OPHI WORKING PAPER NO. 98

Towards a Multidimensional Poverty Index for Germany

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September 2015

Abstract
This paper compiles a multidimensional poverty index for Germany. Drawing on the capability approach as conceptual framework, I apply the Alkire-Foster method using German data. I propose a comprehensive operationalization of a multidimensional poverty index for an advanced economy like Germany, including a justification for several dimensions. Income, however, is rejected as a dimension on both conceptual and empirical grounds. I document that insights obtained by the proposed multidimensional poverty index are consistent with earlier findings. Moreover, I exploit the decomposability of the Alkire-Foster measure for both a consistently detection of specific patterns in multidimensional poverty and the identification of driving factors behind its changes. Finally, the results suggest that using genuine multidimensional measures makes a difference. Neither a single indicator nor a dashboard seem capable of replacing a multidimensional poverty index. Moreover, I find multidimensional and income-poverty measures to disagree on who is poor.

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Citation: Suppa, N. (2015). "Towards a Multidimensional Poverty Index for Germany." *OPHI Working Papers* 98, University of Oxford.

The Oxford Poverty and Human Development Initiative (OPHI) is a research centre within the Oxford Department of International Development, Queen Elizabeth House, at the University of Oxford. Led by Sabina Alkire, OPHI aspires to build and advance a more systematic methodological and economic framework for reducing multidimensional poverty, grounded in people's experiences and values.

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1 Introduction

Background. The last two decades have witnessed increasing interest in both concepts and measures of well-being. Remarkable efforts have been made, from the Human Development Index in 1990, to the Millennium Development Goals in 2001, to the OECD Better Life Index in 2011.[1] Conceptual frameworks related to well-being, such as the capability approach (CA), the subjective well-being literature, and the theory of fairness, are burgeoning alike. In 2009 the so-called Stiglitz-Sen-Fitoussi Commission, appointed to explore alternative measures of welfare and social progress, presented its report. By now, the importance of measuring well-being in general and poverty and social exclusion in particular is acknowledged even in advanced economies.

Along with these developments, significant improvements in the methodology of multidimensional measurements have been made as well (e.g., Tsui, 2002, Bourguignon and Chakravarty, 2003, Alkire and Foster, 2011a). So far, these measures have been systematically employed to analyze poverty in the developing world; see in particular Alkire and Santos (2011) and UNDP (2011). However, applying these techniques to advanced economies requires appropriately adapted specifications and operationalizations, such as choosing the relevant dimensions, appropriate indicators, and reasonable cutoffs. Moreover, these choices are also contingent upon the concrete purpose of the poverty measure: Is the task to identify general trends across countries and to assess countries' relative performance in fighting poverty? Or alternatively, is there a need for a society-tailored poverty index to evaluate policy measures more carefully and to better understand both poverty structure and dynamics in that society? As these overall objectives crucially affect the response to many of the arising trade-offs, their explication is imperative.

Previous Research. Recent attempts applying the Alkire-Foster method (AFM) to advanced economies include Whelan *et al.* (2014) and Alkire *et al.* (2014). Both studies focus on cross-country comparisons and use EU-SILC data, where most indicators are located in resource space. While Whelan *et al.* (2014) only exploit the cross-section, Alkire *et al.* (2014, p. 3) emphasize that currently their contribution is not an empirical one, for reasons of data availability and coverage. Busch and Peichl (2010) also apply the AFM (among other methods), using SOEP data. However, they only consider education, health, and income and only loosely relate their work to a conceptual framework. Also using SOEP data, Rippin (2012) employs a different method (a correlation-sensitive poverty index), which also reflects inequality among

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[1]See UNDP (1990), UN (2012), OECD (2011).

the poor. However, Alkire and Foster (2013) demonstrate that no measure can be both sensitive to inequality (understood as dimensional transfer) and satisfy dimensional breakdown and subgroup decomposability simultaneously. Moreover, if at hand, most studies include income as a dimension, although it is unclear whether such an approach is justified (conceptually and empirically).

Finally, there is also the literature on material deprivation in the tradition of Townsend (1979) and Yitzhaki (1979), thanks to which new indicators have been widely introduced. This research, however, primarily relies on resource indicators. Consequently, their transformation into well-being is mostly ignored. Thus, despite some attempts in this direction, more comprehensive and well-justified multidimensional poverty indexes for advanced economies are still lacking.

Contribution. The present paper complements the previous literature in several ways. Conceptually, I propose a more comprehensive operationalization of a MPI for an advanced economy like Germany, including a justification for selected dimensions. Specifically, I argue in favour of including material deprivation and employment as important dimensions, as they contribute extra information on otherwise ignored functionings. However, I reject a lack-of-income dimension on both conceptual and empirical grounds. In addition to education, health, housing, I also propose an operationalization of social participation. Empirically, I demonstrate that insights obtained by the proposed multidimensional-poverty index are consistent with earlier findings (e.g., migrants suffer more poverty). Going beyond a documentation of changes in multidimensional-poverty, I exploit, moreover, features of the adopted method (e.g., its decomposability) that allow to consistently detect specific patterns (e.g., changing gaps or other asymmetric impacts). Unfolding the summary measure allows, moreover, to identify the driving factors behind changes in poverty (e.g., changes employment or material deprivation indicators). Finally, I demonstrate that using genuine multidimensional measures makes a difference. First, the data at hand suggest that neither a single indicator, nor a dashboard approach can replace a genuine multidimensional approach. The crucial information of coupled deprivation (the "joint distribution") is otherwise easily missed. Importantly, I also find multidimensional- and income-poverty measures to substantially disagree on who is poor. This contrast in targeting renders different policy implications likely.

Significance. The present study enhances multidimensional poverty measurement for an advanced economy like Germany. Since, by now, the importance of poverty in advanced

economies is widely acknowledged, several governments, started to compile dedicated reports, documenting numerous poverty-relevant developments. The German government, for instance, now releases an official report on poverty and wealth (RPW) for each legislative session. The reports publish and analyze selected core indicators, and also provide advice on policy measures. So far, however, the RPWs lack both a composite measure and a systematic account of multiple deprivation.[2] The present study aims to close this gap and promote a multidimensional poverty index tailored to the German society. Such an index complements the official reports with (i) a comprehensive summary measure (which still allows a detailed analysis) that (ii) takes account of the joint distribution of deprivations and (iii) improves the measurement of poverty as capability deprivation. Indeed, the latest RPW finds difficulties in measuring functionings, capabilities, and capability deprivations (see Bundesregierung, 2013, pp. 23–24).

Procedure.   A cogent poverty measure must (i) be embedded within a grounded conceptual framework, (ii) have a sound technical basis, and (iii) use high-quality data for the calculation. To meet these requirements I first adopt the CA, essentially as developed by Sen (1985, 1992, 1999b), as a conceptual foundation. Dimensions are understood as functionings, which in turn constitute human well-being. Because of this inherently multidimensional concept of well-being, the CA offers a comprehensive and coherent account of deprivations. Moreover, for the inevitable value judgments (normative exercises) the CA requires any application to draw on a relevant public debate (e.g., Sen, 1999b, ch.6). Second, I apply the dual cutoff counting approach suggested by Alkire and Foster (2011a). The AFM fulfills several desirable axioms that allow a sensible analysis (e.g., numerous decompositions). Moreover, the AFM is sensitive to changes in both the breadth and the incidence of poverty. Importantly, as an "open-source technology", it also reveals rather than buries the value judgments and thereby allows for a constructive exchange with the public debate. Finally, I use the SOEP, a rich, high-quality data set for Germany, which allows a comprehensive specification.

Outline.   Section 2 provides a brief exposition of the underlying methods; section 3 introduces both data and specification. Section 4 presents the results. Finally, section 5 offers some concluding remarks.

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[2]The importance of multiple deprivation or "the joint distribution" has been emphasized repeatedly (Duclos *et al.*, 2006, Wolff and de-Shalit, 2007, Stiglitz *et al.*, 2009, Ferreira, 2011).

2 Methodology

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, e.g., in Alkire and Foster (2011a,b). Alkire *et al.* (2015) provide a more comprehensive discussion.

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 and 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 and 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_j 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 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 and Foster (2011a) then define the adjusted headcount ratio as $M_0 = \frac{1}{N} \sum_{i=1}^{N} c_i = HA$, which is sensitive to both changes in incidence and breadth of poverty. In principle other members of the FGT class of measures (see Foster, Greer, and Thorbecke, 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 depriva-

tion count becomes $c_i = \sum_{D=1}^{D} w_d \mathbb{1}(y_{id} \leq z_d)$, and $M_0 = \frac{D}{N} \sum_{i=1}^{N} c_i(k)$.

Decompositions.   The adjusted headcount M_0 and both its single components and its changes over time have been shown to be decomposable in numerous ways. For instance, subgroup decomposition for the adjusted headcount ratio means that, after allowing for relative population sizes, the subpopulation-specific adjusted headcount ratios exactly add up to the overall adjusted headcount ratio. Let the subscript $g = 1, \ldots, G$ denote the particular subpopulation with $\sum_{g}^{G} N_g = N$ and $\psi_g = \frac{N_g}{N}$. Formally, the subgroup decompositions for the adjusted and the censored headcount ratio then are

$$M_0(y; z) = \sum_{g=1}^{G} \psi_g M_0(y_g; z) \qquad \text{and} \qquad H(y; z) = \sum_{g=1}^{G} \psi_g H(y_g, z). \tag{1}$$

If data on more than one point of time is available, we also can calculate and decompose changes of aggregate measures. Let the superscript t denote the respective period. The relative change of M_0 from $t-1$ to t then is

$$\delta M_0^t \equiv \frac{M_0(y^t; z) - M_0(y^{t-1}; z)}{M_0(y^{t-1}; z)}. \tag{2}$$

The percentage changes of $H(k)$ and $A(k)$ can be defined analogously; in general, however, they are not independent of each other. Consequently, a basic decomposition of the change in M_0 is as follows:[3]

$$\delta M_0^t = \delta H^t + \delta A^t + \delta H^t \times \delta A^t. \tag{3}$$

Changes in the censored headcount, in turn, can be traced back to subpopulation-specific headcount ratios, $H(y_g; z)$, and changing shares of the respective subpopulations (ψ_g). Formally,

$$\delta H^t = \sum_{g=1}^{G} r_g^{t-1} \left[\delta \psi_g^t + \delta H(y_g^t; z) + \delta \psi_g^t \times \delta H(y_g^t; z) \right] \tag{4}$$

with $r_g^{t-1} = \frac{\psi_g^{t-1} H_g(y_g^{t-1}; z)}{H(y^{t-1}; z)}$ being the contribution of subpopulation g to the overall headcount in $t-1$. The adjusted headcount can also be decomposed into the contributions of each dimension (dimensional breakdown). First, the dimension-specific censored headcount is

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[3]For an alternative decomposition see Roche (2013), for a comparison along with a discussion of the assumptions, see Alkire *et al.* (2015, ch. 9.2).

$\underline{H}_d \equiv \frac{1}{N} \sum_{i=1}^{N} \mathbb{1}(c_i \geq k \wedge y_{id} \leq z_d)$, allowing us to rewrite the adjusted headcount as

$$M_0 = \sum_{d=1}^{D} \frac{w_d}{D} \underline{H}_d. \tag{5}$$

Then, the contribution of dimension d to overall poverty is $\frac{w_d}{D} \frac{\underline{H}_d}{M_0}$. Additionally, changes in the adjusted headcount can be decomposed into changes in dimension-specific censored headcount ratios. Specifically,

$$\delta M_0^t = \sum_{d=1}^{D} s_d^{t-1} \delta \underline{H}_d, \tag{6}$$

where $s_d^{t-1} = \frac{\theta_d A_d(y^{t-1};z)}{A(y^{t-1};z)}$ is the contribution of dimension d to the average intensity.

The Alkire-Foster method and Capability Deprivation. The latest RPW finds difficulties in measuring functionings, capabilities, and capability deprivations (Bundesregierung, 2013, pp. 23–24).[4] Admittedly, functionings are often difficult to measure, but capability deprivation even more so. Either we can assume deprivation for low achievements from the outset, which often still may be justified (e.g., Robeyns, 2005, p. 101). Alternatively, we base this assumption—that functionings not chosen were infeasible—on further information. Using the AFM allows exactly this, since being poor (i.e. capability deprived) requires the *simultaneous* presence of several low-functioning achievements, thereby lending support to the assumption of an enforced low achievement.[5] Hence, exploiting the joint distribution in the identification step of poverty analysis helps to distinguish between (deliberately chosen) low-functioning achievements and (enforced) capability deprivations.

3 Data and Specification

Sample. For the analysis I use data of the German Socio-Economic Panel (SOEP) and calculate a multidimensional poverty index for three periods of time (2001–02, 2006–07, 2011–12).[6] The SOEP not only allows one observe the same individuals in different years, but also

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[4]Note that Suppa (2014) argues that even if functionings are difficult to measure and often only imperfect data is at hand, the CA's conceptual structure is still helpful for revealing the underlying assumptions.

[5]Alkire *et al.* (2015, ch. 6.1) provide a more detailed account. Indeed, M_0 can be shown to be a measure of unfreedom in the sense of Pattanaik and Xu (1990), who axiomatically the study measurement opportunity sets.

[6]I use SOEP data v29.1, provided by the DIW; 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 and Haisken-DeNew (2013) and Haisken-DeNew and Hahn (2010) for details. The PanelWhiz-generated DO file to retrieve the data

provides information on various aspects of a respondent's life. However, to avoid an overload of the respondents, some questions are only asked every other year (or less frequently), whereas other items are only collected in between these years. Consequently, a comprehensive poverty index can only be calculated for selected years. Moreover, for using the best-suited items simultaneously, I merge two consecutive years into one period. Naturally, this comes at the cost of losing those observations not observed in both years of a period.

The natural target population for a study on multidimensional poverty in Germany are the adults living in Germany in the respective year. Consequently, I treat the SOEP as repeated cross-sectional data.[7] To account for the complex survey design of the SOEP, the subsequent analyses use sampling weights, which are basically the inverse sampling probabilities (see Goebel *et al.*, 2008).

Operationalization. The importance of the conceptual framework for empirical exercises was already outlined and emphasized by Lazarsfeld (1958). The operationalization of the present study draws on both the capability approach and the German government's official reports on poverty and wealth. Relying simultaneously on both is possible, since the official reports by now explicitly use the CA as well.[8] The capability view not only considers human well-being as inherently multidimensional; moreover, it assigns intrinsic importance to functionings, i.e. the doings and beings individuals have reason to value. Note that intrinsic importance naturally leaves room for instrumental importance as well, as being able to read and write or being healthy illustrate.[9] Poverty, then, is understood as capability deprivation, implying both a shortfall in one or several of the functionings deemed relevant and their infeasibility for the individual in question.[10] Consequently, indicators of deprivation both (i) need to be located in the functioning space and (ii) need to take account of the functioning's infeasibility.

