20 years.

Social participation and genuine personal leisure time

We argued that genuine personal leisure time in particular allows and restrict social participation, a relevant dimension of an enhanced poverty perspective and important for the poverty capability approach by Amartya Sen. As to our results (Figure 4), when social participation, as a part of genuine personal leisure, is measured by average time spent in social life (social contacts with others, visiting neighbour/friends, cultural participation etc.), as well when alternatively measured as time spent with others beside household members (social companions, not shown here), then social participation indeed is considerably lower among the IMD poor compared to the not IMD poor and compared to the middle class (not poor minus IMD rich). Yet, almost 25% (IMD poverty) and around 30% (IMD affluence) of genuine personal leisure time is spent for social participation, a remarkable result despite that fulltime working restricts remaining daily time. This picture holds over those 20 years with a slightly diminishing difference between *IMD poor* and *not IMD poor*, and, it also holds for general genuine leisure unidimensional *time poor* compared to *not time poor* (and compared to the middle class, absolute and relative).

Figure 4: Time Spent for Social Participation in Polarization Poles and Not Poles – Germany 1991/92, 2012/13



Source: GTUS 1991/92, 2012/13, Regimes as in Figure 2b: 1,2,3 for IMD poor or rich and 4,5,6 for non IMD poor or rich, middle class without the poles, IMD = interdependent multidimensional polarization, in % of regime specific mean time, own calculations, fulltime working (working hours > 5 hours per day), weighted data.

Taking together, polarization appears also with respect to social participation and corresponds to Amartya Sen's enhanced poverty perspective.

5 Microeconometric Analysis of IMD Polarization – Incidence and 2DGAP Intensity

It is to be expected that different individual resources and limitations will result in a different polarization picture for different socio-economic groups. To quantify competitive socio-economic explanatory factors behind the IMD polarization incidence and intensity of the 2DGAP approach we apply the two-stage Heckman 1976 procedure to account for the expected selectivity (the poor and the affluent are expected not to be random subgroups of the entire population, respectively of the working population). In the first stage the incidence probability (polarization risk, participation, probit estimation) and in the second stage the polarization intensity is estimated corrected for a self-selection bias (COLS) (2012/12 poor and affluent results in Table 3, descriptive statistics in Table 4.

Hypotheses and variables to explain IMD polarization in the following refer to manifold poverty and labor supply research results. Regarding income, human capital variables are recommended. Moreover, household and family variables contribute in many labor supply studies (Polachek and Siebert 1999). Regarding time, the focus unabatedly is on labor supply of paid work. However, with the extension to Becker's household production approach unpaid work and other nonmarket activities are incorporated here. The respective reference category will be a person expected not to be poor. To be brief we pinpoint only some prominent results.

The two-stage estimation result all over: the model goodness of fit measured by the Chi²-Wald test is highly significant and supports our modelling strategy. To the sake of brevity the single socio-economic influences are only summarized. They are discussed in more detail in the discussion paper behind this study (Merz and Scherg 2021).

Table 3: Multidimensional Polarization of Time and Income – IMD Incidence and IMD 2DGAP C Intensity: Two-stage Heckman Estimates for IMD Poor and IMD Rich – Germany 2012/13

