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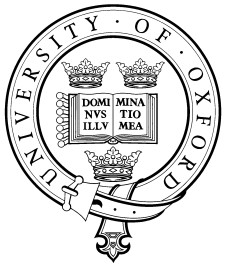


OPHI WORKING PAPER NO. 103

Comparing Monetary and Multidimensional Poverty in Germany

Nicolai Suppa*

April 2016

Abstract
This paper compares Germany's official income-based poverty measure with a multidimensional poverty index based on the Alkire-Foster method. For their comparative assessment, I employ the capability approach as a conceptual framework. I find both measures agree on certain aspects, such as socio-demographic risk factors. However, I also document a substantial mismatch in who is deemed poor, which seems to originate from inherent, conceptual features of the measures. More generally, the results also suggest additional individual income reduces multidimensional poverty, if only at a decreasing rate. Examining regional variations, I find that the measures do not agree about trends in poverty and that there is no clear-cut link between aggregate income and multidimensional poverty. I conclude that, despite some basic agreement, the choice of poverty measure makes a difference, with properly designed multidimensional poverty indices having the advantage of better reflecting human well-being.

Keywords: multidimensional poverty, Alkire-Foster method, capability approach, SOEP.

JEL classification: I32, D63, H1.

Acknowledgements
The author gratefully acknowledges funding by the German Research Foundation (DFG).

Citation: Suppa, N. (2016). "Comparing monetary and multidimensional poverty in Germany." *OPHI Working Paper* 103, University of Oxford.

* TU Dortmund, Department of Economics, 44221 Dortmund, Germany, e-mail: nicolai.suppa@tu-dortmund.de, phone: +49 231 755-4374, fax: +49 231 755-5404. The author gratefully acknowledges funding by the German Research Foundation (DFG).

This study has been prepared within the OPHI theme on multidimensional measurement.

ISSN 2040-8188 ISBN 978-19-0719-490-0

1 Introduction

Background. The fight against poverty enjoys popularity among researchers and policy makers alike. However, an agreement about what poverty is exactly and how it is best measured is still missing. Conceptually, rather different routes have been proposed to pin down what poverty precisely means; Ruggeri Laderchi *et al.* (2003) compare some of them. Many approaches consider poverty as a shortfall in resources, whether in income, consumption expenditures or a lack of essential goods. Other approaches locate poverty in the utility space, while yet others proclaim that basic needs have to be met. Finally, some attempts widen the perspective further and study social exclusion or argue poverty and well-being to be constitutively multidimensional, as the capability approach does. Finding an appropriate cutoff to distinguish poor and non-poor further adds to the diversity of approaches. Issues of data quality and availability also affect the choice of approach. Consequently, empirical applications adopt rather different strategies.

Progress in Multidimensional Methods. However, during the last 15 years multidimensional poverty measurement has advanced significantly (Tsui, 2002, Bourguignon & Chakravarty, 2003, Alkire & Foster, 2011a). Moreover, a consensus that poverty is multidimensional seems have emerged (Ravallion, 2011, Alkire & Foster, 2011b, Ferreira, 2011). Important as it is, this agreement neither implies a particular conceptual framework nor a specific method for measurement. Nevertheless, multidimensional measures, in general, and the Alkire-Foster method in conjunction with the capability approach, in particular, are attracting more and more attention, see e.g. Alkire & Santos (2014), UNDP (2010). Thus far, the relative performance of novel multidimensional and conventional income-based methods is largely unknown for both developing and advanced economies. Closing this gap is the aim of this paper.

Significance. A careful comparison of monetary and multidimensional measures is of paramount importance, since target group, trends, conclusions and policy measures may vary significantly. The importance of this issue manifests in two (partly related) debates. On the one hand, within development economics, monetary poverty and broader concepts of poverty have been compared against each other for quite some time (Drèze & Sen, 1989, World Bank, 1990, UNDP, 1990, Ravallion & Chen, 1997, Klasen, 2000, Ruggeri Laderchi *et al.* , 2003). On the other hand, in advanced economies, after the seminal work of Slesnick (1993) measuring poverty received renewed attention (see Meyer & Sullivan, 2012). The lat-

ter debate, however, largely maintains a utilitarian perspective and is confined to monetary poverty measures (i.e., income and consumption poverty), whereas the former debate goes explicitly beyond this on the conceptual level.

Contribution. In this study I compare a multidimensional poverty index, similar to the one suggested in Suppa (2015), against the official income poverty measure using German panel data. The multidimensional poverty index is compiled using the Alkire-Foster method and conceptually embedded within the capability approach (Sen, 1985, 1992, 1999). The latter supports both the operationalization of the index and the comparative assessment of both poverty measures. Specifically, I argue that well-specified multidimensional poverty indices reflect human well-being better than resource-based approaches in general and income-based poverty measures in particular.

I find both measures agree on some aspects, e.g., higher risks of poverty for people with a migration background and for women. However, I also document a substantial mismatch in who is deemed poor. Neither stricter poverty cutoffs, nor a focus on permanently poor improves the overlap substantially. Therefore, the mismatch in who is deemed poor seems to originate from more inherent, conceptual features of the measures. Exploring the link between individual income and multidimensional poverty more fundamentally, I find additional individual income reduces multidimensional poverty, if only at a decreasing rate. This link is important for both a better understanding of how resources translate into well-being and for devising efficient anti-poverty strategies. Finally, when examining regional variations, the results suggest both measures disagree about trends in poverty and offer no support for a clear-cut link between aggregate income and multidimensional poverty. I conclude that, despite some basic agreement, the choice of poverty measure makes a difference because, not only are different people considered poor, but, also, trends in poverty appear to vary.

Previous Literature. The means for comparing poverty measures have been applied throughout numerous previous studies. For instance, studies frequently examine the overlap of the populations identified as poor in the cross-section (Klasen, 2000, Meyer & Sullivan, 2012). Both studies document a modest agreement between who is poor based on income and who is poor based on alternative measures. Using German data, Noll & Weick (2007) confirm this modest agreement for income and consumption poverty measures. If panel data is available, the overlap of the persistently poor can be studied as well. Whelan *et al.* (e.g., 2004) document a similar level of mismatch for both the longitudinal and the cross-sectional perspective. The role of socio-demographic risk factors is also routinely studied (see e.g. Delhausse *et al.* ,

1993). Meyer & Sullivan (2012, p. 112) emphasize the importance of assessing the measures' relative performance on the basis of the characteristics of those who are poor according to only one measure. See McGregor & Nachane (1995) for a more mechanical assessment using researchers' preference parameters. Finally, trends are frequently compared in the aggregate and found to vary significantly (e.g., Slesnick, 1993, Meyer & Sullivan, 2012). Akin to this work, the present study is essentially an explorative empirical investigation. The final assessment of the evidence, however, requires a conceptual viewpoint.

Outline. The remainder of this paper is structured as follows: Brief expositions of the Alkire-Foster method and the conceptual background are provided in section 2 and section 3, respectively. Section 4 introduces both data and specification. Section 5 presents the results and section 6 offers some concluding remarks.

2 The Alkire-Foster Method

The Alkire-Foster method offers numerous benefits for the evaluation of both poverty-relevant developments and policy measures. The exposition here is restricted to those aspects used in the subsequent empirical analysis. Further aspects are found elsewhere, e.g., in Alkire & Foster (2011a,b).

Identification. The matrix y contains the available data, is of size $N \times D$, and describes for each individual the achievement in each dimension deemed relevant. Specifically, $y_{id} \geq 0$ represents the achievement of individual $i = 1,\ldots,N$ in dimension $d = 1,\ldots,D$. The row vector z, with $z_d > 0$, describes the deprivation cutoffs, i.e., the achievements necessary for not being considered as deprived in the respective dimension. Using this information, we obtain the deprivation vector c by counting individual deprivations, i.e., the column vector's elements are $c_i = \sum_{d=1}^{D} \mathbb{1}(y_{id} < z_d)$. Following Bourguignon & Chakravarty (2003), the discrimination between poor and non-poor individuals depends critically on dimensional achievements and the respective cutoffs. Thus identification can be described by a function $\rho(y_i, z)$. Several approaches have been suggested so far. While the union approach is characterized by $\rho(y_i, z) = \mathbb{1}(c_i \geq 1)$, the intersection approach requires $c_i = D$. The key idea of Alkire & Foster (2011a) is to define $\rho_k(y_i, z) = \mathbb{1}(c_i \geq k)$ for $k = 1,\ldots,D$. Since ρ_k depends on both the dimension-specific cutoffs z_d and the overall cutoff k, it is called the dual cutoff approach. The union and intersection approaches are included as special cases ($k = 1$ and $k = D$).