Moreover, the CA requires value judgments to be exposed rather than concealed, and in addition they must be subjected to public debate. Only with clear presentation of the normative problem can a public debate about these issues be expected to fulfill its constructive role; see Sen (1999a, p. 10). Value judgments are needed for (i) the selection of function-

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used here is available from me upon request. Any data or computational errors in this paper are my own.

[7] Exploiting the panel setup of the data, implies a different concept of the samples' underlying population, i.e. the individuals living in Germany during the complete period investigated. Hence, such a setup ignores several groups by construction including migrants, individuals who become 18, die or otherwise leave the SOEP during the period investigated. Suppa (2015a) exploits the panel setup of the data.

[8] Moreover, the RPWs also use another framework, the condition-of-life approach, essentially developed by (Neurath, 1917 [2006], 1937 [2006]). For a comparison of the two approaches see Leßmann (2009).

[9] For the distinction between intrinsic and instrumental relevance see, e.g., Sen (1999b).

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

ings included in the index, (ii) the respective deprivation cutoffs, (iii) the assigned weights, and (iv) the poverty cutoff. The official reports provide a first set of indicators, which aim at measuring important functionings. Specifically, so-called core indicators are to be regularly reported, and their selection is based on scientific advice (Arndt and Volkert, 2007).[11] This selection is thus reasoned and transparent, and yet open to criticism and modification. Hence, the choice of dimensions is subjected to public debate and thereby complies with the aforementioned requirement of the CA (see also Sen, 2004, on this). Subjecting the choice of the deprivation cutoff to public debate, however, further constrains the choice of a functioning's *indicators*. Specifically, indicators should allow for deprivation cutoffs that are similar and meaningful across individuals, such that a public debate can study the pros and cons and eventually agree upon those cutoffs. Limitations of available data, however, prompt us to draw on imperfect indicators as well. In some cases a functioning may be only captured incompletely; in others, measurement remains within the resources space. Finally, the CA assigns goods, income, and other resources an instrumental role only, howsoever important they may be.

Dimensions. The increasing interest in alternative measures of well-being motivated numerous novel measurement initiatives in various directions. In addition to that, a consensus on relevant dimensions seems to emerge. Table 1 provides an (non-exhaustive) overview of dimensions frequently suggested. Note that Nussbaum (2001) approaches the question from a philosophical and conceptual view. In contrast, the other studies (e.g., Stiglitz *et al.*, 2009) survey and organize already available indicators. As mentioned earlier, exercises in measurement necessitate a clear conceptual understanding. In this respect, the CA argues that if we study poverty or well-being, we ideally measure functionings (or capabilities). As it stands, in many cases we still face imperfect indicators. Some of their shortcomings will be discussed later. Nonetheless, table 1 reflects an agreement on certain dimensions such as education, health, or social participation.

However, table 1 also reveals two further aspects. On the one hand, for some of more complex dimensions of human well-being, such as the functionings of self-respect, practical reason, or agency, there is no accepted set of indicators sofar. On the other hand, several dimensions (along with available indicators) are frequently proposed which are, from a conceptual point of view, *no* functiongings. Consequently, they are not dimensions of well-being by themselves. Leading examples are housing, material deprivation, and income. Concep-

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[11]Note that other contributions and debates reach similar conclusions, for instance the report of Stiglitz *et al.* (2009), or the European efforts for social inclusion (e.g., Atkinson *et al.*, 2002, 2004, Marlier and Atkinson, 2010), but also the earlier Scandinavian approach to welfare (e.g., Allardt, 1993, Erikson, 1993).

tually, all of them provide resource information. Only in some cases, resource-indicators can be clearly related to a single key functionging, as e.g. housing indicators (even though conversion factors are then ignored). In constrast, many other indicators are likely to affect several functionings and, moreover, in an a priori unclear way (e.g., employment). Thus, they are best considered as multipurpose means.[12] The vital point is this: should we incorporate or ignore information provided by material deprivation indicators, income and other resource-based indicators? Ignoring crucial information about the lives the poor experience, poses a seriously flaw of any poverty measure, just as adding redundant information may distort conclusions as well. The present paper proposes to incorporate resource dimensions, if their indicators—argumentatively or evidentialy—contribute important information on otherwise ignored functionings. For instance, the present studies' specification introduced later, argues that indicators of material deprivation are well-suited to infer a shortfall in both practical reason and economic security. Recent insights from behavioral economics (also discussed later) lend support to this nexus. In contrast, a shortfall in income, is not included, since a key functioning income may help to achieve is already modelled explicitly, i.e. social participation. This argument is reinforced by including material deprivation indicators which tend to better reflect well-being than income. Consequently, adding an income dimension is likely to cause redundancy—given that material deprivation and social participation indicators are already included.

Finally table 1, also signals further, partly conceptual, difficulties. For instance, is security best considered as a dimension on its own, as suggested by Stiglitz *et al.* (2009, p.194) who, however, further distinguish personal and economic security. Or alternatively, is it better to model them as risks for the respective functionings (e.g., bodily integrity or health), as advocated by Wolff and de-Shalit (2007)? Likewise, how to account best for employment-related aspects requires still more investigation and debate.

Specification. Although an in-depth discussion of all indicators is beyond the scope of this study, I briefly comment on the selected indicators. The justification of the *material deprivation* and *employment* dimensions receive particular attention. Table 2 shows the selected functionings and their indicators, along with their weights. Note that almost all indicators are either already core indicators of or analyzed within the RPW.[13]

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[12]Note that even housing indicators may not only affect "shelter" and "privacy" but also, say, health.

[13]See, e.g., Bundesregierung (2013, 461–491,) or Wissenschaftszentrum Berlin für Sozialforschung (WZB) and Institut für Arbeitsmarkt- und Berufsforschung (IAB) (2013).

Education.   Education is meant to capture not only achievements in reading and writing, but also the abilities to use one's senses, to imagine, think, and reason (see Nussbaum, 2001). The first indicator (dep_educ) switches to deprivation if a respondent failed to complete elementary education or completed elementary education but later failed to obtain a vocational qualification. Elementary education refers to the graduation after Germany's 10 years of compulsory education. Beyond formal education, I also consider the number of books within the household. Members of a household owning less than 10 books are considered deprived (dep_Nbooks). This information proxies both the educational climate within the household and effective literacy.[14] However, as a proxy located in the resource space, it suffers the usual limitations (potentially important conversion factors are ignored).

Health.   Deprivation in health, which is multidimensional itself, is signalled by three indicators. First, respondents are deemed deprived of bodily integrity if they are partially or severely disabled ($dep\_disability$). Second, I compile a sub-index, which allows for substitutability among several medical conditions. Two out of four health problems must be reported for being deprived. The four health issues are (i) a *strong* limitation when climbing stairs, (ii) a *strong* limitation for tiring activities, (iii) physical pain occured *always* or *often* during the last 4 weeks, and (iv) the health condition limited *always* or *often* socially. Finally, a BMI larger than 30 ($dep\_obesity$) indicates, according to WHO (2000, p. 242), obesity and thus is medically critical. Note that for these indicators the deprivation cutoffs are similar and meaningful across individuals—avoiding a common drawback of indicators like subjectively assessed health state or health satisfaction.

Housing.   Housing indicators are to capture the functionings of being sheltered and enjoying privacy. To measure housing, I resort to 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 (see Bundesregierung, 2013, p. 243). 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

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[14]This indicator is used frequently to study the influence of constructs like "scholarly culture" of the parental household on children's educational attainments (see, e.g., Evans *et al.*, 2010), and is, moreover, applied by the OECD as well (see, e.g., OECD, 2014).

social participation.

Social Participation.   The measurement of social participation exploits information on 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*. Table A.1 contains the exact wording of the questions. While meeting friends or relatives, the social activity *par excellence*, is of central importance, many other activities also facilitate relatedness and social interaction. To emphasize the importance of meeting one's friends (for its own sake), I consider a person deprived if she reports to *never* meet 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*.

Material Deprivation.   Inspired by the work of Townsend (1979) and others, previous poverty measures also used indicators for consumption or ownership on selected goods. Conceptually goods, like income, are resources. Notwithstanding, resource indicators may provide extra information. However, material and wealth deprivation are best considered as a shortfall in a multipurpose means. Lacking multipurpose means may affect several distinct functionings simultaneously and, moreover, in an a priori unclear way. This paper proposes to use resource dimensions, if their indicators argumentatively or evidentialy contribute extra information on otherwise ignored functionings.   More specifically, I argue that indicators of material and wealth deprivation are well-suited to infer a shortfall in both practical reason and economic security.

Nussbaum (2001) suggests the functioning practical reason, referring to an individuals' capacity to act and to plan one's life, including the ability to perform deliberate and reasoned actions.[15] In economic choice theory this corresponds to the activity of balancing costs and benefits. The proposed justification for material deprivation draws on recent research from behavioral economics. Specifically, Mullainathan and Shafir (2013) argue economic conditions to systematically distort decision-making via the so-called scarcity mindset. Important

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[15]Though related to agency, both concepts are distinct. Agency refers to the ability to set one's own goals and eventually strive for them, such as whether to devote one's life to a country's independence, to opt for an austere and spiritual life style, or to maximize one's well-being (e.g., Sen, 1992, ch. 4). In contrast, practical reason refers also to technical and operational decisions. However, low achievements in practical reason may well entail deprivation in agency.

implications are both focus dividend and tunneling.[16] The authors conclude (p. 119), "When we focus so intensely on making ends meet now, we plan less effectively for the future." Later (pp. 120–121), they continue, "myopia is not a personal failure. Tunneling is not a personal trait. [...] rather, it is the context of scarcity that makes us all act that way."[17] Individuals struggling hard to make ends meet are fully occupied with monitoring every penny spent and any penny to be earned. Consequently, long-run effects (costs or benefits) and goals are located outside the tunnel, and hence ignored. Since it is these economic conditions that induce (*inter alia*) myopia, decision making is systematically distorted.

Material and wealth deprivation are also suited to signal a lack of economic security. Goods not consumed for financial reasons already indicate difficulties to make ends meet, and thus a threatened level of consumption. Moreover, the role of wealth (and borrowing) in consumption smoothing is well-established, since the permanent income hypothesis of Friedman (1956 [2015]). Finally, depending on the specific goods used, material deprivation indicators may also indicate shortfalls in even other functionings (e.g., respecting oneself).

The dimension of material deprivation is operationalized using two sub-indices, which allows among other things a certain substitutability. First, dep_wealth equals one if none of the following wealth items is owned: life insurance, pension, house or apartment, financial assets, commercial enterprise, tangible assets.[18] Second, dep_matdep equals one if two or more items of the following are missing for financial reasons (i) a warm meal, (ii) friends are invited for dinner, (iii) money is put aside for emergencies, and (iv) worn out furniture is replaced. Both indicators are suited to detect shortfalls in practical reason and both indicators capture important aspects of economic insecurity. Consequently, extra information is added which otherwise would have been ignored.

Employment.   Previous studies either include an employment dimension or explicitly advocate an *employment capability* (e.g., Leßmann and Bonvin, 2011, Alkire *et al.*, 2014). In fact, by now there is widespread agreement about the importance of employment for human well-being (e.g., Stiglitz *et al.*, 2009, Bundesregierung, 2013). Employment, or labour more general, may indeed help to do things which are intrinsically important (e.g., masterly proficiency, or contributing one's share for the good of all).[19] However, an array of effects of

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[16]Poorer people, for instance extract a focus dividend as they are found to be robust to commonly found framing effects (Mullainathan and Shafir, 2013, ch. 4, surveys the evidence).

[17]Shah *et al.* (2012), Mani *et al.* (2013) provide more evidence and elaborate this line of thought.

[18]The absence of wealth items indicates what Mullainathan and Shafir (2013, ch. 3,) call slack (dep_wealth). In their suitcase-packing metaphor, slack is space accidentally left here and there. Among other things, slack also provides room to fail, i.e., less disastrous consequences of erroneous actions.

[19]See e.g. Csíkszentmihályi (1990) who discusses the flow-aspect of labour.

labour on other dimensions of well-being has been documented as well. In fact, most information collected for the labour-well-being nexus usually pertains to its instrumental relevance (e.g., occupational diseases and risks for accidents, various security schemes, workers' participation in various processes, exposure to adverse conditions, etc.). Suppa (2015b) elaborates the link of labour and well-being, and argues labour to be a crucial means for achieving numerous functionings, such as being healthy, agency, self-respect, practical reason, appearing in public without shame, etc.

The effects of *un*employment on well-being are a case in point. Research on life satisfaction, for instance, documents the importance of non-pecuniary costs of unemployment for subjective well-being and thus demonstrates their importance in principle (Winkelmann and Winkelmann, 1998). Further results find identity utility to be important (Hetschko *et al.*, 2013), which from a capability view may indicate an effect on being ashamed or respecting oneself. Some studies also directly examine the effect of unemployment on specific functioning achievements. Kunze and Suppa (2014), for instance, find unemployment to reduce social participation, whereas Schmitz (2011) finds no effect on health in general. If, however, perfect measures for all relevant functionings were available, there would be no need to rely on an unemployment indicator. In this sense, the justification for an unemployment indicator would lapse.

As it stands, however, accepted measures for many of the more complex functionings are lacking and existing ones might be incomplete. Thus, similar to the material deprivation indicators, employment-related indicators may provide important extra information on otherwise ignored functionings as well.

The current specification draws on three employment-related indicators. First, if an individual reports to be registered unemployment dep_unemp equals one. As outlined above deprivation in numerous functionings a likely to accompany unemployment. Moreover, $dep\_underemp$ equals one if a person reports to involuntarily work less than 30 hours a week. This may be associated by shortfalls in similar functionings, although to a lesser extend. Moreover, part-time jobs are often found to provide lower job quality. Restricting deprivation to the *involuntary* is important, since for many households part-time work may, in fact, be desirable for improving the work-life balance. Finally, $dep\_precemp$ equals one for persons who are marginally employed or in temporary employment. Associated deprivations are in social and economic security and practical reason.

Weights.   The main specification assigns equal weights to each dimension and, within a dimension, equal weights to each indicator. Consequently, most indicators receive a weight

of $^1/_{18}$, whereas education and social participation indicators receive $^1/_{12}$ each. Finally, note that full deprivation in employment is only achieved by unemployed (weighted with $^1/_6$). Assigning the other two indicators a weight of $^1/_{18}$ each, implies an improvement for a formerly unemployed, who finds a precarious part-time job.