	IMD Polarization Incidence		IMD Polarization Intensity	
	Probit IMD ¹ poor	Probit IMD rich	COLS IMD poor	COLS IMD rich
Personal				
Female	0.0926 *	-0.0113	-10.72 *	-0.496
Age	0.0576 ***	-0.0451 **	-0.052	-6.808 **
Age**2/100	-0.0601 ***	0.0409 *	0.0318	6.666 **
Married	-0.0274	-0.361 ***	-7.852	-8.939
German	-0.499 ***	0.0627	-8.985	-6.833
Education				
Junior high	-0.192 ***	0.228 *		
A level	-0.217 ***	0.447 ***		
School years			-0.825	-70.33
School years ²			0.0732	3.123
Occupation				
Self-employed	0.285 ***	0.152	1.73	5.792
Job				
Working hours (min. day)	0.00213 ***	-0.00131 ***	-0.0857	-0.1 *
Wage	-0.0758 ***	0.0781 ***	-1.714	3.71 ***
Family/Household				
Household size	-0.0975 **	0.0483	-2.172	-7.38
Couple 0 kids	-0.614 ***	0.621 ***	-22.04	21.48
Couple 1 kid	-0.149 *	-0.109	-9.921	-27.78
Couple 2 kids	0.0646	-0.591 ***	-11.99	-3.562
Couple > 2 kids	0.574 ***	-0.919 ***	-6.02	-12.86
Single parent	0.316 ***	-0.913 ***	-11.22	-43.65
Single > 1 kids	0.511 ***	-1.096 ***	-17.69	-44.6
Child care hours, paid ⁽²⁾	-0.00506	-0.00181	0.163	-0.539
Child care hours, unpaid ⁽²⁾	0.0184 **	-0.0346 *	-0.305	-4.024
Saturday	-0.00225	0.343 ***	-9.772	25.92 *
Sunday	0.0717	0.268 *	-17.22	51.74 **
Region				
County type ⁽³⁾	0.0157	-0.0297	0.506	-6.13
East Germany	0.302 ***	-0.177 *	-14.08	-8.561
Constant	-2.143 ***	-1.011 *	229.2 *	610.7
Mills' Lambda			-40.82	35.09
<i>n</i>	7 721	7 721	7 721	7 721
<i>Censored n</i>	6 772	7 285	6 772	7 285
<i>Uncensored n</i>	949	434	949	434
<i>Wald Chi(23)²</i>	91.81 ***	47.62 **	91.81	47.62 **

¹ IMD=interdependent multidimensional; ² Paid resp. unpaid child care of other individuals in mean hours per week; ³ County type/population density: 1 = county free cities ... 4 = thin populated rural counties; Significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: GTUS 2012/13; own presentation, weighted data, fulltime workers.

IMD Polarization Incidence

IMD Polarization incidence is estimated as the probability to be a member of the respective polarization pole (polarization risk, probit approach). The general result: remarkably, the polarization incidence can be explained predominantly by highly significant personal (women, elderly and foreigners with higher poverty risk), educational (higher education reduces IMD poverty), occupational and job variables (self-employed have a significant higher IMD poverty risk but not a higher affluence chance), family/household (couples with more than two children have a higher poverty risk but reduced affluence chances; received unpaid child care hours even raise IMD poverty risk and points to a particular temporal burden of families with children) and regional variables (living in East Germany more than 20 years after the reunification still increases the IMD poverty risk and decreases the IMD affluence chance).

IMD Polarization 2DGAP Intensity

Whereas the polarization incidence could be explained by many significant socio-economic variables the polarization intensity, the pole gaps measured by the multidimensional minimum 2DGAP can only hardly explained in a comparable manner. Gender only is influencing 2DGAP poverty polarization intensity, growing age reduces 2DGAP affluence polarization intensity. As expected, a higher wage rate will raise income and allows to reduce working hours in the affluence pole. Weekend activities, either direct or indirect, yield an increase of the affluence gap. However, many personal and human capital variables, daily working hour arrangements, the children situation, and the region are no more significant. Further background variables are needed to better explain the deepness, the intensity of multidimensional poverty and affluence.

6 Concluding Remarks

Interdependent multidimensional (IMD) polarization of time and income of fulltime workers over 20 years (1992 till 2013) in Germany is the topic of this study. Beyond the methodological 2DGAP contribution six striking general substantive results appear:

- First, genuine personal leisure time additional to income is a significant subjective well-being and polarization dimension.
- Second, the *interdependence of time and income*, its compensation/substitution, evaluated by the German Society, is of economic and statistical significance and strength the importance of dimensions interaction (as by the Garcia-Gomez et al. 2021 study). Remarkably, there are interdependent multidimensional (IMD) polarization regimes where even higher income cannot compensate time deficits, a result missed in the poverty and affluence discussion so far. The statement “time is money”, meaning time can be compensated by income, a core assumption in microeconomics, thus holds only limited.
- Third, *IMD polarization incidence* (headcount ratio): Almost every fifth individual (about 20% in all three survey years) belongs to the IMD polarization. IMD polarization incidence is asymmetric: the majority of the polarized fulltime workers are IMD poor.