Aggregation. A simple form of aggregation is the calculation of the headcount ratio, which is defined as $H = q/N$, where $q = \sum_{i=1}^{N} \mathbb{1}(c_i > k)$ is the number of the poor. Additionally, to take account of the breadth of poverty we first censor the counting vector of deprivations for the non-poor and thus define $c(k)$ with elements $c_i(k) = \mathbb{1}(c_i \geq k)c_i$ for all $i = 1,\ldots,N$. As $c_i(k)/D$ is the share of all possible deprivation suffered by i, $A = \sum_{i=1}^{N} c_i(k)/(qD)$ represents the average deprivation suffered by the poor. Alkire & Foster (2011a) then define the adjusted headcount ratio as $M_0 = \frac{1}{N}\sum_{i=1}^{N} c_i(k) = HA$, which is sensitive to both changes in incidence and breadth of poverty. In principle other members of the Foster-Greer-Thorbecke class of measures (see Foster *et al.* , 1984) can be applied as well—their discussion is however beyond the scope of this paper.

Weights. So far we have assumed equal weights for all dimensions. To allow for different weights, we introduce a weighting vector w with $\sum_{d=1}^{D} w_d = 1$. Then the weighted deprivation count becomes $c_i = \sum_{d=1}^{D} w_d \mathbb{1}(y_{id} \leq z_d)$, and $M_0 = \frac{D}{N}\sum_{i=1}^{N} c_i(k)$.

3 Conceptual Background

Compiling and comparing poverty measures is not taking place in vacuo. From the outset to the final assessment of the results, a conceptual framework is required that explicates what exactly is to be measured and how to probe a measure's cogency. Thus what is needed for the present study is a grounded understanding of poverty and well-being. To this end I draw on the capability approach (CA), which was developed by Sen (1985, 1992, 1999).[1]

Capability Approach. The CA locates human well-being in the functionings space. Functionings are the doings and beings that an individual has reason to value (e.g., being well-nourished, being happy or participating in social life). Therefore, human well-being and, thus, poverty are inherently multidimensional. Going beyond achievements, the set of all functioning vectors an individual can actually choose is called the capability set. Actual opportunities to choose a certain functioning vector or the capability set matter in several ways. One may value the actual opportunity (or the substantive freedom) to participate in political life without choosing it, and being able to choose (the process aspect of freedom) is important, too.[2] Finally, it is the capability set that clearly brings out the contrast in well-being between a starving and a fasting person. Accordingly, poverty is understood as capability

[1] For helpful overviews and introductions see, e.g., Alkire (2005, 2009), Robeyns (2005, 2011).
[2] On the process aspect of freedom and the opportunity aspect, see Sen (1993).

deprivation, implying both a shortfall in one or several of the functionings deemed relevant and their infeasibility for the individual in question.[3]

Within the CA, income is considered as a resource that helps a person achieve a decent being and doing. More specifically, income can be used to buy commodities, which in turn provide characteristics, such as a certain amount of calories (Lancaster, 1966, 1971). Characteristics, in turn, are converted into functioning achievements. This conversion, however, is moderated by a set of parameters that may vary between individuals (e.g., for metabolic diseases), societies (e.g., due to social and legal norms) and the environment (e.g., for different climates).

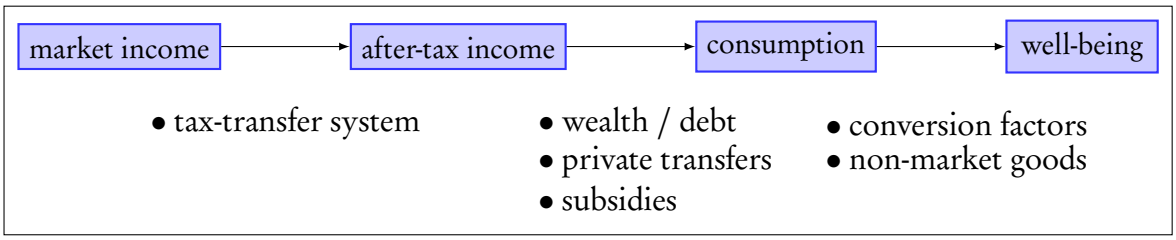
While conceptually convincing, most critics of the CA point to its exacting demands regarding data. In fact, several scholars considered the CA to be inoperative because of this (e.g., Sugden, 1993, Srinivasan, 1994, Comim, 2008). However, explicating the normative and conceptual details correctly up front is precisely one of the CA's strengths (Suppa, 2014). Only then are the deficiencies of operationalizations and measures unveiled and straight forward to spot. Comparing alternative, possibly imperfect poverty measures, precisely illustrates this advantage.

Well-being and Poverty Measurement. By now, most scholars agree that well-being and poverty are truly multidimensional and go beyond material well-being (Ferreira, 2011). Slesnick (2001, p.8), for instance, begins with: "I acknowledge at the outset that I am looking at only one of many possible dimensions of the standard of living. The development of a more comprehensive concept of individual and social welfare will be left for future investigation." However, when devising a measure of poverty or well-being, a conceptual notion of the target is still required. Many studies adopt the standard economics paradigm which "describes consumers as 'rational' agents who choose the combination of goods that maximizes welfare (i.e., utility) subject to the constraint of limited financial resources. Well-being is a function of the quantities consumed so that, in this framework, it is at least theoretically possible to infer the level of welfare from the observed quantities of the goods consumed" (Slesnick, 2001, p.8–9). Like Slesnick (1993, 2001), most scholars who advocate for consumption-based poverty measures argue that such a measure is closer to an individual's welfare. From this view, it also makes sense to examine the standard of living of the poor (Mayer, 1993) and thereby support a poverty measure's validity. More recently, Meyer & Sullivan (2003) conclude that consumption measures are better suited to proxy shortfalls in well-being because they are more closely linked to material hardship and adverse family outcomes.

[3] On poverty as capability deprivation, see in particular Sen (1992, ch. 7) and Sen (1999, ch. 4).

In contrast, multidimensional approaches are, in principle, capable of measuring poverty directly in terms of well-being, i.e. in functioning achievements. For reasons of data availability and quality, however, resources are still frequently used. Nevertheless, a major strength of a properly specified multidimensional poverty index is that it reflects the lives poor people actually lead—by construction. In this sense, multidimensional measures provide support for capturing an individual's well-being by themselves.

Figure 1: Stylized Production Process of Well-Being



Production and Well-being. Figure 1 depicts a stylized production process of well-being that highlights the different starting points for poverty measurement. Conventional poverty measures have frequently used (pre-tax) market income, disposable income, or consumption expenditures. Between the single stages of production, factors are given that render the adjacent concepts incongruent. These factors also give reasons as to why lower stages might be more deficient measures of well-being. The recent literature advocating for a consumption poverty measure in the US (e.g., Meyer & Sullivan, 2012) emphasizes the role of the tax-transfer system, as it contains major anti-poverty instruments. The effects of such anti-poverty instruments would be ignored by poverty measures drawing on market income, suggesting these measures to be particular inaccurate. In addition, this literature also documents the empirical importance of wealth and access to credit markets in consumption smoothing, as well as the importance of specific subsidies (e.g., food stamps, student discounts, etc.).

Finally, the capability perspective offers a detailed account of how consumption translates into well-being. Specifically, the CA emphasizes the role of conversion factors that may result in resources being a poor proxy for an individual's beings and doings. Individuals with metabolic diseases, for instance, may need to spend more on food to achieve the same level of "being well-nourished." Likewise, elderly people may need additional resources to move about freely or to participate in social life (e.g., transport services, etc.). For still other achievements money may be of lower priority or even insufficient, just think of achieving various self-set goals (agency), self-fulfilment or self-respect. Moreover, conversion factors can essentially result in entrenched deprivation. In education, for instance, social and sometimes

legal norms, rather than a shortage of resources, can be the cause of deprivation. Similar arguments can be given for social participation, appearing in public without shame, etc.

Therefore, acknowledging that incomes, expenditures and functionings represent different stages in the production process of well-being, it is after all not too surprising that the respective measures disagree about who is poor—it is, in fact, quite reasonable. Specifically, against the background of the previously found modest overlap in consumption- and income-poor people (Noll & Weick, 2007, Meyer & Sullivan, 2012), I expect also a modest overlap in income and multidimensionally poor people.