Who is poor?   Many instances of the subsequent empirical analysis use a poverty cutoff $k = 33$, implying an individual is considered poor if she suffers at least 33% of the (weighted) maximal possible deprivation. Moreover, to consider people who are actually poor, is a useful exercise to justify a poverty cutoff. For instance: There is a male respondent aged 34, who (i) failed to obtain a vocational qualification, (ii) exhibits obesity, (iii) is considered at least partially disabled, (iv) is currently unemployed, and (v) reports critically low social activity. As his (weighted) deprivation count amounts to $0.\overline{4}$ ($^2/_{12} + {}^2/_{18} + {}^1/_6$), he is considered multidimensionally poor. Alternatively, consider a female respondent aged 76, who (i) failed to complete general elementary education, (ii) reports strong problems with climbing stairs and often physical pain occurred during the last 4 weeks, (iii) calls none of the wealth items her own, (iv) never meets friends, and also (v) reports critically low social activity. This woman is also considered poor, since her weighted deprivation count sums to $0.3\overline{89}$. Note that although these deprivations, such as education and unemployment, might even be causally related, each of them inherently diminishes the life the person leads, which is ultimately why we count it.

Deprivation Headcounts.   Table 3 provides first information about deprivation indicators. The uncensored deprivation headcount is simply the share of individuals deprived in a given indicator. Uncensored headcounts for the whole population (total) indicate different levels of prevalence for different dimensions. Housing indicators, for instance, vary from 1–5%. Similarly, employment indicators vary from 4–7%, whereas deprivations in wealth or social participation amount to 20% each. The so-called dashboard approach exclusively relies on these headcount ratios along with their changes (i.e. the marginal distributions). However, the uncensored headcount ratio can also be calculated for certain subgroups, e.g., by poverty status. While only 1% of the non-poor is found unemployed, 32% of the multidimensional poor are. Table 3 also reveals that the most prevalent deprivations among the poor are material deprivations (67–79%) and social participation (54–62%). Similarly, 47% of all poor are deprived in education. Given the counting approach to poverty, higher prevalences for the poor are to be expected. In fact, prevalences are substantially larger for the poor—often by a triple or more. This finding simply mirrors the fact, that the AFM exploits the joint

distribution of deprivation already in the identification step of poverty measurement. Put differently, the AFM uses the joint distribution to distinguish more important (i.e. coupled) from less important (i.e. occasional) deprivations.

In addition to this, Table 3 also shows the censored headcount ratios, i.e. the share of the population who is poor *and* deprived in the given indicator. Censored heacounts are the key ingredient for dimensional decompositions. While the censored headcount must be smaller or equal the uncensored headcount, it is important to note that none of the censored headcounts is really close to its uncensored headcount. Thus, virtually no indicator directly implies poverty (i.e. multiple deprivation).

The final column contains the share of a given deprivation borne by the non-poor; thus the fraction of a deprivation ignored throughout the subsequent analysis. Note, that for most indicators the non-poor account for 50% or more of a deprivation. The only exception is unemployment, where only 20% of the unemployed are non-poor (which results from the higher weight). Table 3 also clearly reflects that even rather widespread deprivations (e.g., in health or social participation) are by themselves not only insufficient to render an individual poor. Furthermore, a significant share of these deprivations is deliberately ignored in the subsequent analysis. More importantly, table 3 suggests that neither a single indicator, nor a dashboard approach is capable of replacing the multidimensional approach. The latter is in particular supported by the high shares of deprivation borne by the non-poor. To infer from a declining uncensored headcount ratio what happens to the multiply deprived becomes a doubtful exercise for the data at hand.

4   Results

Aggregate Measures.   Figure 1 depicts the multidimensional poverty measure M_0 (the adjusted headcount ratio), the incidence H (the headcount ratio), and the intensity A (the average number of deprivations suffered by the poor)—each for all three periods and for poverty cutoffs $k \in [25, 50]$. Figure 1 suggests for both M_0 and H an increase from period 1 to 2 and decrease from period 2 to 3— independent of k. Average intensity seems to be lowest in 2001/02.

In order to obtain a more detailed account of multidimensional poverty, figures 2 and 3 contain adjusted and headcount ratios, each computed for specific subgroups. Figure 2 (a), for instance, documents that individuals with a background of migration exhibit both a larger M_0 and a larger H—in all years for all relevant k. Similarly, figure 2 (b) suggests both a higher M_0 and a higher H for East Germany—this difference is, however, much less

pronounced. Finally, figure 2 (c) shows that differences according to age groups are not that clear-cut, since most lines are crossing another.

Figure 3 uncovers further substantive differences in multidimensional poverty among groups, for $k \in [10, 50]$. Specifically, persons in single households tend to experience more poverty than individuals in households of couples, regardless of eventual children in the household (figure 3 (a)). Figure 3 (b) clearly documents the importance of the father's education on an individual's deprivation. Three groups appear to be distinguished: First, persons with fathers completely lacking education or where education is unknown are associated with the highest M_0. The second group consists of individuals whose father completed *Hauptschule* or other schools, while the fourth contains those whose fathers completed *Realschule* and *Abitur*. Finally, figure 3 (c) suggests both a slightly higher M_0 and H for women. Differences in average intensity vary less by subgroup (e.g., for age), see figure A.1. However, respondents living in couples or whose father's education is *Realschule* or better display a slightly lower intensity on average.

In sum, figure 2 and 3 document that the insights generated by the adjusted headcount ratio are consistent with earlier findings. The systematic discrimination of individuals with migration backgrounds is just as well documented as the influence of the family background on the offspring's educational achievements (e.g., Bundesregierung, 2008, ch. IX and III.5).

Contributions of Subpopulations.   The previous results suggest certain socio-demographic groups to suffer more from multidimensional poverty. Instead, this paragraph reveals the shares these groups contribute to overall multidimensional poverty, i.e., relative population size is incorporated. Specifically, using (1), M_0 and H can be decomposed into contributions of each subpopulation to overall poverty. Setting to $k = 33$, figure 4, shows such a decomposition for German states, suggesting that the populous states NRW, BAV, and BW contribute the lion's share to overall multidimensional poverty (M_0).[20] Figure 4 also shows that 32% of the overall multidimensional poverty (M_0) is contributed by people with a background of migration. Note that this share is disproportionate to their population share (19%). Figure 2 (a) also reflects this finding. Finally, figure 4 clearly underlines the importance of the father's educational background. More specifically, respondents reporting their fathers to have completed *Hauptschule* alone make up approximately ²/₃. Including those individuals reporting their father's education to be unknown, uncompleted, or absent, the share of multidimensional poverty associated with a handicapped education of the father climbs to ca.

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[20]Naturally, marked differences in population are driving this result. State-specific adjusted headcount ratios reveal differences among states, but fail to provide clear-cut conclusions (results not shown).

85%. Admittedly, the corresponding population share is 69%. [21]   Nonetheless, this finding emphasizes the role of the educational background of the father in multidimensional poverty.

Dimensional Breakdown.   In figure 5 multidimensional poverty (M_0) is further decomposed to each indicator's contribution using (5). The subsequent figures report both the absolute contribution of a dimension d, $\frac{w_d}{D}\underline{H}_d$, summing to M_0, and the relative contribution, $\frac{w_d}{D}\frac{H_d}{M_0}$, summing to 100%. Figure 5 suggests the dimensional contributions to be stable over time. The major contribution comes from social participation, followed by a material deprivation. Housing indicators add the smallest share (ca. 4%).

In order to display different profiles of poverty, figure 6 (a) shows dimensional breakdowns for different subgroups. Typically, for persons with a background of migration, the dimensions of material deprivation and housing contribute relatively more to multidimensional poverty, whereas health appears to contribute relatively less. However, the profiles seem to converge over time, as the dimension-specific differences decrease in general (previous year's results not shown). Figure 6 (b), however, shows that virtually any absolute contribution is larger for individuals with migration background. Similarly, figure 6 (a) also suggests that the relative contributions of deprivations in social participation and health increase with age, so that the roles of housing and material deprivation decrease. In absolute terms, however, figure 6 (b) shows each indicator's contribution to multidimensional poverty to increase with age.[22] Thus, virtually all indicators contribute absolutely more for the elderly and for people with migration background. However, only for age do relative contributions change: in old age health and social participation become increasingly important.   The fact that multidimensional poverty, M_0, can be reduced to contributions of subgroups and dimensions, allows a consistent and deep analysis of multidimensional poverty, and thus a better understanding thereof.

Dynamics.   The natural starting point for studying poverty dynamics is first to document changes over time. Figure 8 (a) contains absolute changes in M_0 for several k. Clearly, multidimensional poverty increases during the first part of the decade, and decreases during the second part. Both findings are independent of the chosen poverty cutoff k. However, (absolute) decreases are smaller for larger k. At $k = 33$ multidimensional poverty remains approximately unchanged after the 10 years under investigation. Moreover, figure 8 (b) not only

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[21]The corresponding contributions to the simple headcount ratio are presented in figure A.2.

[22]Figure 7 shows dimensional breakdowns for the type of household and the father's education. Note that singles and single parents exhibit remarkably similar deprivation profiles.

plots the relative changes of M_0, but also decomposes the changes into the contributions of H and A (according to eq (3)). This decomposition reveals that only for low values of k, the poverty intensity A contributes to the changes in M_0. The reason is that for higher k-cutoffs individuals being relieved of one deprivation are more likely to leave poverty completely.

In order to obtain a deeper insight into changes of multidimensional poverty one can compare changes in censored and uncensored headcounts, which are both depcited in figure 9.[23] More specifically, the three employment indicators and the material deprivation indicator exhibit relatively high changes in both censored and uncensored headcounts during the first half of the decade. Apparently, these four indicators drive the overall increase in multidimensional poverty observed from 01/02 to 06/07. Similarly, indicators for education and unemployment play a crucial role for reducing M_0 during the second half of the decade.

Other patterns, however, are more difficult to rationalize and require a more carfeful analysis. For instance, in Figure 9, the changes in the simple uncensored headcount of education, suggests an improvement from 01/02 to 06/07. In contrast, the censored headcount of education (at $k = 33$) for the same period hardly changes at all. While several different underlying trends may produce this pattern, it simply states that the same share of the population is still multidimensionally poor *and* deprived in education—despite the decrease in the uncensored headcount. Thus, education among the multidimensional poor calls for more attention of both policy makers and reasearchers alike. Moreover, censored headcounts also suggest that precarious employment and underemployment increase among the poor during the second half of the decade, despite the overall decrease in M_0 for this period. Thus, despite the welcome decrease in poverty, these results caution against exaggerated optimism.

A complementary analysis is to study changes by subpopulations. In principal (absolute and relative) changes in M_0 can be decomposed into contributions of subpopulations. However, it is importnant to correctly account for changing population shares, which would affect M_0 as well. A simpler and yet instructive exercise compares absolute changes in M_0 by selected subgroups. Figure 10 shows absolute changes by four different subgroups. East-Germany, for instance, experiences both a larger (absolute) increase during the first half and a smaller decrease during the second half. Consequently, the gap in multidimensional poverty between both regions increases during the period investigated. Asymmetric changes can also be observed for other socio-demographic groups. Most age groups, for example, first experience increases in M_0, but only youngest (<25) and oldest ($65+$) people are finally better off. For the intermediate age groups (25–45 and 45–65) the improvements during the second

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[23]Note that weighted changes of censored headcount ratios sum up to the overall change in M_0. Presenting this breakdown would however impede the direct comparison with uncensored headcount ratios.

half of the decade fail to offset the worsenings of the first half. However, with respect to a background in migration things appear to be different, since migrants experienced a stronger increase during the first half and a stronger decrease during the second half of the period investigated. Moreover, these improvement finally result in a overall shrinking poverty gap between migrants and non-migrants. Finally, distinguishing different household types reveals that multidimensional poverty of non-standard (i.e. "other") household compositions increases throughout the whole period investigated—contrary to the general decrease during the second part.

In summary, the Alkire-Foster framework not only documents multidimensional poverty and its changes, but also provides features to consistently detect specific patterns (e.g., changing gaps or other asymmetric impacts). Moreover, these features also allow to identify the driving factors behind changes in poverty (e.g., changes employment or material deprivation indicators). A more comprehensive analysis may not only combine the presented exercises more systematically, i.e. decomposing changes by subgroup *and* dimensions (or incidence-intensity-breakdown). In addition to this, an even deeper analysis of changes requires a (balanced) panel data setup, which however is beyond the scope of the present study (see Suppa, 2015a). Only then the underlying trends, which drive overall changes can be unambiguously identified, allowing an even better understanding of the mechanisms behind poverty.

Multidimensional and Income Poverty.   Income-poverty is both an alternative to multidimensional poverty measures and a potential dimension. To begin with, figure 11 contrasts the respective headcount ratios for income poverty and multidimensional poverty, each for several poverty cutoffs. Note that $k = 33$ and 60%-of-median-income imply roughly the same incidence (ca. 11%). Moreover, monetary poverty rates are slightly increasing overtime. In particular, monetary poverty also increases from 2006/07 to 2011/12, for which multidimensional measures indicates a decrease (see also figure 8). Suppa (2015a) studies changes in both measures more carefully.

An important question is whether both measures identify the same individuals as poor. Naturally, such a comparison depends on the poverty cutoffs. Figure 12 shows the population shares of individuals who are considered poor (i) by both measures (both-poor), (ii) by income poverty only (IO-poor), and (iii) by multidimensional poverty only (MDO-poor). These shares are plotted for $k = 27, 33, 38$ and for income poverty cutoffs of 50%, and 60% of the median net household equivalence income. By construction the sum of IO-poor and both-poor is constant within a subplot. Likewise, the population shares of MDO-poor and both-poor decrease mechanically with k. For $k = 33$ and an income poverty cutoff of 60%

only 5% of the population is identified as poor by both measures. Moreover, the shares of the IO-poor and MDO-poor are 8% and 5%. Neither other cutoffs nor different years essentially affect this finding (see also figure A.3 in the appendix). The results, therefore, suggest a substantial disagreement of both measures on who is poor. Hence, with respect to targeting the poor the choice of measure makes a difference.

Income as a dimension? The previous section revealed that multidimensional and income measures identify partly different people as poor. However, income-poverty is both an alternative to multidimensional poverty measures and a potential dimension. In fact, previous studies frequently used income as a dimension (Alkire *et al.*, 2014, Busch and Peichl, 2010, Rippin, 2012). Importantly, including a lack-of-income dimension introduces the risk of double-counting. What might be counted is not a novel deprivation, but instead the income-driven lack of, e.g., health or social participation. Moreover, this paper proposes to use resource dimensions only, if their indicators—argumentatively or evidentialy—contribute extra information on otherwise ignored functionings. Then the crucial questions are: does income-poverty provide novel information about shortfalls in some functionings and to what extent do we double-count deprivations?