Over 20 years in Germany IMD polarization incidence declines slightly but significantly. In other words, we find a slight rising share of the fulltime working middle class. In particular, the self-employed show a strong incidence tendency to the lower end of the distribution. And, IMD polarization incidence in all three survey years is by far more pronounced (twice as much) for self-employed than for employees.

- Fourth, *IMD polarization intensity* (measured by the two-dimensional 2DGAP distance) significantly increased over 20 years by more than 22%, a distinct result for an intensity drift to the tail ends of interdependent multidimensional polarization (alike the increased unidimensional income polarization incidence by Goebel et al. 2010 and Scherg 2014).

IMD polarization intensity is more pronounced for the rich than the poor (in all three years). However, over 20 years the multidimensional intensity scissor opened asymmetrically with a particular strong worsening of the poor compared to the rich and stronger for employees than self-employed. So, interdependent multidimensional polarization increased not by risk but rather by amount of “burden” particular for the poor.

Disentangling IMD polarization 2DGAP components: It is the income component (A) (employees stronger increase) to be responsible for the combined polarization 2DGAP intensity growth though the time component (B) still grew remarkably (again employees stronger).

- Fifth, Social participation and genuine personal leisure time: Polarization appears also with respect to social participation and corresponds to Amartya Sen’s enhanced poverty perspective; social participation is considerably lower among the IMD poor compared to the not IMD poor or to the middle class. Yet, almost 25% (IMD poverty) and around 30% (IMD affluence) of genuine personal leisure time is spent for social participation, a remarkable result despite that fulltime working restricts the remaining daily time.
- Sixth, Socio-economic influences, microeconomic results: Multidimensional polarization proved to be different for different socio-economic groups. In addition to the remarkable differences between self-employed and employees, there are additional significant impacts of personal variables (gender, age), education, job (working hours, wage), and region (East, West Germany). A higher polarization risk is given in particular for single parents and couples with children, the more the more children live in the household. Whereas the polarization risk could be better explained by many socio-economic factors behind, the polarization intensity, however, needs a broader set of background variables.

Some policy lessons

What can we learn for targeted policies? Polarization is multidimensional and should respect in particular the interdependence of time and income: The asymmetric IMD polarization incidence with a larger poverty pole, and the emerging strong growth of poverty incidence (in particular for self-employed) with a dominant growth of poverty intensity ask in particular for an active economic and social anti-polarization policy with focus on the poor and both, time and income. And, different IMD polarization pictures of self-employed and employees require different policy considerations.

Economic and social policy will deal differently according to the poverty and affluence pole when a decline in polarization is aspired. Yet, targeted policy needs detailed polarization information for which our study will be a contribution. A lot more could be discussed to it like the synchronizing of time dependent processes (public traffic and services) etc. to enable more time for personal activities (time policy discussion: www.zeitpolitik.de).

Again, and to emphasize our findings: the results stress the relevance of genuine personal leisure time with its social participation aspect as an important polarization dimension and an important dimension for individual and society well-being.

A last word: The detected polarization development in the two decades since the 1990s is embedded in many changes and disruptions in society worldwide and in Germany in

particular (more in Merz and Scherg 2021). Individual time and income polarization thus is definitively only a part, yet an important part which makes visible individual economic and social cohesion effects of the general economic, societal and cultural drifting apart.