4 Data and Specification

Sample. For the analysis I use data from the German Socio-Economic Panel (SOEP) and calculate a multidimensional poverty index for two years 2007, 2012.[4] As a panel, the SOEP allows one to observe the same individuals in different years, and the present study uses this information explicitly. Thus, the target population consists of adults who lived in Germany from 2007 to 2011. Therefore, people who leave or enter Germany, die, or reach the age of 18 between these years are ignored. Consequently, some results may not exactly match findings based purely on cross-sectional data as both approaches essentially study different populations.

The SOEP provides information on numerous aspects of a respondent's life. However, to avoid overwhelming the respondents, some questions are only asked every other year (or less frequently), whereas other items are only collected in between these years. The waves of 2007 and 2011 are particularly suited for compiling a comprehensive multidimensional index as many relevant items are collected.

The subsequent analyses utilize longitudinal weights. Broadly speaking, the longitudinal weights used are the product of the inverse sampling probabilities and each of the subsequent years' staying probabilities. Thus, these weights account, among other things, for the complex survey design and unit non-response in both the cross-section and the longitudinal section (i.e., panel attrition).[5]

[4] I use SOEP data v29.1, provided by the DIW Berlin; see Wagner *et al.* (2007) for more details. The data used in this paper was extracted using the add-on package PanelWhiz for Stata. PanelWhiz (http://www.panelwhiz.eu) was written by Dr. John P. Haisken-DeNew (john@PanelWhiz.eu). See Hahn & Haisken-DeNew (2013) and Haisken-DeNew & Hahn (2010) for details. The PanelWhiz-generated DO file to retrieve the data used here is available from me upon request. Any data or computational errors in this paper are my own.

[5] For more details see Haisken-DeNew & Frick (2005), Rendtel (1995).

Table 1: Functionings, Indicators, and Weights

Functioning	Deprivation cutoff	Variable	Weight
Education	left school without graduation or graduation but no vocational qualification[a]	dep_educ	1/6
Housing	house requires major renovation or is ready for demolition	dep_housecond	1/18
	any of bath, kitchen, water, or toilet is missing	dep_hhfacilities	1/18
	less than 1 room per person in household	dep_overcrowded	1/18
Health	partially or severely disabled	dep_disability	1/12
	respondent reports her health to be *poor* or *bad*	dep_health	1/12
Precarity	reporting 2/4 goods missing for financial reasons[b]	dep_matdep	1/12
	precariously employed (incl. temporary work)	dep_precemp	1/12
Social Participation	at least 5/7 activities are performed *never*; remaining at most *less than monthly*[c]	dep_actindex	1/12
	respondent report to *never* meet her friends	dep_meetfriends	1/12
Employment	registered unemployed	dep_unemp	1/6
	working less than 30 hours a week, but desiring to work more	dep_underemp	1/12

Notes: [a] Graduation in Germany is usually achieved after 10 years of schooling. [b] The four goods asked for are (i) a warm meal, (ii) whether friends are invited for dinner, (iii) whether money is put aside for emergencies, and (iv) whether worn-out furniture is replaced. [c] Activities included are (i) going to the movies, pop music concerts, dancing, disco, etc, (ii) going to cultural events (such as concerts, theater, lectures), (iii) doing sports yourself, (iv) volunteer work, (v) attending religious events, (vi) helping out friends, relatives or neighbours (vii) involvement in a citizens' group, political party, local government.

Operationalization and Specification. The operationalization of the present study draws on both the capability approach and the German government's official reports on poverty and wealth. A broader specification and further issues in the operationalization are discussed in Suppa (2015). In this paper I opt for a narrower specification, since individual changes in poverty status are studied as well, which requires the calculation of longitudinal weights. Merging two waves into one, as Suppa (2015) does, would render the present analysis more complicated.

Note, however, that for recent efforts to improve the measurement of well-being in high-income countries, a consensus on relevant dimensions seems to emerge, see for instance Stiglitz *et al.* (2009), OECD (2011). Consequently, improving and selecting indicators, along with their availability, in large-scale data sets become the more pressing issues. Table 1 shows the selected functionings and their indicators, along with their weights. Note that almost all indicators are either already core indicators of or, at least, analysed within the official reports on poverty and wealth (e.g., Bundesregierung, 2013, 461–491).

Dimensions. *Education* is meant to capture not only achievements in reading and writing, but also the ability to use one's senses, to imagine, think, and reason (see Nussbaum, 2001). The indicator dep_educ switches to deprivation if a respondent failed to graduate and left school before finishing.[6] Moreover, persons who completed school but later failed to obtain a vocational qualification are also considered deprived. Deprivation in *health*, which is multidimensional itself, is signaled by two indicators. First, respondents are deemed deprived of bodily integrity if they are partially or severely disabled ($dep\_disability$). Second, I resort to self-assessed health as more objective measures are not available in this wave. A person is considered deprived if he or she reports *poor* or *bad* health (dep_health).

Housing indicators capture the functionings of being sheltered and enjoying privacy. To measure housing, I draw on resource indicators. Specifically, I consider a person to be deprived of adequate shelter and privacy if any of bath, kitchen or toilet is missing in her accommodation ($dep\_hhfacilities$) or if the respondent reports that her house either "requires major renovation" or is "ready for demolition" ($dep\_housecond$). Finally, I use a simple overcrowding index ($dep\_overcrowded$), which indicates deprivation if there is less than 1 room per person in the household. However, drawing on these resource indicators ignores relevant conversion factors (e.g., the power relations within the family). Moreover, the housing situation may also contribute to healthy living conditions more generally. In addition, it may support self-respect or facilitate social participation.

[6] The majority of this group of people had 7 years of schooling, some, however, had 10.

The measurement of *social participation* uses information about the frequency with which certain activities are reported to be performed. These activities represent common forms of social life. Respondents may report *at least once a week*, *at least once a month*, *less often*, or *never*. The first indicator, $dep\_meetfriends$, equals 1 if a respondent reports that she *never* meets her friends. The remaining items are used to construct an activity index. Specifically, the activity index considers an individual deprived if she reports *never* performing six or all of a list of seven activities or, alternatively, *never* performing five activities and, additionally, performing one or two activities *less often*.

Precarity or economic insecurity is frequently deemed a relevant dimension of human well-being (see, e.g., Stiglitz *et al.* , 2009, pp.198–203). However, it may originate from very different sources, such as employment, illness, or old age. Moreover, recent findings in behavioural economics suggest that the economic conditions faced by individuals who have difficulties in making ends meet, systematically distort those decisions (Mullainathan & Shafir, 2013). Making deliberate decisions, planning one's life and the capacity to act are, however, of intrinsic interest by themselves. Specifically, Nussbaum (2001) suggests a functioning called 'practical reason'. Suppa (2015) provides a more detailed justification. The material deprivation indicator, dep_matdep, signals difficulties with making ends meet if two or more items are missing for financial reasons. Alternatively, dep_prec indicates precarious employment including temporary work.

Finally, the *employment* dimension combines two major deprivations from this domain of life. The dep_unemp indicator captures individuals registered as unemployed who, in fact, may suffer from deprivations in several functionings, such appearing in public without shame, self-respect, mental health, or agency. A similar argument can be made for involuntary underemployment ($dep\_underemp$), although shortfalls in functionings might be quantitatively smaller.

Weights. The main specification assigns equal weights to each dimension and, within a dimension, equal weights to each indicator. Consequently, the three housing indicators receive a weight of $1/18$, health, precarity, and social participation indicators each receive a weight of $1/12$. Deprivation in education and unemployment is weighted at $1/6$. Note that switching from unemployment to underemployment reduces an individual's weighted deprivation count but still considers the individual to be deprived in employment. This is implemented with a lower weight of $1/12$ for underemployment.

Income Poverty. The conventional approach to poverty measurement aims at monetary shortfalls. As noted earlier, numerous approaches have been taken, even within monetary poverty measurement. A major debate settles around the issue of whether to use consumption data, i.e. expenditure, or income data. Blundell & Preston (1995) take a conceptual perspective, whereas Meyer & Sullivan (2012) adopt an empirical one using US data and Noll & Weick (2007) using German data.

For the comparison with multidimensional poverty measures the present study borrows the official poverty measurement approach adopted by Eurostat. Specifically, Europe's 2020 strategy refers to 60% of the median of the disposable household equivalence income (COM, 2010). Disposable income is sensitive to taxes paid and social benefits received and thus better proxies the actually achieved living standard. Consuming wealth or living in one's own home, however, still goes undetected.[7] To address different household sizes the modified OECD equivalence scale is used. Accordingly, the first adult receives a weight of 1, each further household member aged 14 or older receives a weight of 0.5, and children below age 14 receive 0.3. Moreover, incomes are deflated to allow comparisons over time. All monetary terms are expressed in EUR of 2010. Finally, the cutoff used the most is 60% of median income, often called at-risk-of-poverty (AROP). However, lower cutoffs are also used (40% or 50%).