These questions can be approached in two ways. Exploratively, who are the IO-poor, do they suffer from other deprivations and how do they differ from non-poor?[24] Table 4 contains information about both socio-demographic background and suffered deprivations by poverty status. Evidently, IO-poor are younger than non-poor, in particular the share of individuals aged 25 or less is larger for IO-poor. Additionally, both single and single-parents are more prevalent household types among IO-poor. Turning to the deprivation the respective groups suffer, the IO-poor indeed exhibit a slightly higher average deprivation count of 0.17 compared with the non-poor (0.1), even though a much lower one than MDO- or both-poor (.4 and .45). However, most deprivation indicators are similar in size for IO-poor and non-poor. The outstanding exception are both material deprivation indicators, which are substantially higher for the IO-poor and may well explain their higher deprivation count. This finding points to a sizeable, though not surprising, overlap of material deprivation indicators with income-poverty. This overlap can also be observed pre-identification. Inspection of table 5 reveals that 16% of the income-poor are materially deprived, 21% are deprived in wealth, and 34% are both. Thus 71% of the income-poor are considered deprived in at least

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[24]Studying the MDO- or both-poor in more detail may provide insights on the people ignored by income-based measures and the role of income for multidimensional poverty more generally. However, both exercises are beyond the scope of the present paper.

one material deprivation indicator.[25] Put differently, to the extent in which a low income translates into material deprivation or is accompanied by a lack of wealth, income-poverty is already accounted for. Thus, adding income as a dimension is likely to introduce substantial double-counting.

Additionally, one may also question whether income adequately proxies even the material well-being of the IO-poor. In fact, Slesnick (2001, p.196–97), notes that in particular for young and elderly income does not accurately reflect well-being. The major reason is that income underestimates actual consumption, as the role of wealth is ignored. Wealth may not only be directly consumed, but can also provide a service flow from its stock (e.g., self-occupied property or durables). As shown by Table 4, the young (aged 30 and below) are not only overrepresented among the IO-poor, moreover, together with the elderly (aged 60 and above) they account for ca. 60% of the IO-poor. Table 4 also contains frequently collected wealth information. It turns out, that 25% of the IO-poor own their accommodation and 64% own a car, indicating a substantially share of this subgroup to have indeed access to wealth. Figure 13 provides more detailed wealth information by poverty status and age groups.[26] The left figure shows the median of net household wealth. Notably, older IO-poor seem to have access to significant amounts of wealth. Specifically, individuals aged 45–65 report a median net household wealth of 34k EUR, whereas persons aged 65 or more report 47k EUR. To better assess the prevalence of wealth access, the right figure shows the share of individuals whose net household wealth is larger than 3500 EUR (the 25%-percentile of the overall wealth distribution). The results suggest that over 60% of the older IO-poor individuals own some wealth, but also 30–40% of the younger age groups. Finally, it should be noted that 23% of the IO-poor aged 25 or less currently do an apprenticeship, and another 24% is currently in some educational training. Thus, the evidence suggests that income indeed does not accurately reflect material well-being, in particular the young and the elderly. Theoretically, this is supported by the permanent income hypothesis, which implies consumption smoothing behaviour.

Conceptually, one could draw on social participation to justify a lack-of-income dimension. Social participation is shaped by customs, organization and endowment of a society, which is why it is also often used to justify a *relative* income-poverty cutoff. Thus, if social participation was not already included as a dimension on its own, there might be a case for adding a lack-of-income dimension Table A.2, suggests income-poverty and social participation indicators to be correlated (0.16 and 0.28). Similar arguments could be made if material

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[25]This pattern is also suggested by the correlation coefficients in Table A.2.

[26]This information is collected by a comprehensive SOEP wealth module, which is however, only available in 2002 and 2007, see Frick *et al.* (2007).

deprivation indicators were unavailable.

Alternatively, one could argue to replace material deprivation indicators with an income-dimension. However, material deprivation indicators can be linked more closely to specific functionings, as practical reason and economic security in the present study. More generally, consumption information is often argued to be preferable to income information as it is conceptually closer to well-being.[27] For instance, the role of wealth in consumption smoothing or owner-occupied property is well-established. Finally, externally fixing a uniform income-poverty threshold, attracted also substantial critique in general (e.g., Sen, 1992, ch.7). In the present context the question is how to choose a reasonable cutoff, given other dimensions are already accounted for directly.

Summing up, I reject a lack-of-income dimension based on both conceptual and empirical grounds. First, social participation, a key dimension income is important for, is already directly implemented. Second, material deprivation is also included and can be related to deprivations in two further functionings more directly (economic security and practical reason). Third, there is evidence for redundancy, as the higher deprivation of IO-poor is basically driven by material deprivation indicators. Finally, for a significant share of the IO-poor (the young and the old) income seems not to accurately reflect even their material well-being.

5   Concluding Remarks

Outlook.   Instead of another summary, I conclude with some final remarks. Better official poverty measures are feasible. By now, conceptional frameworks have been carefully devised, and sound and flexible methods have been developed. Many advanced economies have convenient high-quality data at hand. Importantly, both key concepts and major empirical findings are still easy to communicate and therefore may foster public debate. Moreover, a convincing poverty measure promotes the recognition of poverty as an pressing issue more generally—in particular for an advanced economy like Germany. Thereby, it also helps to organize majorities in parliaments necessary to approve appropriate measures. Additionally, an effective and efficient fight on poverty is feasible, once the truly deprived can be better targeted, and once the coupling of deprivations and their mechanisms are better understood. Improving the lives of the most seriously deprived is within reach.

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[27]In standard economic theory goods rather than income provide utility, moreover, consumption is argued to better measure permanent income.

Limitations. First, complex functionings like agency, self-respect, economic security and practical reason are currently only captured indirectly. However, research on providing direct implementations already commenced (Alkire, 2007). A further aspect generally ignored is the role of time, which may, e.g., illuminate the contrasting living conditions of singles with and without children. Unfortunately, its conceptual and empirical integration is complex and still requires more thought.[28]

Moreover, the previous analysis of multidimensional poverty and socio-demographic variables is basically descriptive. Confounding factors may drive some findings, while certain variables are obviously highly endogenous (e.g., type of household). Consequently, these findings cannot be interpreted causally, though future research may well address this issue. Finally, given the current data, more detailed analyses of shocks and reforms are not feasible. Assuming a consensus on the relevant indicators, collecting all items on a yearly basis is, however, straight forward. Finally, certain groups of the society are ignored completely. Homeless people, for instance, are not covered by the underlying data basis. Children, on the other hand, are deliberately excluded, since a more tailored specification to accurately capture their being and doing seems called for.

Future Research. The next steps towards a multidimensional poverty index for Germany should explore the options for direct implementations of missing dimensions such as such as agency, self-respect, security, practical reason and appearance in public without shame. Additionally, a clear conceptual account of both employment and time is a precondition for a better empirical integration of employment- and time-related deprivation into poverty measures. Regarding the data basis, having yearly data of all indicators would allow a more detailed analysis. Questions on Internet-based social participation may complement the present implementation. Finally, applying methods that take account of confounding factors would deepen the analysis and help to uncover the mechanism behind multidimensional poverty.

References

Alkire, S., 2007. The Missing Dimensions of Poverty Data: Introduction to the Special Issue, *Oxford Development Studies*, 35 (4), 347–359.

Alkire, S., Apablaza, M., and Jung, E., 2014. Multidimensional poverty measurement for EU-SILC countries, OPHI Research in Progress Series 36b, OPHI, Oxford.

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[28]Contributions approaching this issue include Merz and Rathjen (2014a,b).

Alkire, S., Ballon, P., Foster, J., Roche, J.M., Santos, M.E., and Seth, S., 2015. *Multidimensional Poverty Measurement and Analysis: A Counting Approach*, Oxford Univ. Press.

Alkire, S. and Foster, J., 2011a. Counting and Multidimensional Poverty Measurement, *Journal of Public Economics*, 95 (7-8), 476–487.

Alkire, S. and Foster, J., 2011b. Understandings and Misunderstandings of Multidimensional Poverty Measurement, *Journal of Economic Inequality*, 9 (2), 289–314.

Alkire, S. and Foster, J.E., 2013. Evaluating dimensional and distributional contributions to multidimensional poverty, mimeo, OPHI, University of Oxford.

Alkire, S. and Santos, M.E., 2011. Acute Multidimensional Poverty: A New Index for Developing Countries, Proceedings of the German Development Economics Conference, Berlin 2011 3, Verein für Socialpolitik, Research Committee Development Economics, Berlin.

Allardt, E., 1993. Having, Loving, Being: An Alternative to the Swedish Model of Welfare Research, *in:* A.K. Sen and M.C. Nussbaum, eds., *The Quality of Life*, Clarendon Press, 88–94.

Arndt, C. and Volkert, J., 2007. A Capability Approach for Official German Poverty and Wealth Reports: Conceptual Background and First Empirical Results, IAW - Discussion Papers 27, Institut für Angewandte Wirtschaftsforschung, Tübingen.

Atkinson, A.B., Marlier, E., and Nolan, B., 2004. Indicators and Targets for Social Inclusion in the European Union, *Journal of Common Market Studies*, 42 (1), 47–75.

Atkinson, T., Cantillon, B., Marlier, E., and Nolan, B., 2002. *Social Indicators: The EU and Social Inclusion*, Oxford: Oxford University Press.

Bourguignon, F. and Chakravarty, S., 2003. The Measurement of Multidimensional Poverty, *Journal of Economic Inequality*, 1 (1), 25–49.

Bundesregierung, 2008. Lebenslagen in Deutschland., 3. Armuts- und Reichtumsbericht, BMAS, Berlin.

Bundesregierung, 2013. Lebenslagen in Deutschland, 4. Armuts- und Reichtumsbericht, BMAS, Bonn.

Busch, C. and Peichl, A., 2010. The Development of Multidimensional Poverty in Germany 1985-2007, IZA Discussion Papers 4922, Institute for the Study of Labor (IZA).

Csíkszentmihályi, M., 1990. *Flow: The Psychology of Optimal Experience*, New York: Harper and Row.

Duclos, J.Y., Sahn, D.E., and Younger, S.D., 2006. Robust Multidimensional Poverty Comparisons, *Economic Journal*, 116 (514), 943–968.

Erikson, R., 1993. Descriptions in Inequality: The Swedish Approach to Welfare Research, *in:* A.K. Sen and M.C. Nussbaum, eds., *The Quality of Life*, Clarendon Press, 67–83.

Evans, M., Kelley, J., Sikora, J., and Treiman, D.J., 2010. Family scholarly culture and educational success: Books and schooling in 27 nations, *Research in Social Stratification and Mobility*, 28, 171–197.

Ferreira, F.H.G., 2011. Poverty Is Multidimensional. But What Are We Going to Do About It?, *Journal of Economic Inequality*, 9 (3), 493–495.

Foster, J., Greer, J., and Thorbecke, E., 1984. A Class of Decomposable Poverty Measures, *Econometrica*, 52 (3), 761–66.

Frick, J.R., Grabka, M.M., and Marcus, J., 2007. Editing and multiple imputation of item-non-response in the 2002 wealth module of the german socio-economic panel (soep), SOEPpapers on Multidisciplinary Panel Data Research 18, DIW Berlin, Berlin.

Friedman, M., 1956 [2015]. *A Theory of the Consumption Function*, Martino Fine Books.

Goebel, J., Grabka, M.M., Krause, P., Kroh, M., Pischner, R., Sieber, I., and Spieß, M., 2008. Mikrodaten, Gewichtung und Datenstruktur der Längsschnittstudie Sozio-oekonomisches Panel (SOEP), *Vierteljahrshefte zur Wirtschaftsforschung*, 77 (3), 77–109.

Hahn, M. and Haisken-DeNew, J.P., 2013. PanelWhiz and the Australian Longitudinal Data Infrastructure in Economics, *The Australian Economic Review*, 46 (3), 379–386.

Haisken-DeNew, J.P. and Hahn, M., 2010. PanelWhiz: Efficient Data Extraction of Complex Panel Data Sets: An Example Using the German SOEP, *Schmollers Jahrbuch*, 130 (4), 643–654.

Hetschko, C., Knabe, A., and Schöb, R., 2013. Changing Identity: Retiring from Unemployment, *Economic Journal*, 124 (575), 149–166.

Kunze, L. and Suppa, N., 2014. Bowling Alone or Bowling at All? The Effect of Unemployment on Social Participation, Ruhr Economic Papers 510, RWI, Essen.

Lazarsfeld, P.F., 1958. Evidence and Inference in Social Research, *Daedalus*, 87 (4), 99–130.

Leßmann, O., 2009. Conditions of Life, Functionings, and Capability - Similarities and Differences, *Journal of Human Development and Capabilities*, 10 (2), 279–298.

Leßmann, O. and Bonvin, J.M., 2011. Job-Satisfaction in the Broader Framework of the Capability Approach, *management revue*, 22 (1), 84–99.

Mani, A., Mullainathan, S., Shafir, E., and Zhao, J., 2013. Poverty Impedes Cognitive Function, *Science*, 341, 976–980.

Marlier, E. and Atkinson, A.B., 2010. Indicators of Poverty and Social Exclusion in a Global Context, *Journal of Policy Analysis and Management*, 29 (2), 285–304.

Merz, J. and Rathjen, T., 2014a. Multidimensional time and income poverty: well-being gap and minimum 2DGAP poverty intensity – German evidence, *Journal of Economic Inequality*, 12 (4), 555–580.

Merz, J. and Rathjen, T., 2014b. Time and Income Poverty: An Interdependent Multidimensional Poverty Approach with German Time Use Diary Data, *Review of Income and Wealth*, 60 (3), 450–479.

Mullainathan, S. and Shafir, E., 2013. *Scarcity: Why Having Too Little Means So Much*, London: Allen Lane.

Neurath, O., 1917 [2006]. Das Begriffsgebäude der Wirtschaftslehre und seine Gurndlagen, *Zeitschrift für die gesamte Staatswissenschaft*, 73, 484–520, reprinted in Uebel, T. and Cohen, R. (eds.): Otto Neurath: Economic Writings: Selections 1904-1945, 2006, pp. 312-341.

Neurath, O., 1937 [2006]. Inventory of the Standard of Living, *Zeitschrift für Sozialforschung*, 6, 140–151, reprinted in Uebel, T. and Cohen, R. (eds.): Otto Neurath: Economic Writings: Selections 1904-1945, 2006, pp. 513-526.