Appendix

Table 4: Multidimensional Polarization of Time and Income: Descriptive Statistics – Germany 2012/13

	All		Working all		IMD poor		IMD rich	
	Mean	Std.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Personal								
Female	0.5094	0.4999	0.4122	0.4923	0.4289	0.4952	0.3641	0.4817
Age	46.6	19.4	42.0	12.6	41.2	13.0	45.1	12.5
Married	0.4964	0.5000	0.5023	0.5000	0.3692	0.4828	0.5223	0.5001
German	0.9824	0.1313	0.9833	0.1281	0.9769	0.1503	0.9832	0.1288
Education								
Junior high	0.3413	0.4742	0.3692	0.4826	0.4049	0.4911	0.2354	0.4247
A level	0.3667	0.4819	0.4619	0.4986	0.3522	0.4779	0.7068	0.4557
School years	10.12	3.34	11.13	2.00	10.63	2.26	12.06	1.49
Occupation								
Self-employed	0.1110	0.3142	0.1162	0.3205	0.2097	0.4073	0.1862	0.3897
Job								
Working hours (daily hours) ⁽¹⁾	2.71	4.1474	9.04	2.0029	9.79	2.8086	8.71	1.7726
Wage	6.53	8.64	10.98	6.30	7.09	4.45	17.86	9.82
Family/Household								
Household Size	2.54	1.23	2.60	1.24	2.46	1.40	2.21	0.94
Couple 0 kids	0.3113	0.4630	0.2540	0.4353	0.1193	0.3243	0.5151	0.5003
Couple 1 kid	0.1198	0.3248	0.1467	0.3538	0.1171	0.3217	0.0968	0.2960
Couple 2 kids	0.1550	0.3619	0.1751	0.3801	0.1358	0.3427	0.0726	0.2598
Couple >=2 kids	0.0730	0.2602	0.0664	0.2491	0.0978	0.2972	0.0144	0.1194
Single parent	0.0368	0.1883	0.0392	0.1941	0.0634	0.2438	0.0081	0.0897
Single > 1 kids	0.0213	0.1445	0.0176	0.1315	0.0232	0.1505	0.0036	0.0596
Child care hours, paid ⁽²⁾	0.4487	3.7840	0.5825	4.3655	0.4543	3.4926	0.2350	2.1406
Child care hours, unpaid ⁽²⁾	0.4520	2.4573	0.5507	2.5901	0.7315	3.4426	0.1207	0.9259
Saturday	0.1397	0.3467	0.1718	0.3772	0.1640	0.3705	0.2473	0.4319
Sunday	0.1479	0.3550	0.0401	0.1962	0.0564	0.2308	0.0409	0.1983
Region								
County type ⁽³⁾	2.14	0.98	2.16	1.00	2.25	1.09	1.93	0.87
East Germany	0.1999	0.3999	0.2123	0.4089	0.3430	0.4750	0.1052	0.3072
Income ⁽⁴⁾ (€)	1 503.14	732.32	1 673.70	758.96	944.39	476.85	3 207.45	901.85
Time ⁽⁵⁾ (minutes)	333.02	172.20	198.72	104.47	93.88	84.83	285.45	112.31
n ⁽⁶⁾	32 103		7791		964		439	
N ⁽⁶⁾	222 815 028		61 960 352		7 163 002		4 635 595	

IMD=interdependent multidimensional; ¹ Main or secondary job, diary day ² Paid resp. unpaid child care of other individuals in mean hours per week; ³ County type/population density: 1 = county free cities ... 4 = thin populated rural counties 4) Equalized monthly household net income in 2002 prices ⁵ Genuine personal leisure time, diary day ⁶ Persondays

Source: GTUS 2012/13; own presentation, weighted data, fulltime workers.

7 References

Aaberge, R. and A. Brandolini (2015), *Multidimensional Poverty and Inequality*, in: Atkinson and Bourguignon 2015, 141-216.