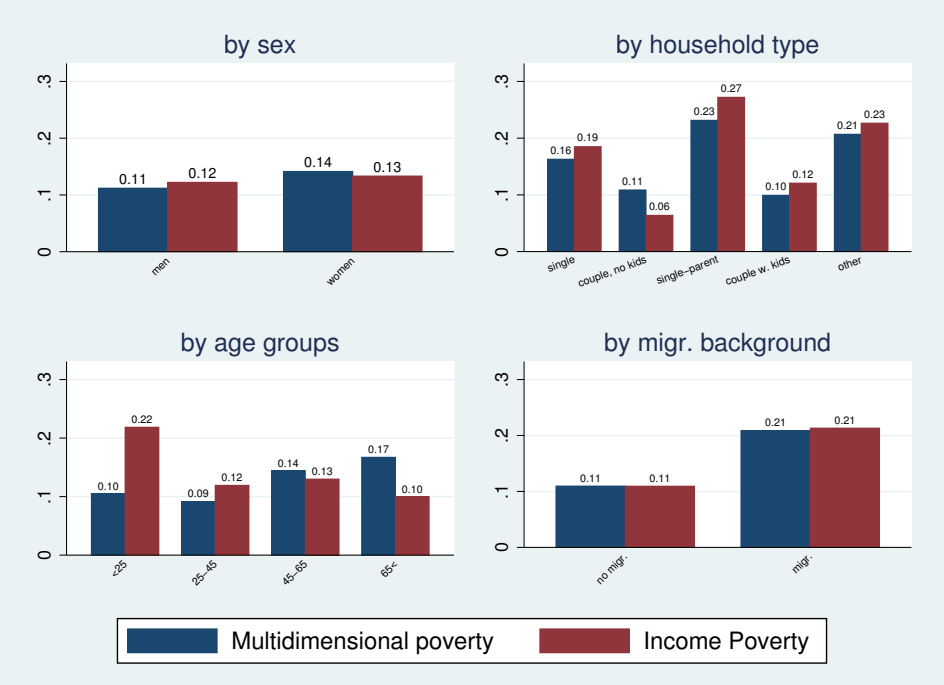
Figure 2: Poverty Rates for Different Cutoffs

Notes: Data from SOEP v29.1, waves 2007, 2011. Income poverty cutoffs refer to median of net household equivalence income, multidimensional poverty cutoffs refer to deprivation count.

Headcount Ratios. Figure 2 shows the headcount ratios for both poverty measures for several poverty cutoffs. Naturally poverty rates decrease if a stricter cutoff is chosen, i.e. in the case of monetary poverty a lower income is required to be poor, whereas in the case of

[7] Frequently, the rent of owner-occupied property is imputed to correct for this.

Figure 3: Headcount Ratios by Socio-demographic Characteristics



Notes: Data from SOEP v29.1, wave 2007, multidimensional poverty cutoff is 33%, income poverty cutoff is 60%.

multidimensional poverty a higher deprivation count is needed. Note that in 2007 both measures exhibit a poverty rate of 13% at an income cutoff of 60% and a k-cutoff of 33%. Thus, this setting is a useful starting point for the subsequent analysis. It should be noted, however, that choosing the poverty cutoff is inescapably a normative exercise. For the present exercise the cutoffs are primarily chosen for convenience. Nevertheless, it can be argued that a poverty cutoff of $k = 33$ is reasonable, since individuals are required to be deprived in two or more dimensions before being considered poor.

5 Results

This section proceeds as follows: subsection 5.1 studies on the individual-level first socio-demographic risk factors, followed by the extent to which both measures agree on who is poor. Finally, the link of income and multidimensional poverty is studied more generally. Lacking longer time series for both measures, subsection 5.2 examines trends in poverty using regional variation. Specifically, changes in multidimensional poverty, income poverty and GDP p.c. are correlated.

5.1 Analysis at the Individual Level

Socio-demographic risk factors. Figure 3 depicts headcount ratios for both measures by socio-demographic characteristics, i.e. risk factors. Broadly speaking, I observe similar patterns, e.g., both measures indicate a higher risk of being poor for respondents with a migration background (even quantitatively similar). Likewise, both measures suggest that women are more at risk, even though the female-male ratio is higher for multidimensional poverty (1.27 vs. 1.14), i.e. the gender differential is more pronounced. Note, however, that the hypotheses that both measures deliver equal headcounts can be rejected for men at a 1%-level of significance and for women at a 5%-level of significance. A noteworthy difference between the measures is that young people are much less likely to be poor in terms of multidimensional poverty in comparison to income-based measures. Instead, people aged 65 and above are more likely to be multidimensionally poor than income poor.

Concordance in a Static Setting. To obtain a better understanding of whom the respective measure considers to be poor, the natural starting point is to examine the degree of concordance in identification of the poor. Naturally, such an exercise depends crucially on the chosen poverty cutoffs. Therefore, Table 2 reveals this overlap for three multidimensional and three income cutoffs for the year 2007. In the upper left of table 2 panel (a) one can see that for an income cutoff of 60% and a k-cutoff of 33%, both measures suggest 13% of the population is poor. Moreover, the results suggest 5.09% of the population is poor according to both measures, whereas 7.71% are only income poor and 7.79% are only multidimensionally poor. Put differently, only 39.78% of the income poor are also multidimensionally poor and only 38.97% of the multidimensionally poor are also income poor. Thus both measures have only a modest overlap and more than 50% of each measure's identified poor are only poor according to this measure.

Does this overlap increase if more rigorous cutoffs are applied? Decreasing only the income poverty cutoff from 60% over 50% to 40% of the median income shows that the absolute share of jointly identified poor declines from 5.09% over 2.72% to 1.30%. Since this absolute share cannot increase, it is more interesting to track what happens to the fraction of the income poor who are also multidimensionally poor (both-poor). In fact this fraction increases from ca. 40% over 44% to 54%. Note, however, that even after applying a much more rigorous income poverty cutoff—the respective headcount ratio fell from 13.1% over 6.2% to 2.4%—46% of the income poor are still not multidimensionally poor. The same exercise can be carried out for stricter k-cutoffs, giving similar results. Specifically, for $k = 50$ the headcount drops to 2.8%, the share of the both-poor falls to 1.5% and the fraction of

Table 2: Concordance of Alternative Poverty Measures for Different Cutoffs

(a) MD-poverty cutoff $k = 33$

	60% of median income			50% of median income			40% of median income		
	INC-non-poor	INC-poor	Total	INC-non-poor	INC-poor	Total	INC-non-poor	INC-poor	Total
MD-non-poor	79.23	7.71	86.94	83.42	3.52	86.94	85.82	1.12	86.94
	90.86	60.22	86.94	88.97	56.40	86.94	87.95	46.24	86.94
	91.14	8.86	100.00	95.95	4.05	100.00	98.72	1.28	100.00
MD-poor	7.97	5.09	13.06	10.34	2.72	13.06	11.76	1.30	13.06
	9.14	39.78	13.06	11.03	43.60	13.06	12.05	53.76	13.06
	61.03	38.97	100.00	79.17	20.83	100.00	90.07	9.93	100.00
Total	87.20	12.80	100.00	93.76	6.24	100.00	97.59	2.41	100.00
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	87.20	12.80	100.00	93.76	6.24	100.00	97.59	2.41	100.00

(b) MD-poverty cutoff $k = 41$

	60% of median income			50% of median income			40% of median income		
	INC-non-poor	INC-poor	Total	INC-non-poor	INC-poor	Total	INC-non-poor	INC-poor	Total
MD-non-poor	83.97	9.68	93.65	89.12	4.53	93.65	92.04	1.61	93.65
	96.29	75.65	93.65	95.05	72.66	93.65	94.32	66.70	93.65
	89.66	10.34	100.00	95.16	4.84	100.00	98.28	1.72	100.00
MD-poor	3.23	3.12	6.35	4.64	1.71	6.35	5.54	0.80	6.35
	3.71	24.35	6.35	4.95	27.34	6.35	5.68	33.30	6.35
	50.91	49.09	100.00	73.13	26.87	100.00	87.34	12.66	100.00
Total	87.20	12.80	100.00	93.76	6.24	100.00	97.59	2.41	100.00
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	87.20	12.80	100.00	93.76	6.24	100.00	97.59	2.41	100.00

(c) MD-poverty cutoff $k = 50$

	60% of median income			50% of median income			40% of median income		
	INC-non-poor	INC-poor	Total	INC-non-poor	INC-poor	Total	INC-non-poor	INC-poor	Total
MD-non-poor	85.95	11.26	97.21	91.87	5.34	97.21	95.27	1.94	97.21
	98.57	87.99	97.21	97.99	85.57	97.21	97.62	80.55	97.21
	88.42	11.58	100.00	94.51	5.49	100.00	98.00	2.00	100.00
MD-poor	1.25	1.54	2.79	1.89	0.90	2.79	2.32	0.47	2.79
	1.43	12.01	2.79	2.01	14.43	2.79	2.38	19.45	2.79
	44.87	55.13	100.00	67.72	32.28	100.00	83.17	16.83	100.00
Total	87.20	12.80	100.00	93.76	6.24	100.00	97.59	2.41	100.00
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	87.20	12.80	100.00	93.76	6.24	100.00	97.59	2.41	100.00

Notes: Data is SOEP v29.1, wave 2007. Cells contain percent, column-percent, row-percent. Income is real net household equivalence income.