Nussbaum, M.C., 2001. *Women and Human Development: The Capabilities Approach*, *The John Robert Seeley Lectures*, vol. 1998, Cambridge: Cambridge University Press, 13th ed.

OECD, 2011. *How's Life? Measuring Well-being: Measuring Well-being*, OECD Better Life Initiative, OECD Publishing.

OECD, 2014. *Education at a Glance*, OECD Indicators, Paris: OECD Publishing.

Pattanaik, P.K. and Xu, Y., 1990. On Ranking Opportunity Sets in Terms of Freedom of Choice, Discussion Papers (REL - Recherches Economiques de Louvain) 1990036, Université catholique de Louvain, Institut de Recherches Economiques et Sociales (IRES).

Rippin, N., 2012. Operationalising the Capability Approach: A German Correlation Sensitive Poverty Index, Discussion Papers 132, Courant Research Centre, Georg-August-Universität Göttingen.

Robeyns, I., 2005. The Capability Approach: A Theoretical Survey, *Journal of Human Development*, 6 (1), 93–117.

Roche, J., 2013. Monitoring Progress in Child Poverty Reduction: Methodological Insights and Illustration to the Case Study of Bangladesh, *Social Indicators Research*, 112 (2), 363–390.

Schmitz, H., 2011. Why are the unemployed in worse health? The causal effect of unemployment on health, *Labour Economics*, 18 (1), 71–78.

Sen, A.K., 1985. *Commodities and Capabilities*, New Delhi: North-Holland Publ., 12th ed.

Sen, A.K., 1992. *Inequality Reexamined*, Russell Sage Foundation book, New York: Russell Sage Foundation, 3rd ed.

Sen, A.K., 1999a. Democracy as a Universal Value, *Journal of Democracy*, 10 (3), 3–17.

Sen, A.K., 1999b. *Development as Freedom*, Oxford: Oxford University Press.

Sen, A.K., 2004. Capabilities, Lists and Public Reason: Continuing the Conversation, *Feminist Economics*, 10 (3), 77–80.

Shah, A., , Mullainathan, S., and Shafir, E., 2012. Some Consequences of Having Too Little, *Science*, 338 (2), 682–685.

Slesnick, D.T., 2001. *Consumption and Social Welfare*, Cambridge, UK: Cambridge Univ. Press.

Stiglitz, J.E., Sen, A.K., and Fitoussi, J.P., 2009. Report by the commission on the measurement of economic performance and social progress, Tech. rep., Commission on the Measurement of Economic Performance and Social Progress.

Suppa, N., 2014. The Capability Perspective: Basic Features and their Relevance for Social Policy, *in:* H.U. Otto and H. Ziegler, eds., *Critical Social Policy and the Capability Approach*, Verlag Barbara Budrich.

Suppa, N., 2015a. Comparing monetary and multidimensional poverty in Germany, mimeo, TU Dortmund, Dortmund.

Suppa, N., 2015b. Labor and the Capability Approach. Towards Conceptional Clarity, mimeo, TU Dortmund, Dortmund.

Townsend, P., 1979. *Poverty in the United Kingdom: A Survey of Household Resources and Standards of Living*, University of California Press.

Tsui, K., 2002. Multidimensional Poverty Indices, *Social Choice and Welfare*, 19 (1), 69–93.

UN, 2012. *Millennium Development Goals Report: 2012*, Millennium Development Goals Reports, New York: United Nations Publications.

UNDP, 1990. *Human Development Report 1990: Concept and Measurement of Human Development*, Human Development Report, Oxford University Press.

UNDP, 2011. *Human Development Report 2011: Sustainability and Equity: Towards a Better Future for All*, Human Development Report, Palgrave Macmillan.

Wagner, G.G., Frick, J.R., and Schupp, J., 2007. The German Socio-Economic Panel Study (SOEP): Scope, Evolution and Enhancements, *Schmollers Jahrbuch*, 127 (1), 139–169.

Whelan, C.T., Nolan, B., and Maître, B., 2014. Multidimensional Poverty Measurement in Europe: An Application of the Adjusted Headcount Approach, *Journal of European Social Policy*, 24, 183–197.

WHO, 2000. *Obesity: Preventing and Managing the Global Epidemic*, no. 894 in World Health Organization technical report series, Geneva: World Health Organization.

Winkelmann, L. and Winkelmann, R., 1998. Why Are the Unemployed So Unhappy? Evidence from Panel Data, *Economica*, 65 (257), 1–15.

Wissenschaftszentrum Berlin für Sozialforschung (WZB) and Institut für Arbeitsmarkt- und Berufsforschung (IAB), 2013. Soziale Mobilität, Ursachen für Auf- und Abstiege, on behalf of BMAS (ed.), Bonn.

Wolff, J. and de-Shalit, A., 2007. *Disadvantage*, Oxford Political Theory, Oxford: Oxford University Press.

Yitzhaki, S., 1979. Relative Deprivation and the Gini Coefficient, *The Quarterly Journal of Economics*, 93 (2), 321–24.

Table 1: Potential Dimensions

dimension	NB	ACMN	SSF	OECD	RPW	functioning
education	✓	✓	✓	✓	✓	✓
health	✓	✓	✓	✓	✓	✓
housing	(✓)	✓	✓	✓	✓	✗ (shelter, health, privacy)
social participation	✓	✓	✓	✓	✓	✓
political participation	✓		✓	✓	✓	✓
agency						✓
practical reason	✓				(✓)	✓
self-respect	✓					✓
employment	(✓)	✓	✓	✓	✓	(✓) (but also self-respect, agency)
income		✓		✓	✓	✗ (multipurpose)
material deprivation	(✓)	✓	✓		✓	✗ (numerous, depends on items)
environment aspects	✓	✓	✓	✓	✓	✗ (health, shelter)
time (activities)			✓	✓	✓	✗ (multipurpose)
security	(✓)	(✓)	✓	✓	(✓)	(✓) (secure functionings?)

Notes: NB is Nussbaum (2001), ACMN is Atkinson *et al.* (2002), SSF is Stiglitz *et al.* (2009), OECD is OECD (2011)

Table 2: Functionings, Indicators, and Weights

| Functioning	Deprivation Cut-off	Variable	Weight
Education	elementary schooling not completed or elementary schooling completed but no vocational qualification[a]	dep_educ	1/12
	less than 10 books in household	dep_nbooks	1/12
Housing	house requires major renovation or is ready for demolition	dep_housecond	1/18
	neither of bath or shower, kitchen, warm water, toilet	dep_hhfacilities	1/18
	overcrowded (less than one room per person)	dep_overcrowded	1/18
Health	partially or severely disabled	dep_disability	1/18
	reporting 2/4 health issues[b]	dep_healthidx	1/18
	body mass index larger than 30	dep_obesity	1/18
Material Deprivation	reporting 2/4 goods missing for financial reasons[c]	dep_matdep	1/18
	none of life insurance, pension, owning the house or apartment, other house, financial assets, commercial enterprise, tangible assets	dep_wealth	1/18
Social Participation	5/7 activities performed *never*[d]; remaining at most *less than monthly*	dep_actindex	1/12
	never meeting friends	dep_meetfriends	1/12
Employment	unemployed	dep_unemp	1/6
	invol. hours worked < 30	dep_underemp	1/18
	precariously employed (incl. temporary work)	dep_precemp	1/18

Notes: Note: [a]Graduation in Germany is usually achieved after 10 years of schooling. [b]The four health issues are (i) a *strong* limitation when climbing stairs, (ii) a *strong* limitation for tiring activities, (iii) physical pain occured *always* or *often* during the last 4 weeks, and (iv) the health condition limited *always* or *often* socially. [c]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. [d]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.

Table 3: Deprivation headcount ratios

	uncensored headcount			censored headcount	share non-poor depr.
	non-poor	m-poor	total		
dep_educ	0.085	0.471	0.126	0.050	0.604
dep_Nbooks	0.032	0.292	0.060	0.031	0.481
dep_healthidx	0.116	0.409	0.147	0.043	0.704
dep_disability	0.124	0.319	0.145	0.034	0.766
dep_obesity	0.169	0.372	0.190	0.039	0.793
dep_housecond	0.017	0.082	0.024	0.009	0.634
dep_overcrowded	0.042	0.134	0.052	0.014	0.725
dep_hhfacilities	0.010	0.039	0.013	0.004	0.676
dep_matdep	0.115	0.669	0.174	0.071	0.591
dep_wealth	0.176	0.789	0.241	0.084	0.653
dep_actindex	0.172	0.627	0.220	0.067	0.697
dep_meetfriends	0.188	0.540	0.225	0.057	0.745
dep_unemp	0.010	0.320	0.043	0.034	0.208
dep_underemp	0.057	0.100	0.062	0.011	0.827
dep_precemp	0.061	0.107	0.066	0.011	0.828

Notes: Data from SOEP v29.1. Calculations for 2012, cells contains shares. Underlying poverty cutoff $k = 33$.

Figure 1: Aggregate Measures over Time

Note: dahsed line at k=33.33
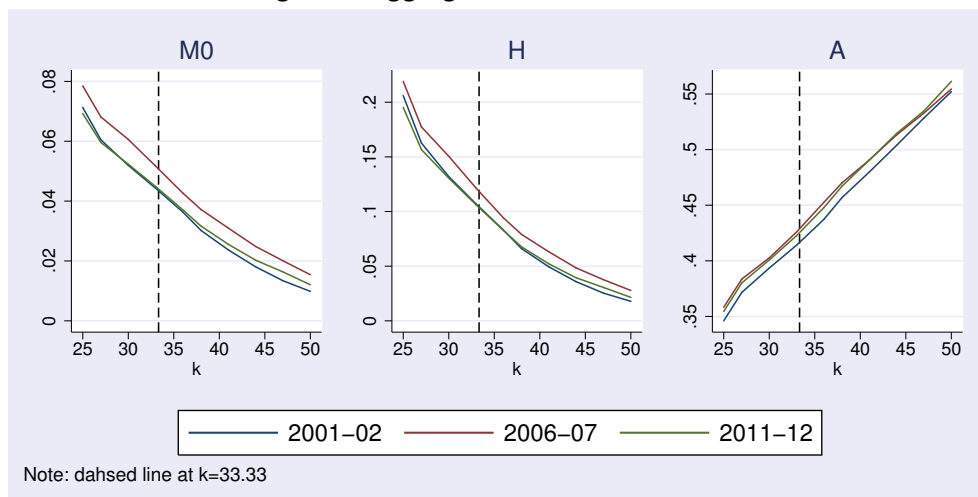
Notes: Data from SOEP v29.1.

Table 4: Statistics by poverty status

	(1) non-poor	(2) both-poor	(3) IO-poor	(4) MDO-poor
age				
<25	0.08	0.08	0.21	0.06
25-30	0.07	0.08	0.10	0.05
31-39	0.15	0.13	0.12	0.12
40-49	0.20	0.21	0.16	0.16
50-59	0.16	0.23	0.13	0.20
60-69	0.16	0.14	0.12	0.18
70+	0.17	0.12	0.16	0.24
hh-type				
single	0.22	0.36	0.33	0.33
couple, no kids	0.37	0.19	0.19	0.31
single-parent	0.04	0.13	0.10	0.08
couple w. kids	0.35	0.29	0.33	0.26
other	0.02	0.03	0.04	0.03
deprivations				
dep_educ	0.10	0.49	0.17	0.52
dep_Nbooks	0.03	0.37	0.07	0.28
dep_disability	0.12	0.24	0.09	0.36
dep_obesity	0.15	0.30	0.15	0.36
dep_healthidx	0.11	0.33	0.12	0.46
dep_housecond	0.02	0.11	0.05	0.08
dep_overcrowded	0.04	0.18	0.12	0.11
dep_hhfacilities	0.01	0.06	0.04	0.06
dep_unemp	0.02	0.44	0.05	0.24
dep_underemp	0.05	0.08	0.08	0.07
dep_precemp	0.05	0.08	0.09	0.08
dep_wealth	0.16	0.84	0.40	0.70
dep_matdep	0.09	0.77	0.35	0.50
dep_meetfriends	0.19	0.47	0.20	0.55
dep_actindex	0.19	0.63	0.23	0.69
house owner	0.43	0.08	0.24	0.12
car owner	0.88	0.39	0.64	0.60
share indebted	0.06	0.14	0.08	0.16
counting vector	0.10	0.45	0.17	0.40
N	40537	1881	3075	2617

Notes: Data from SOEP v29.1. Waves 2001/02, 2006/07, 2011/12. Cells contain shares. Underlying k-cutoff is 33%, income-poverty cutoff is 60%.

Table 5: Cross-tabulation of income-poor and material deprivation indicators

	non-income-poor			income-poor		
	dep_mat=0	dep_mat=1	Total	dep_mat=0	dep_mat=1	Total
dep_wealth=0	75.83	6.42	82.25	28.80	16.22	45.03
dep_wealth=1	13.54	4.21	17.75	20.87	34.10	54.97
Total	89.37	10.63	100.00	49.67	50.33	100.00

Notes: Data SOEP v29.1, cells contain percentages, income poverty cutoff is 60% of median disposable household equivalence income. Deprivation indicators are defined as in table 2.