- Alkire, S. and J. Foster (2011), *Counting and Multidimensional Poverty Measurement*, in: Journal of Public Economics, 95, 7-8, 476-487.
- Alvaredo, F., Chancel, L., Piketty, Th., Saez, E. and G. Zucman (2018), *The World Inequality Report 2018*, World Inequality Lab.
- Atkinson, A. B. and F. Bourguignon (2015), *Handbook of Income Distribution*, Elsevier, North-Holland, Amsterdam, Tokio.
- Atkinson, A.B. (2003), *Multidimensional Deprivation: Contrasting Social Welfare and Counting Approaches*, in: Journal of Economic Inequality, 1, 51-65.
- Atkinson, A.B. (2015), *Inequality. What can be done*, Harvard University Press, Cambridge, Massachusetts USA, London UK.
- Atkinson, A.B. and T. Piketty (Eds.), (2007), *Top Incomes Over the 20th Century A Contrast Between Continental European and English-Speaking Countries*, Oxford University Press, Oxford.
- Becker, G.S. (1965), *A Theory of the Allocation of Time*, in: Economic Journal, 75, 493-517.
- Berg, A.G. and J. Ostry (2011), *Inequality and Unsustainable Growth: Two Sides of the Same Coin?* IMF Discussion Note SDN/11/08, Washington.
- Bertelsmann Stiftung (2014), *Social Cohesion Radar – An International Comparison of Social Cohesion*, www.gesellschaftlicher-zusammenhalt.de.
- Bittman, M. (1999), *Social Participation and Family Welfare: The Money and Time Cost of Leisure*, SPRC Discussion Paper No. 95, Sydney.
- Bossert, W., Chakravarty, S.R. and C. D’Ambrosio (2013), *Multidimensional Poverty and Material Deprivation with Discrete Data*, in: The Review of Income and Wealth, 59, 1, 29-43.
- Bourguignon, F. and S.R. Chakravarty (2003), *The Measurement of Multidimensional Poverty*, in: Journal of Economic Inequality 1, 1, 25-49.
- Bundesregierung (2002, 2004, 2011, 2013), *Lebenslagen in Deutschland, Der erste (zweite, dritte, vierte) Armuts- und Reichtumsbericht der Bundesregierung*, Bundesministerium für Gesundheit und Soziale Sicherung, Berlin.
- Burchardt, Tania (2008), *Time and Income Poverty*, Centre for Analysis of Social Exclusion, London School of Economics, London (UK).
- Burkhauser, R.V., De Neve, J.-E. and N. Powdthavee (2017), *Top Incomes and Human Well-being Around the World*, in: Journal of Economic Psychology, 2017, 62, 246-257.
- Ceriani, L. and Ch. Gigliarano (2020), *Multidimensional Well-Being: A Bayesian Networks Approach*, in: Social Indicators Research, 152, 237–263.
- Chakravarty, S. R. (2018), *Analyzing Multidimensional Well-Being: A Quantitative Approach*, Wiley, Hoboken.
- Chakravarty, S.R. and Silber, J. (2008), *Measuring Multidimensional Poverty: The Axiomatic Approach*, in: Kakwani, N. and J. Silber 2008, 192-209.
- Clark, A. (2016), *SWB as a Measure of Individual Well-Being*, in: M. Adler and M. Fleurbaey (Eds.), Oxford Handbook of Well-Being and Public Policy, Oxford University Press, Oxford.
- Clark, A.E., Frijters, P. and M. Shields (2008), *Relative Income, Happiness and Utility: An Explanation for the Easterlin Paradox and Other Puzzles*, in: Journal of Economic Literature, 46, 95-144.
- De Graaf, J. (Ed.) (2003), *Take Back Your Time*, Berrett-Koehler Publishers, San Francisco.
- Dell, F., (2007), *Top Incomes in Germany Throughout the Twentieth Century: 1891-1998*, in: Atkinson and Piketty 2007, 365-425.,
- destatis.de: German Federal Statistical Office (2021).