Table 3: Concordance in Identification of the Poor (Dynamic Perspective)

(a) percentage of MD-poverty dynamic subgroups

	INC non-poor	INC entry	INC exit	INC permanent poor	Total
MD non-poor	87.59	4.68	4.53	3.20	100.00
MD entry	59.47	16.03	5.61	18.89	100.00
MD exit	46.54	20.29	16.76	16.40	100.00
MD permanent poor	44.49	13.19	8.15	34.17	100.00
Total	81.92	6.32	5.28	6.47	100.00

(b) percentage of inc-poverty dynamic subgroups

	MD non-poor	MD entry	MD exit	MD permanent poor	Total
INC non-poor	91.12	3.02	2.12	3.74	100.00
INC entry	63.09	10.57	11.98	14.36	100.00
INC exit	73.12	4.42	11.84	10.62	100.00
INC permanent poor	42.06	12.15	9.46	36.33	100.00
Total	85.22	4.17	3.73	6.88	100.00

Notes: Data from SOEP v29.1, waves 2007 and 2011. MDP cutoff is 33%, income poverty cutoff is 60%.

multidimensionally poor who are also income poor increases to 55%. Finally, table 2 reveals that varying both cutoffs simultaneously decreases not only the population share of the both-poor in absolute terms, but also in (both) relative terms. Evidently, the modest overlap in identifying the same people as poor does not depend on the chosen poverty cutoff—in fact it holds for more rigorous cutoffs as well.

Concordance in a Dynamic Setting. A different way to apply more rigorous criteria is to focus on those individuals who are repeatedly considered poor. This analysis uses the panel structure of the data. Table 3 applies the previous exercise to dynamic subgroups, though for only one pair of cutoffs. Panel (a) reveals that only 34.17% of the *permanently* multidimensionally poor are also permanently income poor. Likewise, panel (b) indicates that only 36.33% of the *permanently* income poor are also multidimensionally poor. However, in both cases there are around 20% of transiently poor, i.e. who have been observed as poor once. Notably, after adding these, still over 40% of those who are permanently poor in one of the measures are not all poor according to the other. Consequently, restricting attention to

Table 4: Poverty Status and Age

	<25	25-45	45-65	65<	Total
non-poor	9.11	37.02	31.09	22.77	100.00
both-poor	8.69	33.41	41.50	16.40	100.00
IO-poor	22.75	32.30	25.22	19.73	100.00
MDO-poor	7.93	20.15	31.49	40.43	100.00
Total	10.05	35.13	31.20	23.62	100.00

Notes: Data from SOEP v29.1, wave 2007, cells contain percentage points.

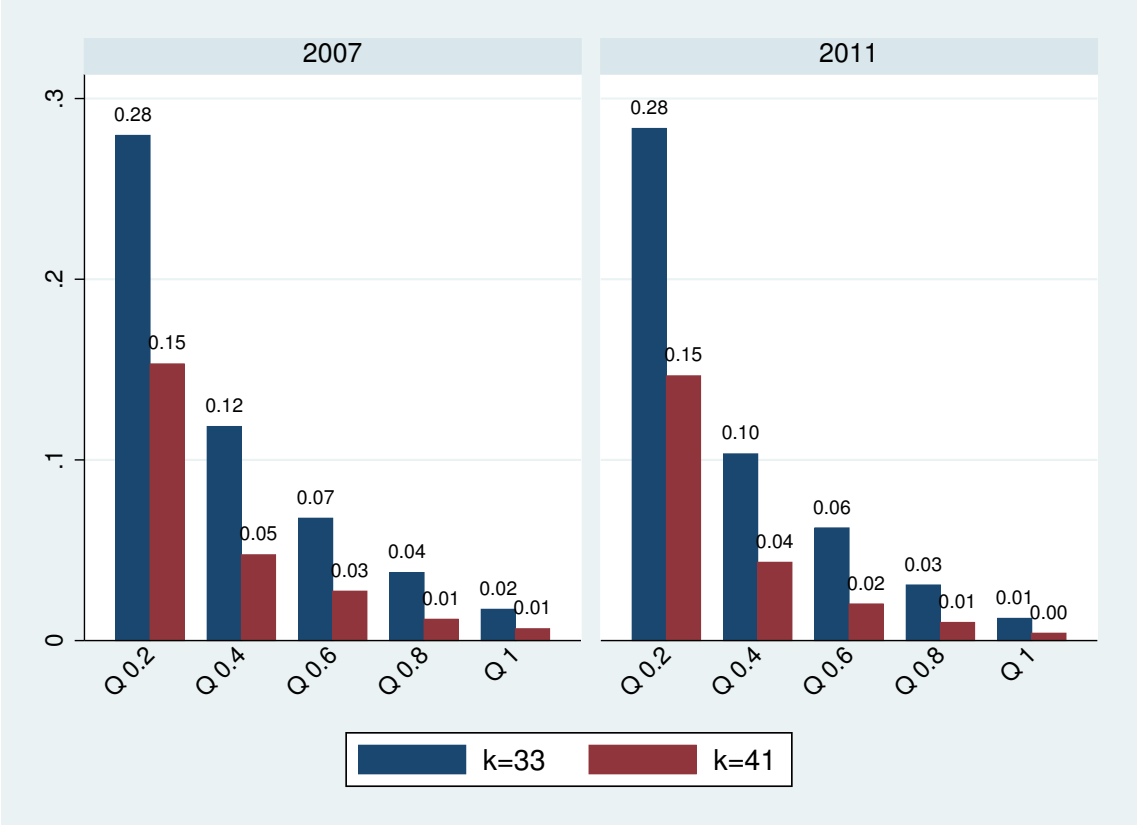
the persistently poor does not improve the concordance either. Thus the mismatch remains and seems not to be driven by fluctuations around the poverty cutoffs. Therefore, inherent differences in both measures may account this mismatch.

About Whom do the Measures Disagree? Who then are the income-only (IO) poor and the multidimensionally only (MDO) poor socio-demographically? Table 4 provides the share of certain age groups for the consistently considered poor (both-poor) and non-poor as well as the IO- and MDO-only poor, along with the age groups' share of the population. The results reveal that young people (aged 25 or less) are clearly overproportionally often only income poor (22.75% of the IO poor vs. 10.05% in the population). Conversely, older people (aged 65 and above) are overproportionally often MDO-poor.

Multidimensional Poverty and Income. An important question is how income and multidimensional poverty are related more fundamentally. Conceptually, this question is interesting as the capability approach emphasizes the role of conversion factors in moderating the effect of income on functioning achievements. This conceptual aspect, however, also emerges in a policy perspective. Specifically, the effects of anti-poverty measures, ranging from means-tested benefits to negative income taxes to a basic income, are no longer trivial. Moreover, there may be more efficient instruments, since a given deprivation also depends on the structure of the society in question.