Figure 2: Aggregate Measures by Subgroups I

(a) migration background
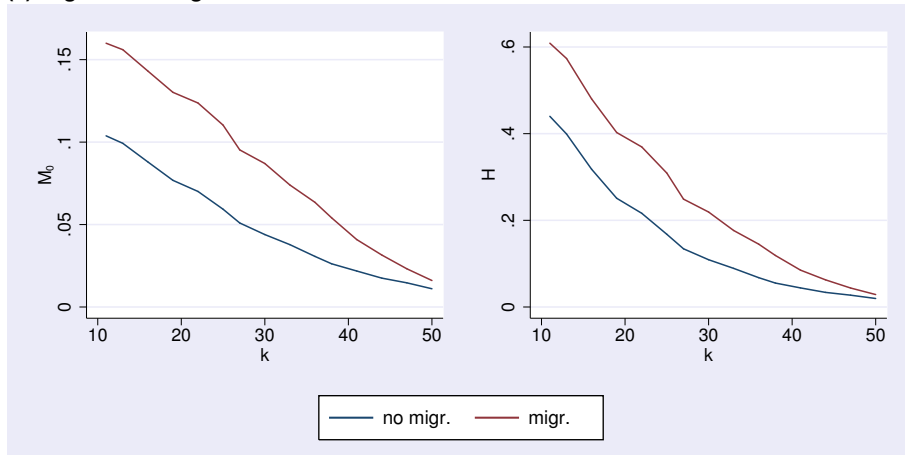
(b) region
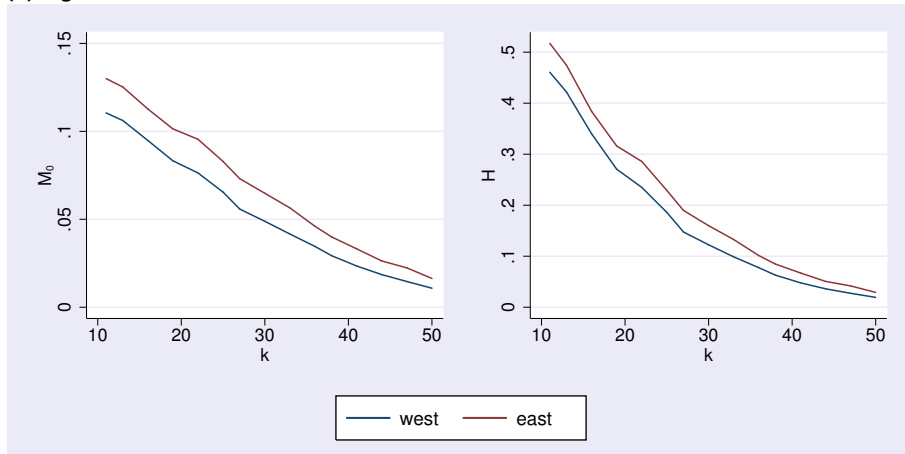
(c) age
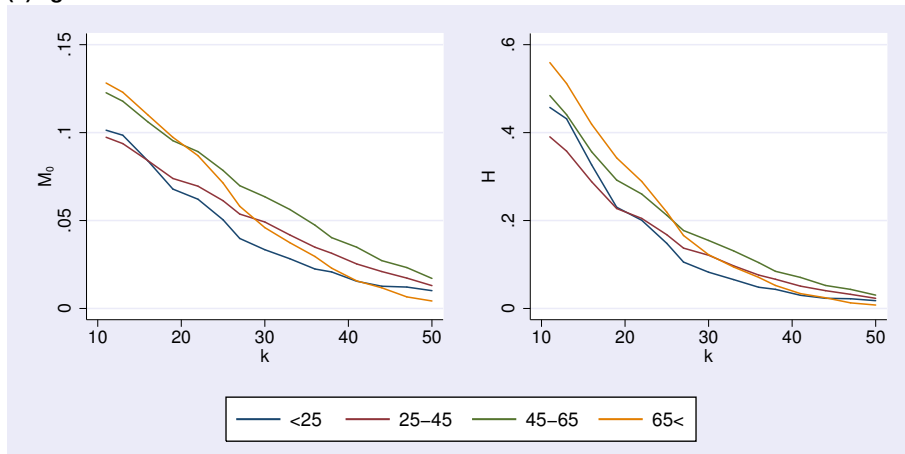
Notes: Data from SOEP v29.1. Calculations for 2011/2012.

Figure 3: Aggregate Measures by Subgroups II

(a) type of household
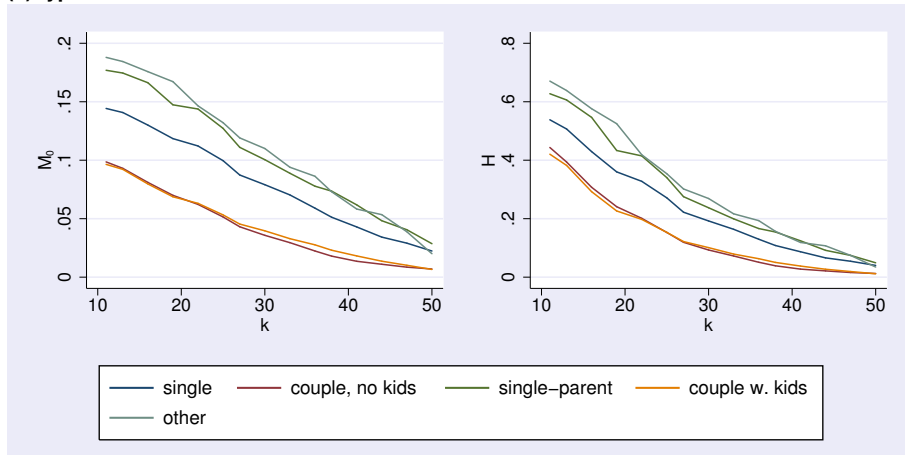
(b) education of father
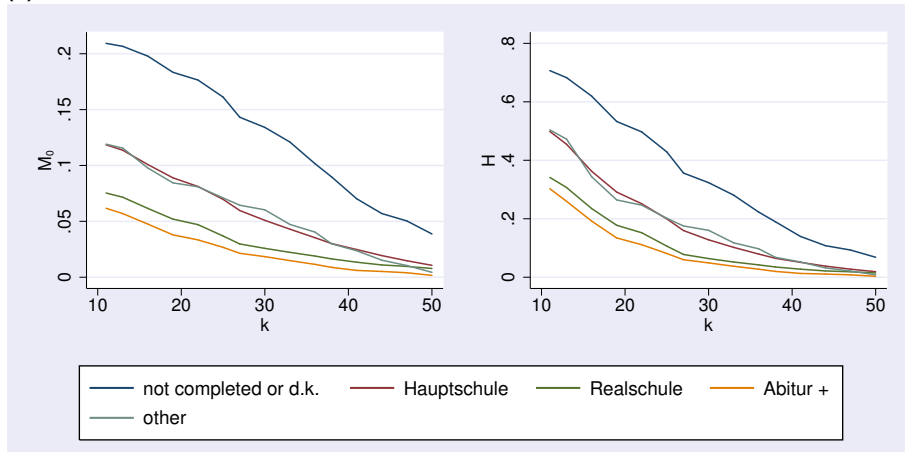
(c) sex
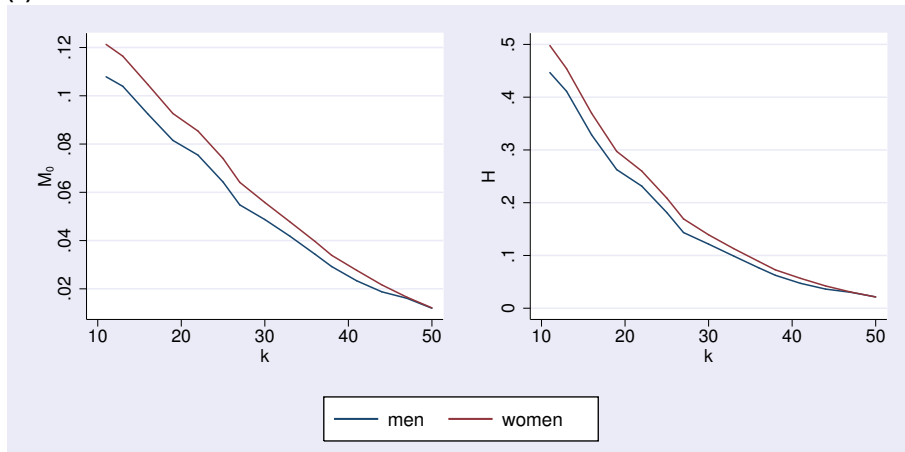
Notes: Data from SOEP v29.1. Calculations for 2011/2012.

Figure 4: Contributions to adjusted headcount ratio by Subgroup
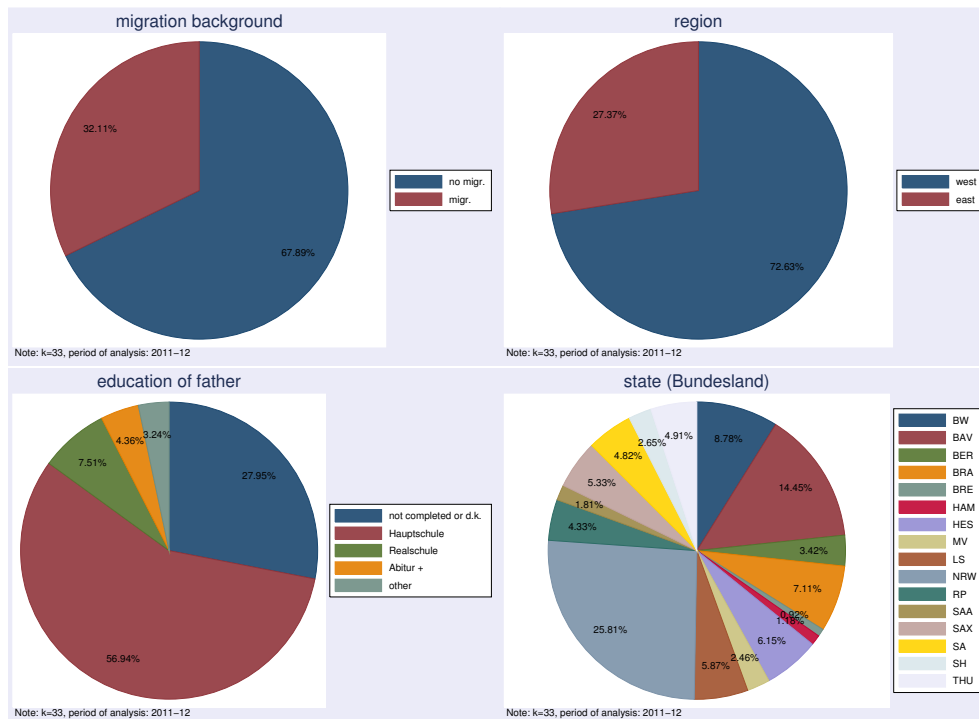
Notes: Data from SOEP v29.1. Year of analysis 2011/12. Graphs show contribution to overall M_0 for selected subgroups, poverty cutoff $k = 33$. For comparison only: share of population with migration background 19%.

Figure 5: Dimensional Breakdown
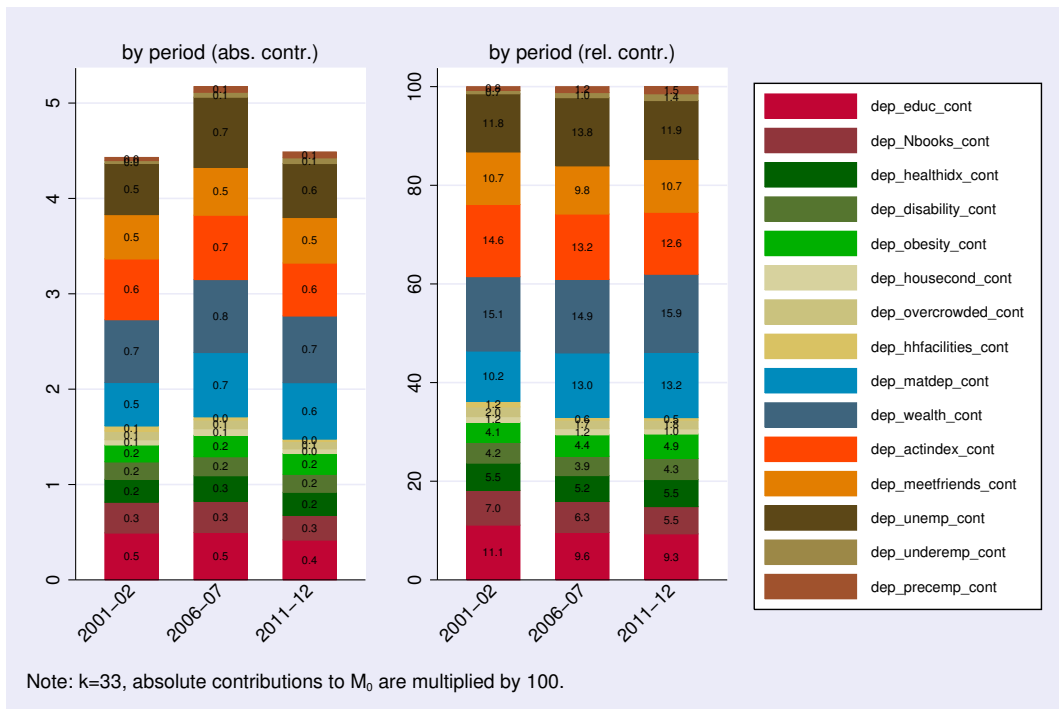
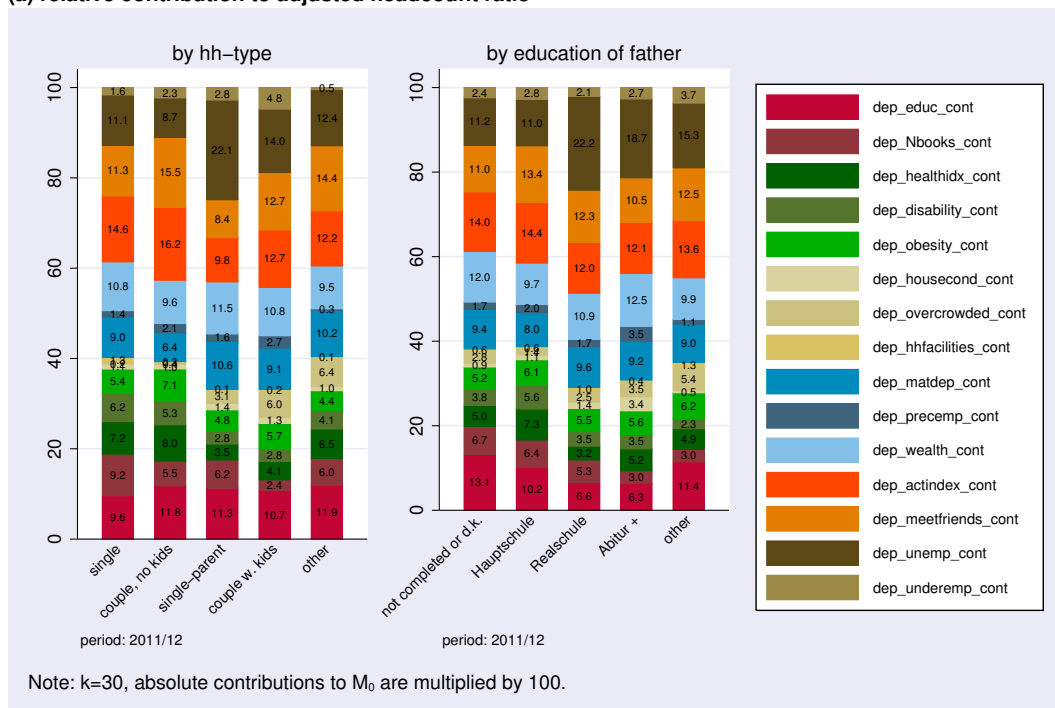Note: k=33, absolute contributions to M_0 are multiplied by 100.