- Deutsch, J. and J. Silber (2005), *Measuring Multidimensional Poverty: An Empirical Comparison of Various Approaches*, in: *The Review of Income and Wealth*, 51, 1, 145-174.
- Downs, A. (1957), *An Economic Theory of Political Action in a Democracy*, in: *The Journal of Political Economy*, 65, 2, 135–150.
- Drewnoski, J. (1978), *The Affluence Line*, in: *Social Indicators Research*, 5, 3, 263–278.
- Duclos, J.-Y. and A.-M. Taptué (2015), *Polarization*, in: Atkinson and Bourguignon 2015, 301-358.
- Duclos, J.-Y., Esteban, J.-M. and D. Ray (2004), *Polarization: Concepts, Measurement, Estimation*, in: *Econometrica*, 72, 6, 1737–1772.
- Easterly, W. (2001), *The Middle Class, Consensus and Economic Development*, in: *Journal of Economic Growth*, 6, 4, 317–335.
- Edo, M., Escudero, W. and M. Svarc (2021), *A Multidimensional Approach to Measuring the Middle Class*, in: *Journal of Economic Inequality*, 19, 139-162.
- Ehling, M. (2003), *Erhebungen zur Zeitverwendung 1991-92 und 2001-02. Skizzierung des methodischen Vorgehens*, in: *Wirtschaft und Statistik - Sonderausgabe anlässlich des 54. Weltkongresses des Internationalen Statistischen Instituts vom 13. bis 20. August 2003 in Berlin*, 85-87.
- Ehling, M., Holz, E. and I. Kahle (2001), *Erhebungsdesign der Zeitbudgeterhebung 2001/2002*, in: *Wirtschaft und Statistik*, 427–436.
- Esteban, J.-M. and D. Ray (1994), *On the Measurement of Polarization*, in: *Econometrica*, 62, 4, 819–851.
- Esteban, J.-M., Gradin, C. and D. Ray (2007), *An Extension of a Measure of Polarization, with an Application to the Income Distribution of Five OECD Countries*, in: *Journal of Economic Inequality*, 5, 1, 1–19.
- Ferrer-i-Carbonell, A. and X. Ramos (2014), *Inequality and Happiness*, in: *Journal of Economic Surveys*, 28, 5, 1016-1027.
- Foster, J. and M.C. Wolfson (2010), *Polarization and the Decline of the Middle Class, Canada and the U.S.*, in: *Journal of Economic Inequality*, 8, 2, 247–273.
- Fratscher, M. (2016), *Verteilungskampf – Warum Deutschland immer ungleicher wird (The Battle for Redistribution – Why Germany is becoming more unequal)*, Hanser, Munich.
- Frey, B.S. and A. Stutzer (2005), *Happiness Research: State and Prospects*, in: *Review of Social Economy*, LXII, 2, 207-228.
- García-Gómez, C., Pérez, A. and M. Prieto-Alaiz (2021), *Copula-Based Analysis of Multivariate Dependence Patterns between Dimensions of Poverty in Europe*, in: *The Review of Income and Wealth*, 67, 1, 165-195.
- Gigliarano, C. and K. Mosler (2009), *Constructing Indices of Multivariate Polarization*, in: *Journal of Economic Inequality*, 7, 4, 435–460.
- Goebel, J., Gorning, M. und H. Häußermann (2010), *Polarisierung der Einkommen: Die Mittelschicht verliert*, Wochenbericht des DIW Berlin, Nr. 24, Berlin.*
- Goebel, Jan, Grabka, Markus M., Liebig, Stefan, Kroh, Martin, Richter, David, Schröder, Carsten und Jürgen Schupp (2019), *The German Socio-Economic Panel Study (SOEP)*, in: *Jahrbücher für Nationalökonomie und Statistik / Journal of Economics and Statistics* 239, Nr. 2, 345-360, doi: <http://doi.org/10.1515/jbnst-2018-2022>.
- Goodin, R., Rice, J., Parpo, A. and L. Eriksson (2008), *Discretionary Time: A New Measure of Freedom*, Cambridge University Press, Cambridge (UK).