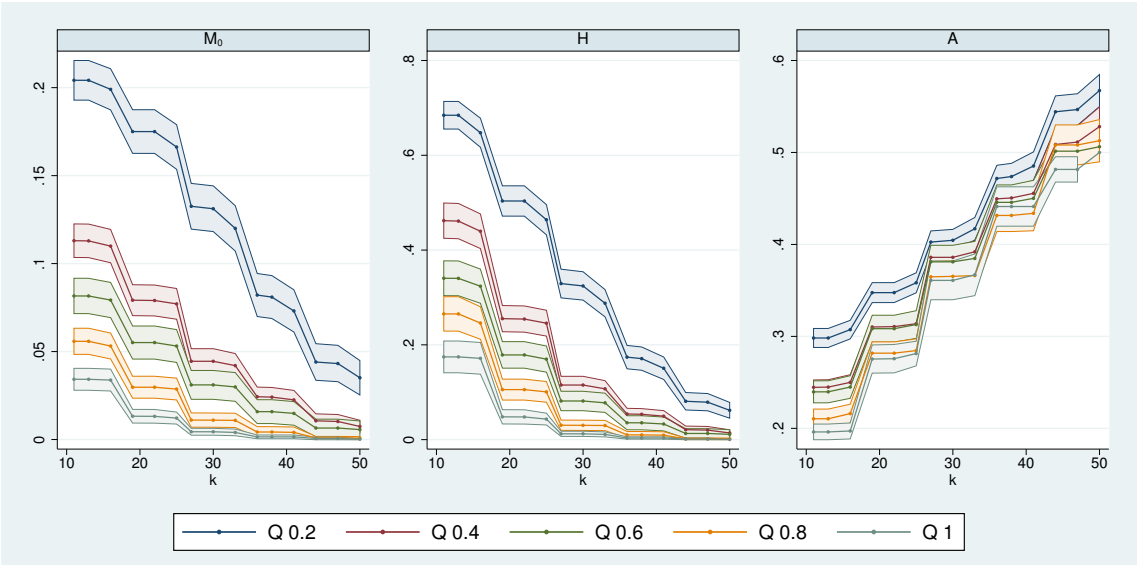
To start with, I partition the sample into income groups using the income quintiles as bounds. Figure 4 shows multidimensional poverty rates for two k-cutoffs for these income groups for both years. Evidently, the higher an individual's income, the less likely she is, on

Figure 4: Headcount Ratios of Multidimensional Poverty by Income Groups



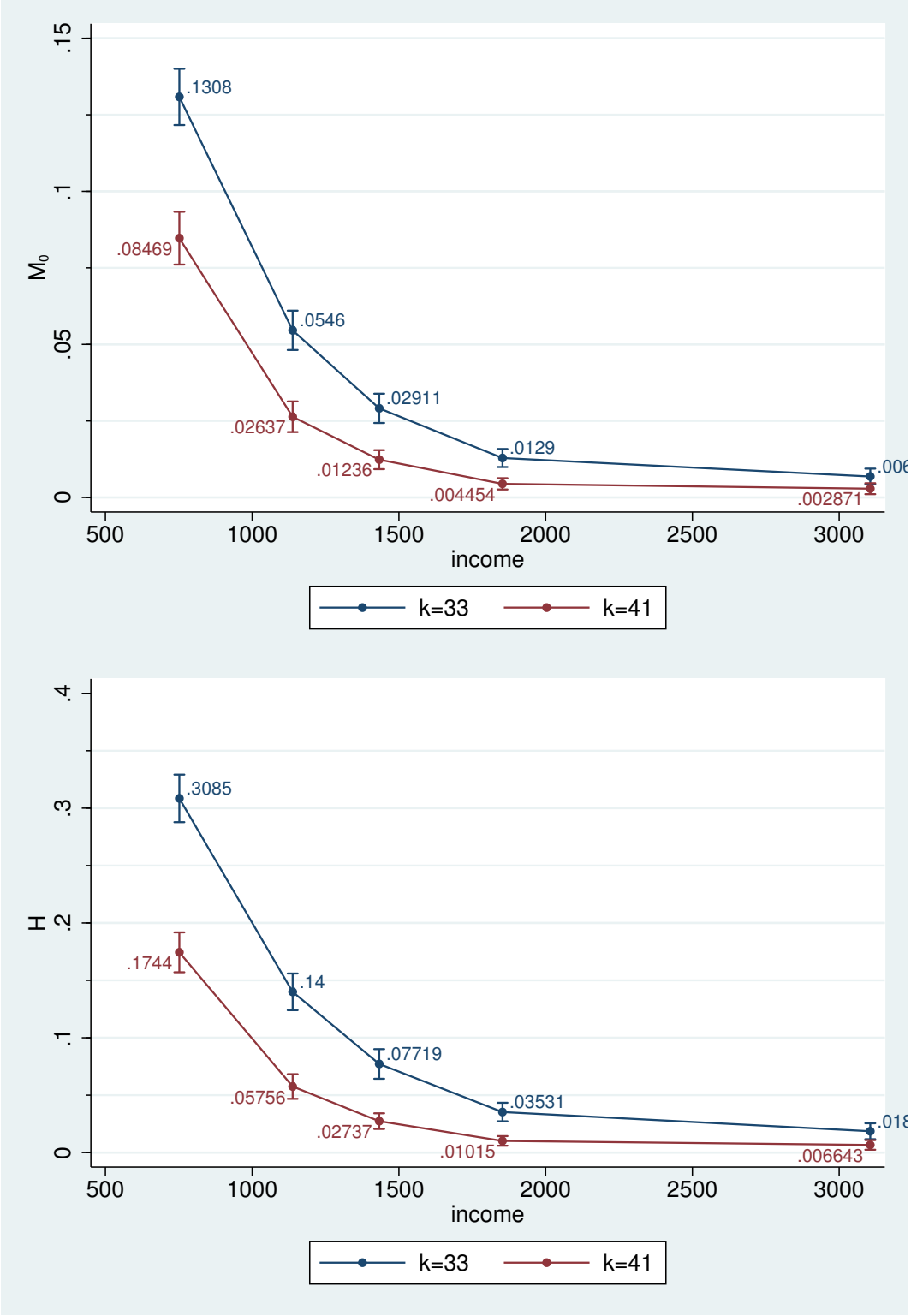
Notes: Data from SOEP v29.1, waves 2007, 2011. Income groups are based on income quintiles.

Figure 5: Aggregate Measures by Income Groups



Notes: Data from SOEP v29.1, wave 2011. Income groups based on income quintiles. Confidence intervals at 95%-level.

Figure 6: Multidimensional Poverty and Average Income by Income Groups



Notes: Data from SOEP v29.1, wave 2007. Income groups based on income quintiles. Confidence intervals at 95%-level.

Table 5: Socio-demographic Characteristics of Income-rich, But Multidimensionally Poor

	single	couple, no kids	single-parent	couple w. kids	other	Total
<25	0.00	0.00	2.59	2.15	0.00	4.75
25-45	3.87	5.69	0.00	5.25	0.00	14.82
45-65	10.47	22.08	0.38	5.75	0.00	38.69
65<	19.04	16.74	3.05	1.45	1.47	41.75
Total	33.39	44.51	6.03	14.60	1.47	100.00

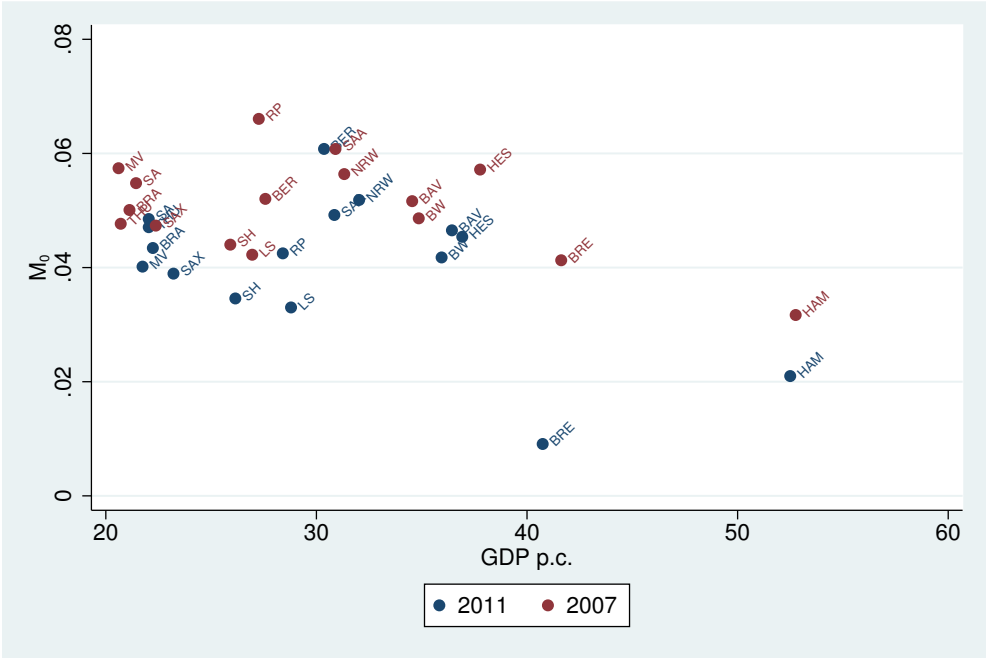
Notes: Data from SOEP v29.1, year 2011, cells contain percentages, frequency tabulation conditional on having an equivalence income $\geq Q_{0.8}$. Poverty cutoff: $k = 33$.