Note: Data from SOEP v29.1. Poverty cutoff $k = 33$. For better readability all (weighted) contributions are multiplied by 100. Thus, relative contributions are percentage points, whereas absolute contribution sum to $M_0 \times 100$.

Figure 6: Dimensional Breakdown by Subpopulations I

(a) relative contribution to adjusted headcount ratio

Note: k=30, absolute contributions to M_0 are multiplied by 100.
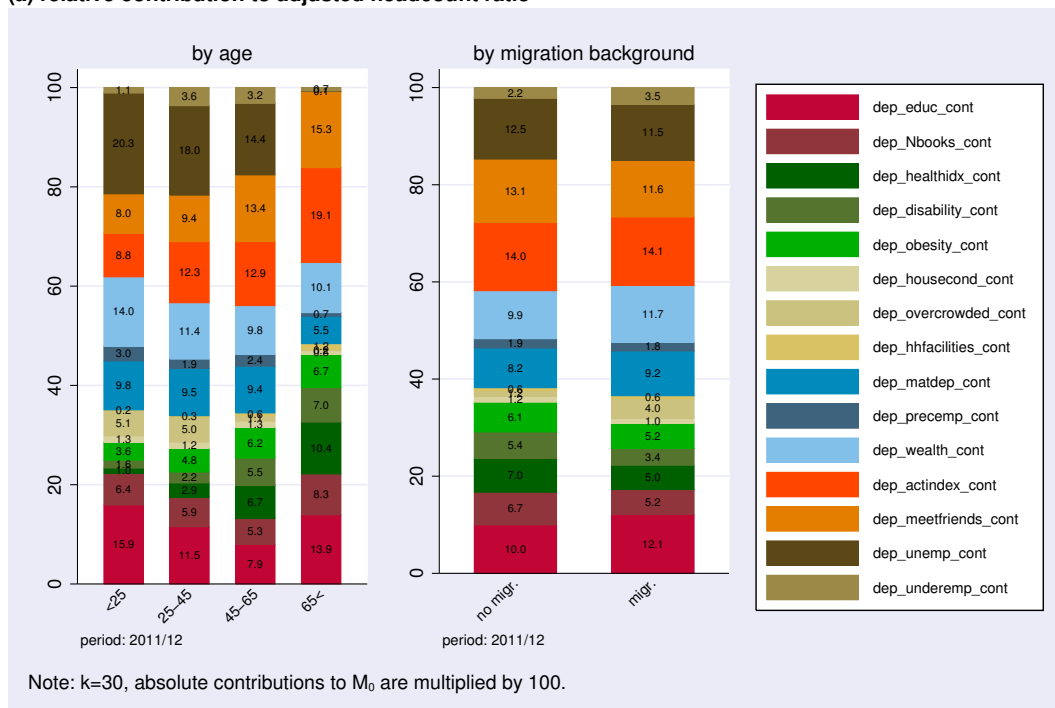
(b) absolute contribution adjusted headcount ratio
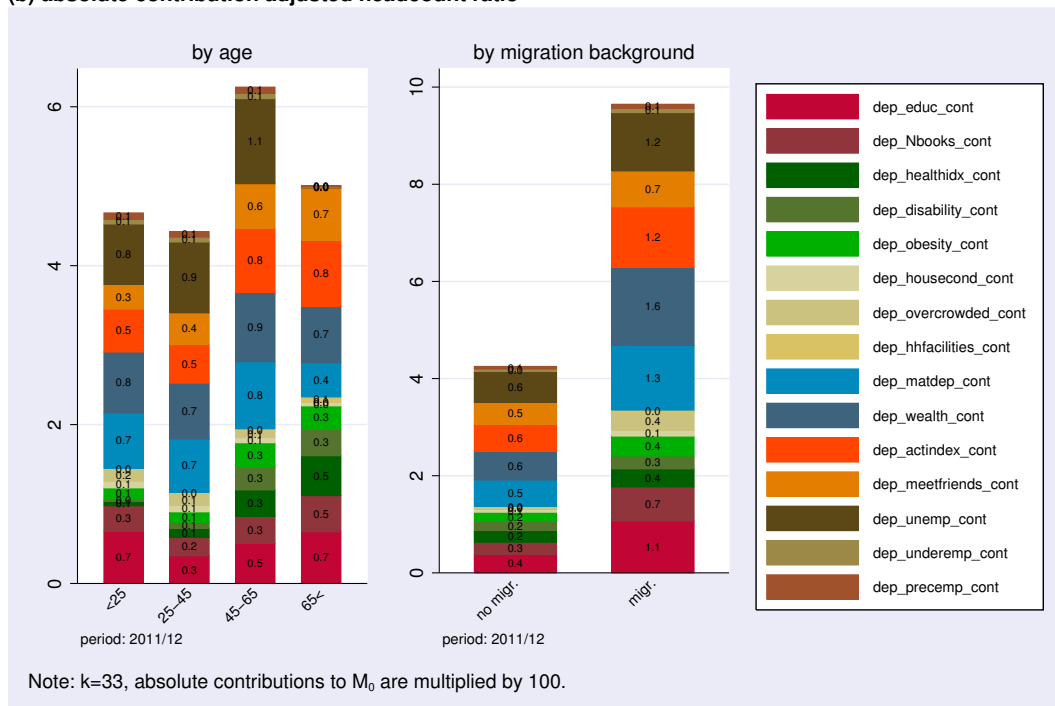
Note: k=33, absolute contributions to M_0 are multiplied by 100.

Note: Data from SOEP v29.1. Poverty cutoff $k = 33$. For better readability all (weighted) contributions are multiplied by 100. Thus, relative contributions are percentage points, whereas absolute contribution sum to $M_0 \times 100$.

Figure 7: Dimensional Breakdown by Subpopulations II

(a) relative contribution to adjusted headcount ratio

period: 2011/12

period: 2011/12

Note: k=30, absolute contributions to M_0 are multiplied by 100.

(b) absolute contribution to adjusted headcount ratio

period: 2011/12

period: 2011/12

Note: k=30, absolute contributions to M_0 are multiplied by 100.
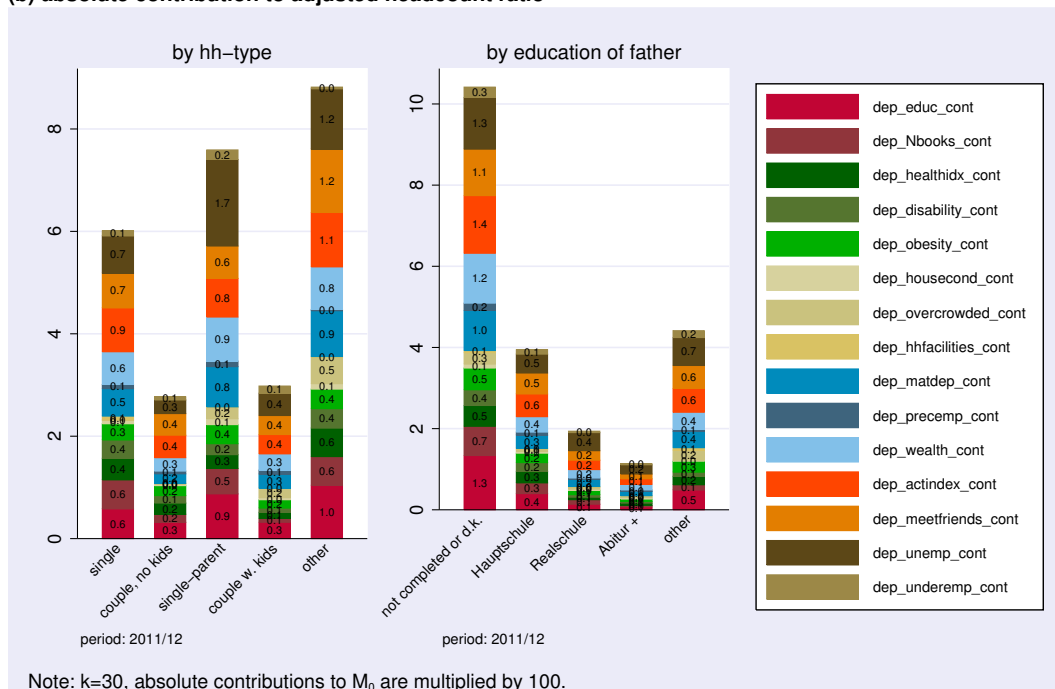
Note: Data from SOEP v29.1. Poverty cutoff $k = 33$. For better readability all (weighted) contributions are multiplied by 100. Thus, relative contributions are percentage points, whereas absolute contribution sum to $M_0 \times 100$.

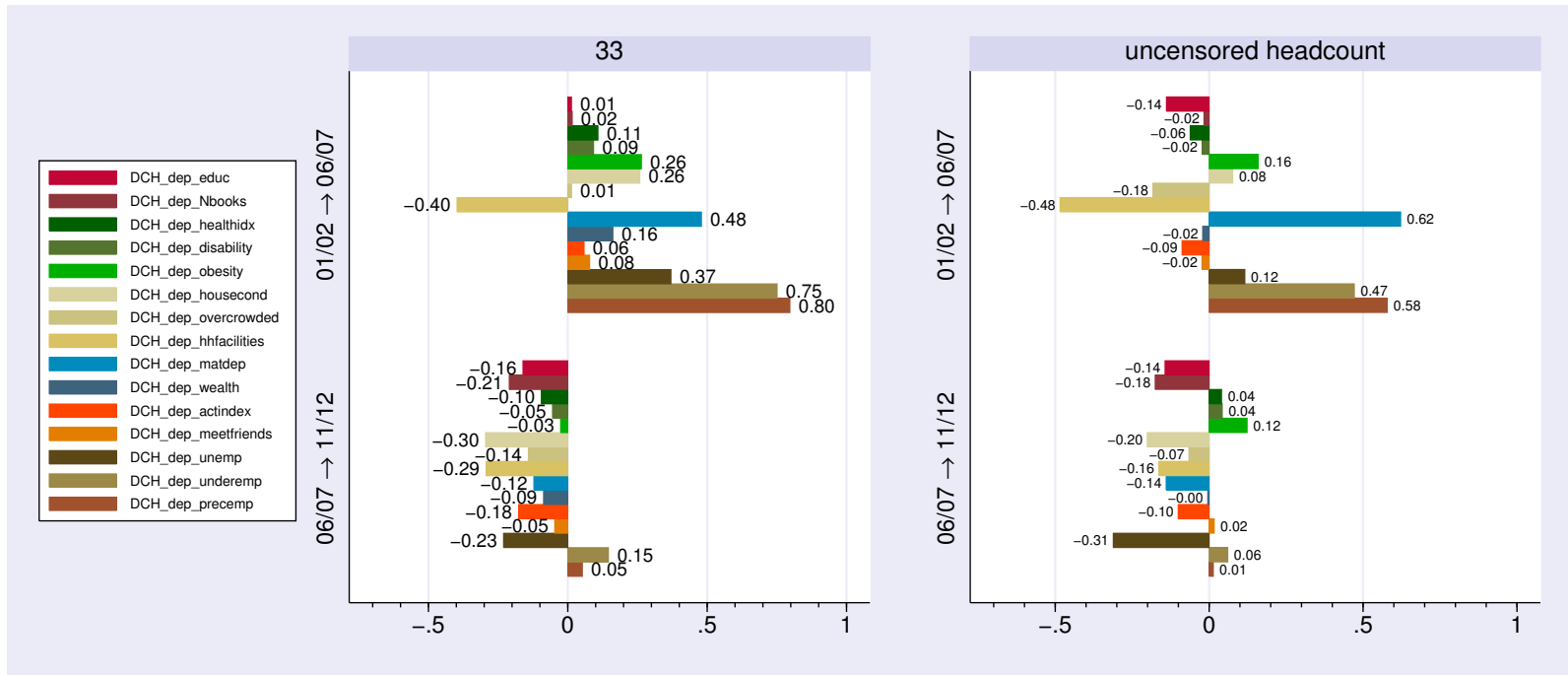**Figure 8: Documenting changes of the adjusted headcount ratio**

(a) absolute changes

Graphs by change
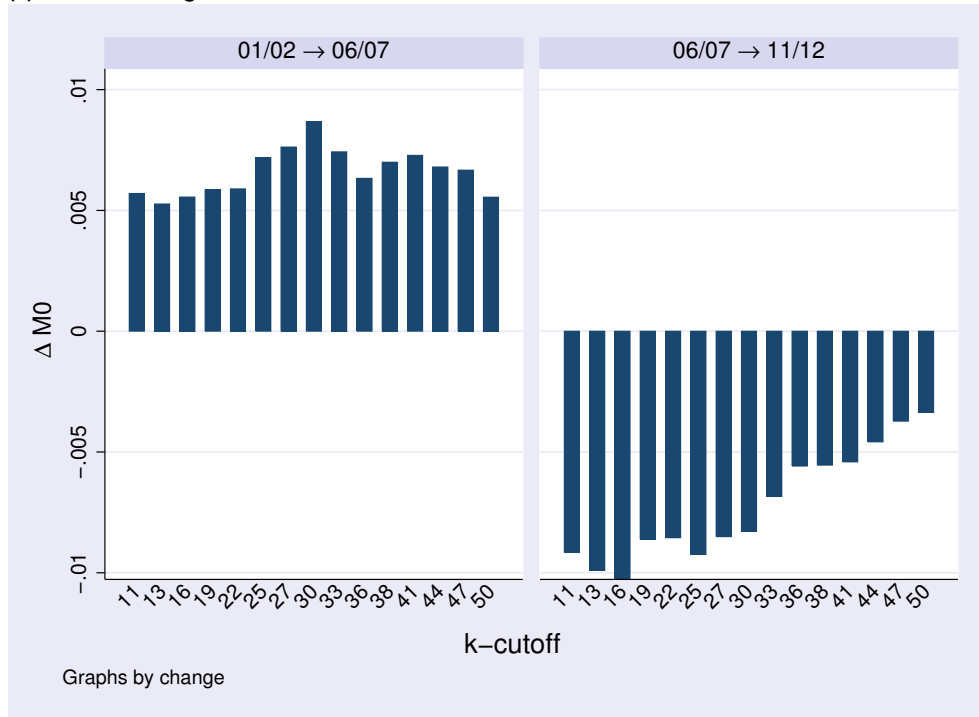
(b) decomposed relative changes

Graphs by change
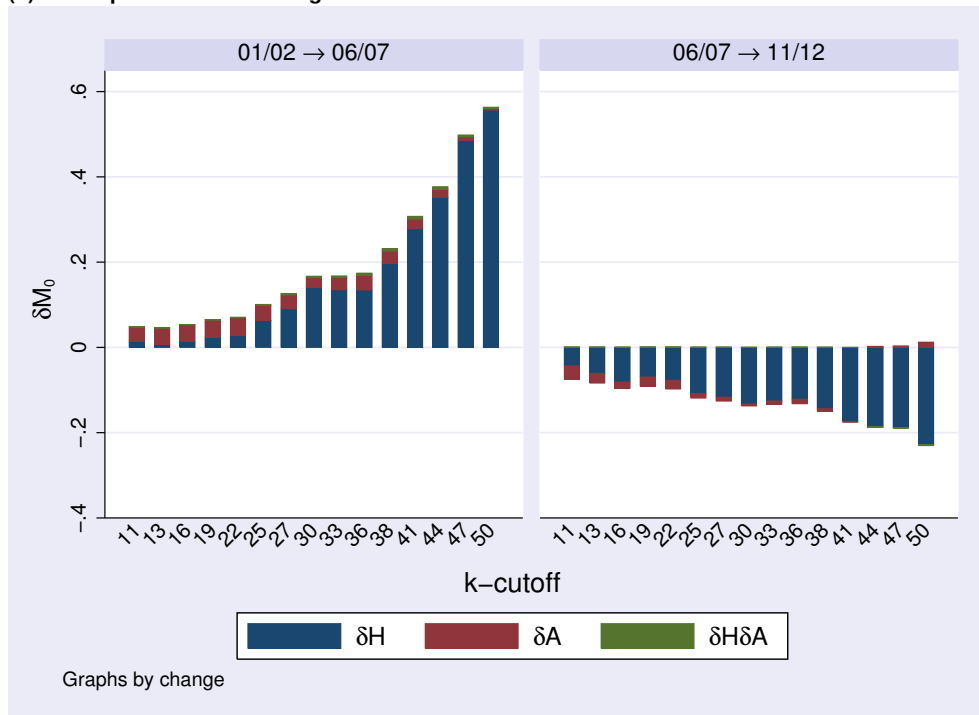
Notes: Data from SOEP v29.1.