- Graafland, J. and B. Lous (2019), *Income Inequality, Life Satisfaction Inequality and Trust: A Cross Country Panel Analysis*, in: *Journal of Happiness Studies*, 20, 1717–1737, <https://doi.org/10.1007/s10902-018-0021-0>.
- Grabka, M. and J.R. Frick (2008), *Schrumpfende Mittelschicht – Anzeichen einer dauerhaften Polarisierung der verfügbaren Einkommen*, Wochenbericht des DIW Berlin, Nr. 10, Berlin.
- Grabka, M.M., Goebel, J. and S. Liebig (2019), *Wiederanstieg der Einkommensungleichheit – aber auch deutlich steigende Realeinkommen*, DIW Wochenbericht Nr. 19, 350, Berlin.
- Harvey, A.S. and A.K. Mukhopadhyay (2007), *When Twenty-Four Hours is Not Enough: Time Poverty of Working Parents*, in: *Social Indicators Research*, 82, 1, 57-77.
- Hauser, R. and Becker, I. (2003), *Anatomie der Einkommensverteilung – Ergebnisse der Einkommens- und Verbrauchsstichproben 1969–1998*. edition sigma, Berlin.
- Heckman, J.J. (1976), *The Common Structure of Statistical Models of Truncation, Sample Selection, and Limited Dependent Variables and a Simple Estimator for Such Models*, in: *Annals of Economic and Social Measurement*, 5, 475-492.
- Kakwani, N. and J. Silber (Eds.) (2008), *Quantitative Approaches to Multidimensional Poverty Measurement*, Palgrave Macmillan, Houndmills, Basingstoke, Hampshire.
- Kmenta, J. (1967), *On Estimation of the CES Production Function*, in: *International Economic Review*, 8, 2, 180-189.
- Linder, S.B. (1970), *The Harried Leisure Class*, New York, London.
- Lugo, M.A. and E. Maasoumi (2009), *Multidimensional Poverty Measures from an Information Theory Perspective*, OPHI Working paper No. 10, Oxford Poverty & Human Development Initiative, Oxford.
- Masuda Y.J., Williams, J.R. and H. Tallis. (2020), *Does Life Satisfaction Vary with Time and Income? Investigating the Relationship Among Free Time, Income, and Life Satisfaction*, in: *Journal of Happiness Studies*, <https://doi.org/10.1007/s10902-020-00307-8>.
- Merz, J. (2006), *Polarisierung der Einkommen von Selbständigen? – Zur Dynamik der Einkommensverteilung von Freiberuflern und Unternehmern*, in: Merz, J. (Ed.), *Fortschritte der Mittelstands Forschung*, CREPS-Schriftenreihe Vol. 3, Lit Verlag, Münster, 395-415.
- Merz, J. (2017), *Freie Berufe – Einkommen, Zeit und darüber hinaus: Aktuelle Forschungsergebnisse für Wissenschaft*, FFB-Schriftenreihe Band 23, Nomos Verlagsgesellschaft, Baden-Baden.
- Merz, J. and B. Scherg (2014), *Polarization of Time and Income – A Multidimensional Analysis for Germany*, in: *Research on Economic Inequality*, 22, 273-321, DOI: 10.1108/S1049-258520140000022009.
- Merz, J. and B. Scherg (2016), *Freie Berufe – Hat die Ungleichheit und Polarisierung von Einkommen und Zeit zugenommen?* FFB-Diskussionspapier Nr. 103, Leuphana University Lüneburg, Lüneburg.
- Merz, J. and B. Scherg (2017), *Zeit, Wohlstand und Zufriedenheit – Multidimensionale Polarisierung von Zeit und Einkommen: Selbständige und abhängig Beschäftigte*, in: *Statistisches Bundesamt (Ed.), Wie die Zeit vergeht – Analysen zur Zeitverwendung in Deutschland*, Wiesbaden, 257-297.
- Merz, J. and B. Scherg (2021), *Time, Income and Subjective Well-Being – 20 Years of Interdependent Multidimensional Polarization in Germany*, Institute of Labor Economics, IZA Discussion Paper No. 14870, Bonn.
- Merz, J. and T. Rathjen (2014a), *Time and Income Poverty: An Interdependent Multidimensional Poverty Approach with German Time Use Diary Data*, in: *The Review of Income and Wealth*, 60, 3, 450-479, DOI: 10.1111/roiw.12117.