average, to be multidimensionally poor, irrespective of the poverty cutoff or the year. This exercise is carried out more rigorously in figure 5, which not only considers a wider range of k but also extends the analysis to other aggregate measures as M_0 and the intensity A. First, we clearly observe significant higher values of M_0 and H for individuals with income below the first quintile ($Q_{0.2}$). Note however, that for the intensity A, $H_0 : A_{Q_{0.2}} = A_{Q_{0.4}}$ can be rejected for all $k \leq 50$ at $p < .01$, despite partially overlapping confidence intervals. Second, I also find all measures to gradually decrease with higher income quintiles (for all k). This pattern in M_0 thus seems driven by both H and A. Figure 6 plots M_0 against the average income within the income group. Individuals in the lowest income group, for instance, exhibit the highest multidimensional poverty, while on average having an equivalence income of ca. 750 EUR at their disposal. Moving on to higher income groups, multidimensional poverty each time not only falls, but each time approximately drops by half. Thus, multidimensional poverty apparently decreases with additional income at a decreasing rate. The lower part of figure 6 shows a similar result for H, the headcount ratio, implying the incidence within income group to be important in this context. Both findings hold for $k = 33, 41$.

The descriptive evidence suggests that income is important for avoiding multidimensional poverty, in particular for very low incomes. Conversely, it also reveals that a few individuals are multidimensionally poor, despite having a high income. However, a more sophisticated approach is required to make statements about causality or to address the role of conversion factors more rigorously.

Rich but Deprived? The previously presented evidence also raises the question of who are the income rich but multidimensionally poor? Table 5 provides some information about multidimensionally poor people with an income above the third quintile ($Q_{0.6}$). More specifically, it contains the joint distribution of age and type of household of this group of people.

Figure 7: Multidimensional Poverty and GDP p.c.



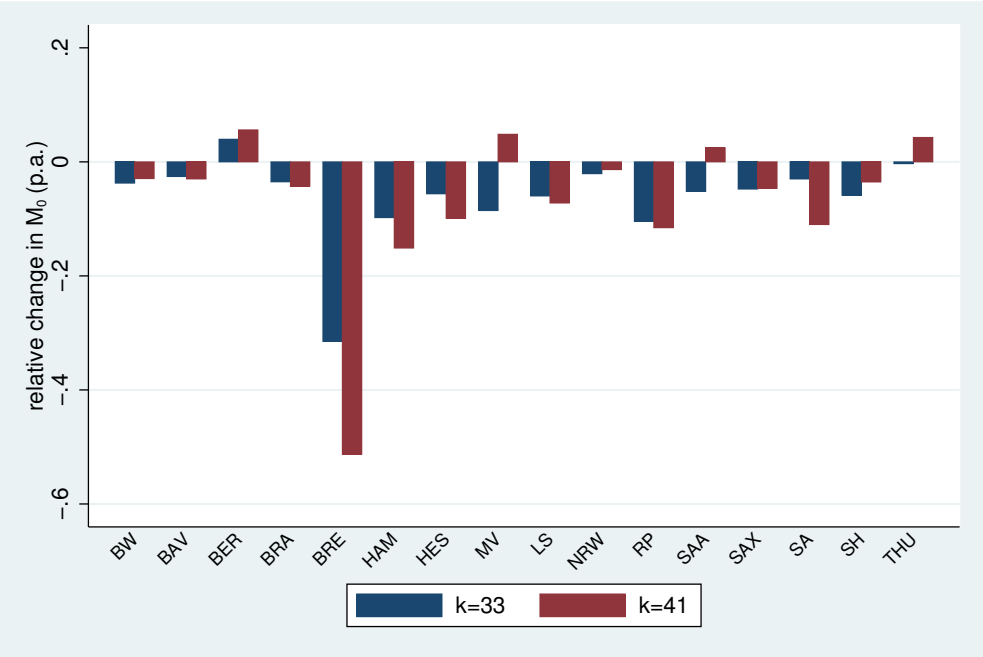
Notes: Data from SOEP v29.1, waves 2007, 2011. GDP p.c. in 1,000 EUR. Multidimensional poverty cutoff $k = 33$.

The table suggests that individuals aged 45 or older, living either in a single or a couple-without-children household make up almost 70% of the rich but deprived. Moreover, $^2/_3$'s of these people are women (data not shown). From a capability perspective this finding is not that unexpected after all. In fact, it is also consistent with both the higher risk of elderly and the earlier documented (and more pronounced) gender gap. Power relations within the household may help to rationalize this finding. Moreover, many deprivations are apparently entrenched and difficult to fix—even with ample resources—and thus they are likely to be only loosely related to income (see also section 3).

5.2 Analysis on the State Level

To start with, figure 7 shows the levels of multidimensional poverty (M_0, with $k = 33$) for each state and year along with the respective GDP per capita. Most states face a level of multidimensional poverty of .04–.06—apparently rather unrelated to GDP per capita levels. The city-states of Hamburg and Bremen, however, not only have the highest GDP p.c., but also lower levels of M_0. Turning to changes, figure 8 depicts relative changes in M_0 by state for $k = 33, 41$. The graph reveals that M_0 decreases in most states for both cutoffs. However, multidimensional poverty increased in Berlin, and in three states the direction of change

Figure 8: Changes in Multidimensional Poverty by States



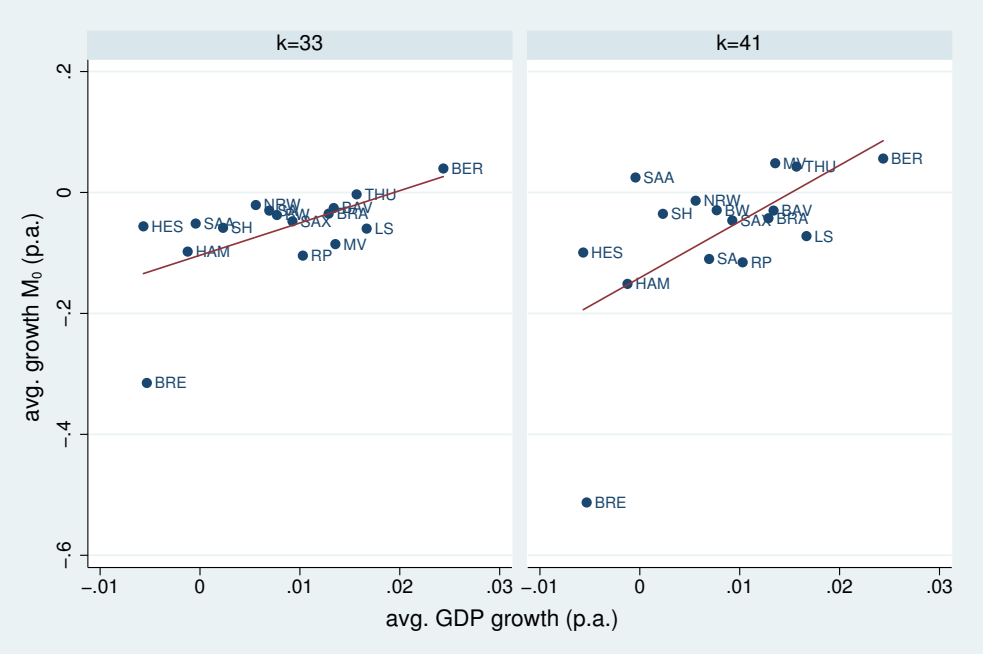
Notes: Data from SOEP v29.1, waves 2007, 2011.

depends on k (MV, SAA, THU).

Going a step further, figure 9 correlates the average yearly (relative) changes in multidimensional poverty and the average yearly GDP p.c. growth for two different poverty cutoffs ($k = 33, 41$). If anything, the scatter plots suggest a slightly positive relation. Rather the graph suggests that similar decreases in poverty took place for various GDP-growth rates. Be that as it may, I do not find clear evidence that a growing GDP p.c. is associated with decreasing multidimensional poverty. Alternatively, average GDP p.c. growth can also be correlated with changes in monetary poverty, i.e. the at-risk-of-poverty rate. Figure 10 shows, first, that income poverty increased in half of the states and decreased for the remaining. If anything, higher GDP p.c. growth rates are associated with smaller increases or larger decreases (Berlin being a remarkable outlier).

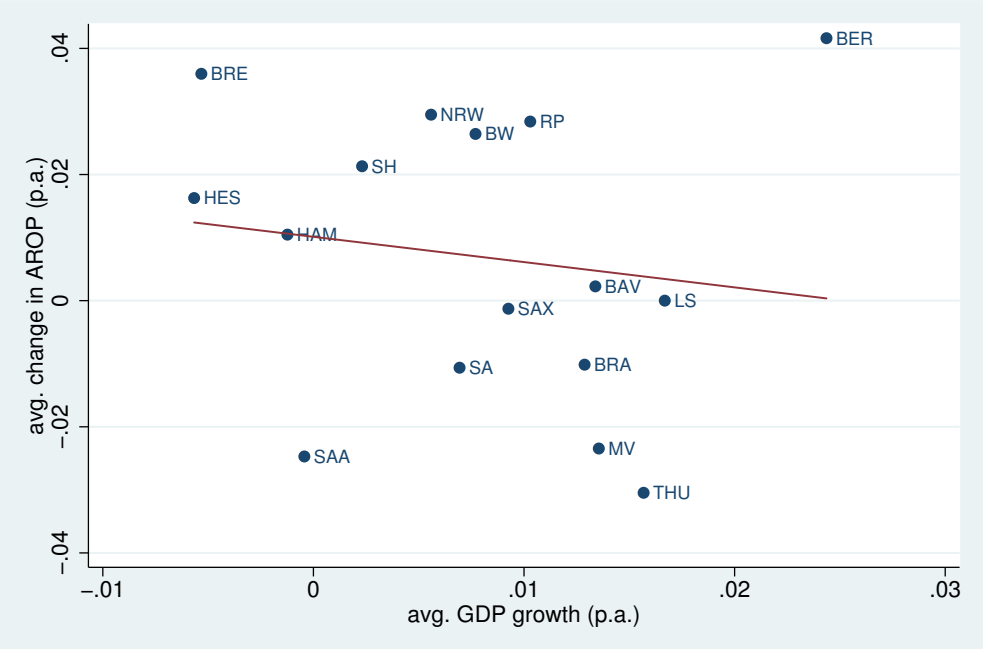
Finally, figure 11 correlates multidimensional and monetary poverty against each other. This graphs illustrates a weak and, if anything, negative relation. Moreover, it clearly highlights that both measures indicate rather different trends: while most states experienced a reduction in multidimensional poverty, only half of them experienced decreases in monetary poverty as well, whereas the other half suffered from non-negligible increases. However, a cautionary note is in order, as the period of analysis covers the financial crisis, major economics stimulus packages, and happens to capture the aftermath of a major labour market

Figure 9: Changes in Multidimensional Poverty and GDP p.c. growth



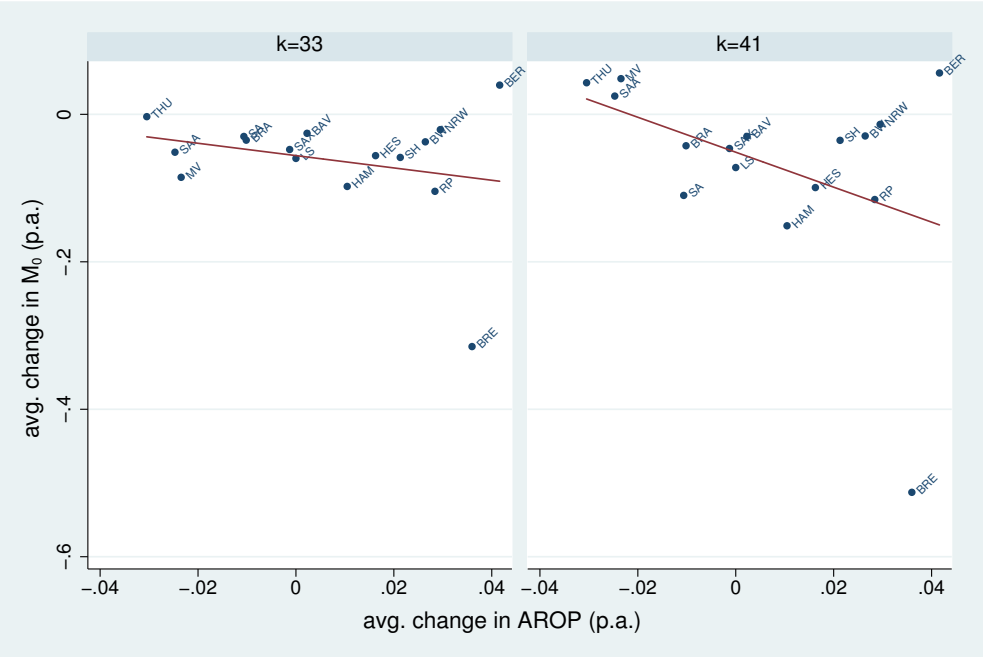
Notes: Data from SOEP v29.1, waves 2007, 2011.

Figure 10: Changes in Income Poverty and GDP p.c. growth



Notes: Data from SOEP v29.1, waves 2007, 2011. Income poverty cutoff is 60% of median real disposable household equivalence income.

Figure 11: Changes in Multidimensional and Income Poverty



Notes: Data from SOEP v29.1, waves 2007, 2011. Income poverty cutoff is 60% of median real disposable household equivalence income.

reform. Thus, future research will have to clarify the role these confounders play.

6 Concluding Remarks

The present study compares Germany's official income-based poverty measure with a multidimensional poverty index based on the Alkire-Foster method, which is operationalized using the capability approach. Although primarily explorative and empirical, the present study also emphasizes the importance of a conceptual framework for a comparison of poverty measures. On the one hand, a conceptually clear framework is important for assessing each measure's validity and thus its cogency. For instance, while income and consumption poverty measures gather their information at earlier production stages of well-being, multidimensional approaches measure well-being more directly. Purely resource-based methods require an additional investigation to ascertain their link to well-being (or related adverse outcomes). On the other hand, for the comparative assessment of poverty measures, the conceptual framework offers an orientation on how to deal with measure-inherent mismatches of those who are deemed poor. Likewise it helps to rationalize other findings, such as the income rich but multidimensionally poor.

The analysis of socio-demographic risk factors revealed an agreement on higher risks of poverty for people with a migration background and women. However, this analysis yields an inconsistent assessment of poverty risk for the elderly and the young. Inspecting the share both measures consider consistently as poor more carefully, reveals the mismatch to be robust. Neither stricter poverty cutoffs nor focussing on permanently poor could improve the overlap substantially. Therefore, the mismatch in who is deemed poor seems to originate from more inherent, conceptual features of the measures. Closer inspection reveals that many of the income only poor are rather young, whereas many of the multidimensionally only poor are rather old. This finding is consistent with both the analysis of socio-economic risk factors and earlier research on consumption-based poverty measures. Specifically, Slesnick (2001, p.196-7) notes that income-based poverty measures perform poorly because income fails to reflect well-being accurately for certain subpopulations, including the young and the old. It would be interesting to investigate whether a comparison of consumption-based and multidimensional poverty provide a more congruent picture. Sufficiently detailed information on consumption are, however, not available in my data, which is why this question is left for future research.

Nevertheless, given that a multidimensional poverty index is adequately specified and captures certain functioning achievements, it reflects an individual's well-being by construction. Hence, the question of the mismatch comes down to whether income only poor are also truly deprived and whether a shortfall in income as a dimension would add something substantial that would be otherwise ignored. Therefore, more research is needed to better understand this incongruence and thereby explore the potential role for an income dimension in multidimensional poverty indices.

One line of such a research may explore the links between income, consumption and poverty more fundamentally. The present study commenced in this line and finds multidimensional poverty to decrease with additional individual income, if only at a decreasing rate. However, a more sophisticated approach is required to make statements about causality or to address the role of conversion factors more rigorously. A subsequent analysis of the income rich but multidimensionally poor uncovered that, in particular, women aged 45 and older (living alone or not) are part of this group. Deeply entrenched deprivations, difficult to fix even with ample resources, may account for this finding, which is consistent with a capability approach perspective.

Lacking longer time series for both poverty measures, I use regional variation to study poverty trends for aggregate measures. I find most states are reducing multidimensional poverty, whereas one half of the states are experiencing increasing, the other decreasing, mon-

etary poverty. Consequently, both measures disagree about the trend. Moreover, I do not find a clear association of multidimensional measures with GDP p.c. or the growth thereof. However, the period of the analysis covers the financial crisis, major economic stimulus packages, and the aftermath of a labour market reform. Future research has to clarify the role of these confounding influences. Thus, despite some basic agreement, the choice of the poverty measure makes a difference: target groups and trends in poverty appear to vary remarkably. Without question, more research is needed to provide more efficient anti-poverty policies.

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