- Merz, J. and T. Rathjen (2014b), *Multidimensional Time and Income Poverty: Well-Being Gap and Minimum 2DGAP Poverty Intensity - German Evidence*, in: Journal of Economic Inequality, 12, 4, 555-580, DOI: 10.1007/s10888-013-9271-6.
- Merz, J. and Tim Rathjen (2016), *Entrepreneur and Freelancers: Are They Time and Income Multidimensional Poor? - The German Case*, FFB-Discussion Paper No. 102, Leuphana University Lüneburg, Lüneburg and IZA Discussion Paper No. 9912, IZA, Bonn.
- Merz, J., Hirschel, D. and M. Zwick (2005), *Struktur und Verteilung hoher Einkommen - Mikroanalysen auf der Basis der Einkommensteuerstatistik*, Gutachten zum zweiten Armuts- und Reichtumsbericht der Bundesregierung, Lebenslagen in Deutschland, Bundesministerium für Gesundheit und Soziale Sicherung, Berlin (<http://www.bmgs.bund.de/download/broschueren/A341.pdf>).
- Mood, C. and J.O. Jonsson (2016), *The Social Consequences of Poverty: An Empirical Test on Longitudinal Data*, in: Social Indicators Research, 127, 633-652.
- OECD (2008), *Growing Unequal? Income Distribution and Poverty in OECD Countries*, Paris.
- OECD (2014), *Focus on Inequality and Growth*, Paris.
- OECD (2015), *How's life – Measuring Well-being*, Paris.
- OECD/Cingano, F. (2014), *Trends in Income Inequality and its Impact on Economic Growth*, OECD Social, Employment and Migration Working Papers, No. 163, OECD Publishing, Paris, <https://doi.org/10.1787/5jxrjncwvxv6j-en>.
- Osberg, L. (Ed.) (2003), *The Economic Implications of Social Cohesion*, University of Toronto Press, Toronto, Canada.
- Parker, S. (2004), *The Economics of Self-Employment and Entrepreneurship*, Cambridge University Press.
- Peichl, A. Schaefer, T. and C. Scheicher (2010), *Measuring Richness and Poverty – A Micro Data Application to Europe and Germany*, in: The Review of Income and Wealth, 56, 3, 597–619.
- Polachek, S.W. and W.S. Siebert (1999), *The Economics of Earnings*, Cambridge University Press, Cambridge.
- Rosa, H. (2005), *Beschleunigung - Die Veränderung der Zeitstrukturen in der Moderne*, Suhrkamp, Frankfurt am Main.
- Scheicher, C. (2010), *Measuring Polarization via Poverty and Affluence*, Köln Discussion Papers in Statistics and Econometrics, Köln.
- Scherg, B. (2014), *Ist die Einkommenspolarisierung gestiegen? - Alternative Messkonzepte und ihre Ergebnisse für Selbständige und abhängig Beschäftigte in Deutschland*, FFB-Diskussionspapier Nr. 97, Leuphana University Lüneburg, Lüneburg.
- Sen, A.K. (1985), *Commodities and Capabilities*, North-Holland, Amsterdam.
- Sen, A.K. (1999), *Development as Freedom*, Knopf Publishers, New York.
- Stiglitz, J. (2015), *The Great Divide- Unequal Societies and What We Can Do About Them*, W.W. Norton & Company, New York.
- Stiglitz, J. E., Sen, A., and J.-P. Fitoussi (2010), *Report by the Commission on the Measurement of Economic Performance and Social Progress*, Technical Report, Institut National de la Statistique et des études économiques, Paris.
- Thewissen, S. (2014), *Is it the Income Distribution or Redistribution that Affects Growth?*, in: Socio-Economic Review, 12, 3, 545-571.
- Vickery, C. (1977), *The Time-Poor: A New Look at Poverty*, in: Journal of Human Resources, 12, 1, 27-48.

Wang, Y.-Q. and K.-Y. Tsui (2000), *Polarization Orderings and New Classes of Polarization Indices*, in: *Journal of Public Economic Theory*, 2, 3, 349–363.