Figure 9: Percentage changes in censored and uncensored deprivation headcounts

Notes: Data from SOEP v29.1. Left figure shows relative changes in censored headcounts at $k = 33$, right figure relative changes of simple uncensored headcounts.

Table A.1: Questions

Activities:

Which of the following activities do you take part in during your free time? Please check off how often you do each activity: at least once a week, at least once a month, less often, never.

Going to the movies, pop music concerts, dancing, disco, sports events

Going to cultural events (such as concerts, theater, lectures, etc.)

Doing sports yourself

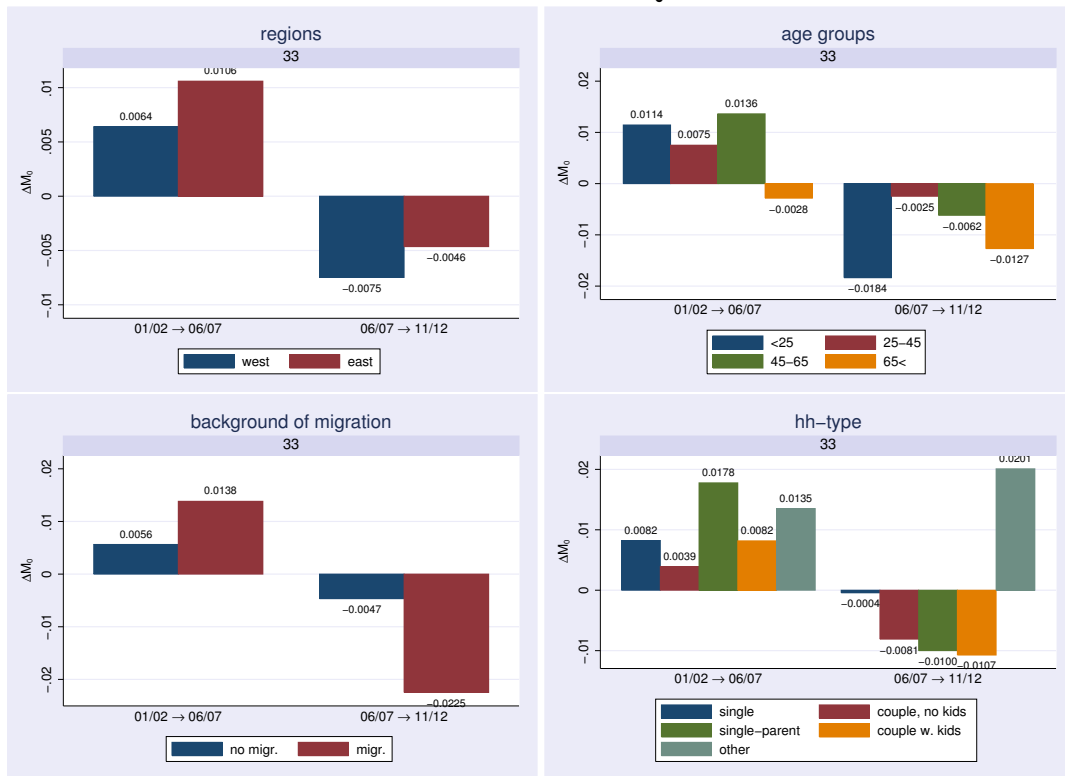Volunteer work in clubs or social services

Attending church, religious events

Meeting with friends, relatives or neighbors

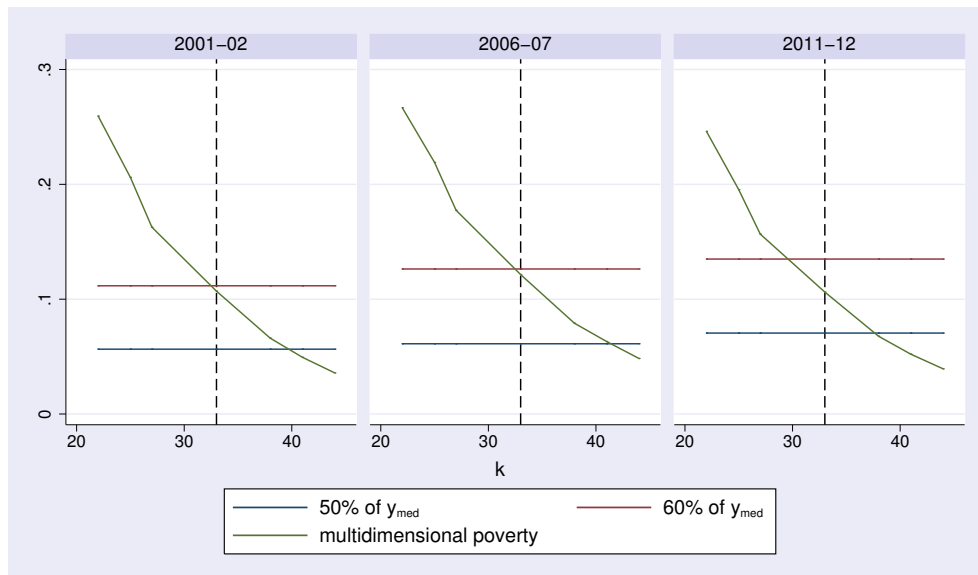Helping out friends, relatives or neighbors

Figure 10: Absolute changes in M_0 by subgroups
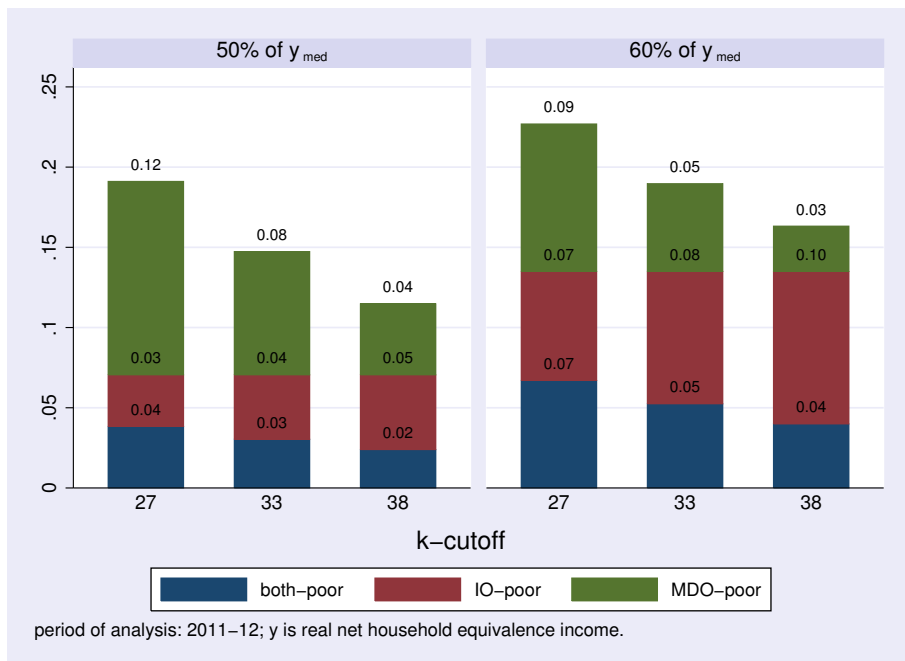

Notes: Data from SOEP v29.1. Poverty cutoff $k = 33$.

Figure 11: Income and Multidimensional Poverty Rates

**Notes:** Data from SOEP v29.1. Underlying income concept is real net household equivalence income.

Figure 12: Income and Multidimensional Poverty

period of analysis: 2011–12; y is real net household equivalence income.

Notes: Data from SOEP v29.1. Underlying income concept is real net household equivalence income. Year of analysis is 2011–12.

Figure 13: Wealth statistics by poverty status
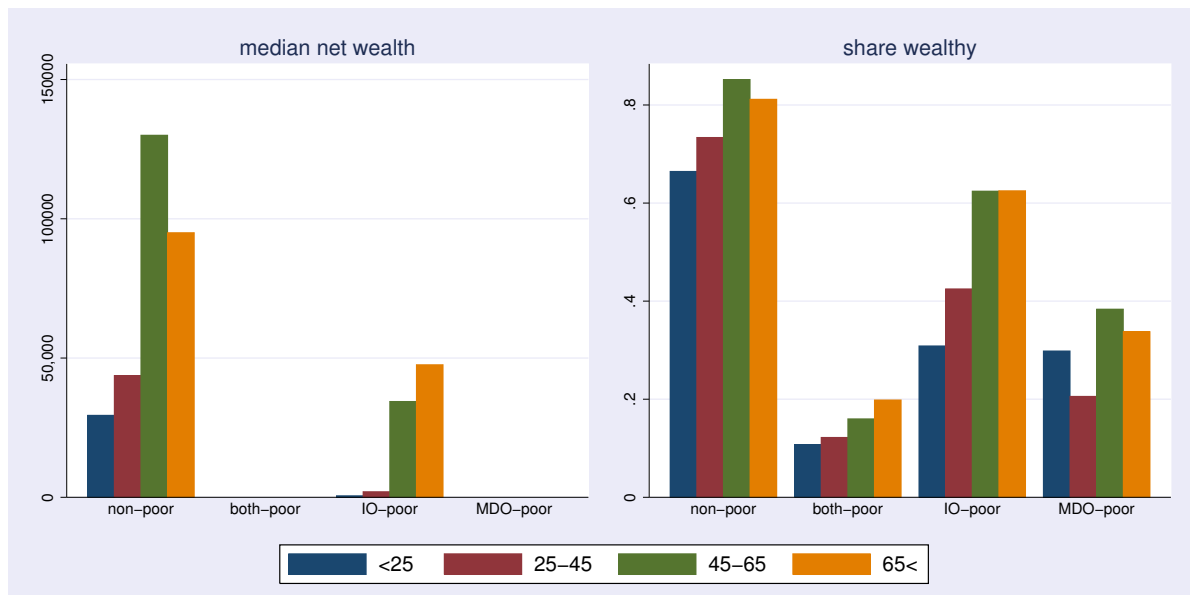
Notes: Data from SOEP v29.1. Wave 2002, 2007. Right figure considers an individual wealthy if her wealth is more than 3.500EUR, the 25%-percentile of the entire wealth distribution.

Table A.2: Correlation of deprivation indicators

|	dep_educ	dep_Nbooks	dep_disability	dep_obesity	dep_healthidx	dep_housecond	dep_overcrowded	dep_hhfacilities	dep_unemp	dep_underemp	dep_precemp	dep_wealth	dep_matdep	dep_meetfriends	dep_actindex	pov60
dep_educ	1.000															
dep_Nbooks	0.437	1.000														
dep_disability	0.154	0.094	1.000													
dep_obesity	0.142	0.092	0.189	1.000												
dep_healthidx	0.276	0.203	0.668	0.280	1.000											
dep_housecond	0.163	0.207	0.064	0.081	0.127	1.000										
dep_overcrowded	0.232	0.139	-0.221	-0.022	-0.172	0.185	1.000									
dep_hhfacilities	0.184	0.324	0.068	0.073	0.165	0.330	-0.045	1.000								
dep_unemp	0.163	0.252	0.016	0.091	0.075	0.261	0.205	0.163	1.000							
dep_underemp	-0.017	-0.084	-0.202	-0.035	-0.168	0.068	0.087	-0.043	-1.000	1.000						
dep_precemp	-0.009	-0.018	-0.142	-0.026	-0.119	0.094	0.088	-0.027	-1.000	0.709	1.000					
dep_wealth	0.349	0.399	0.042	0.051	0.138	0.296	0.314	0.187	0.399	0.067	0.119	1.000				
dep_matdep	0.231	0.342	0.055	0.118	0.152	0.342	0.306	0.141	0.462	0.153	0.148	0.498	1.000			
dep_meetfriends	0.133	0.179	0.201	0.101	0.264	0.090	-0.022	0.148	0.113	-0.047	-0.058	0.091	0.198	1.000		
dep_actindex	0.375	0.428	0.243	0.148	0.348	0.198	0.137	0.158	0.198	-0.071	-0.058	0.298	0.275	0.215	1.000	
pov60	0.329	0.417	0.047	0.098	0.140	0.325	0.328	0.247	0.538	0.116	0.133	0.517	0.609	0.157	0.278	1.000

Notes: Data from SOEP v29.1. Waves 2001/02, 2006/07, 2011/12. Matrix contains tetrachoric correlation coefficients. $pov60$ indicates whether an individual is income-poor, i.e. her real net household equivalence income is less than 60% of its median.

Figure A.1: Average intensity by groups
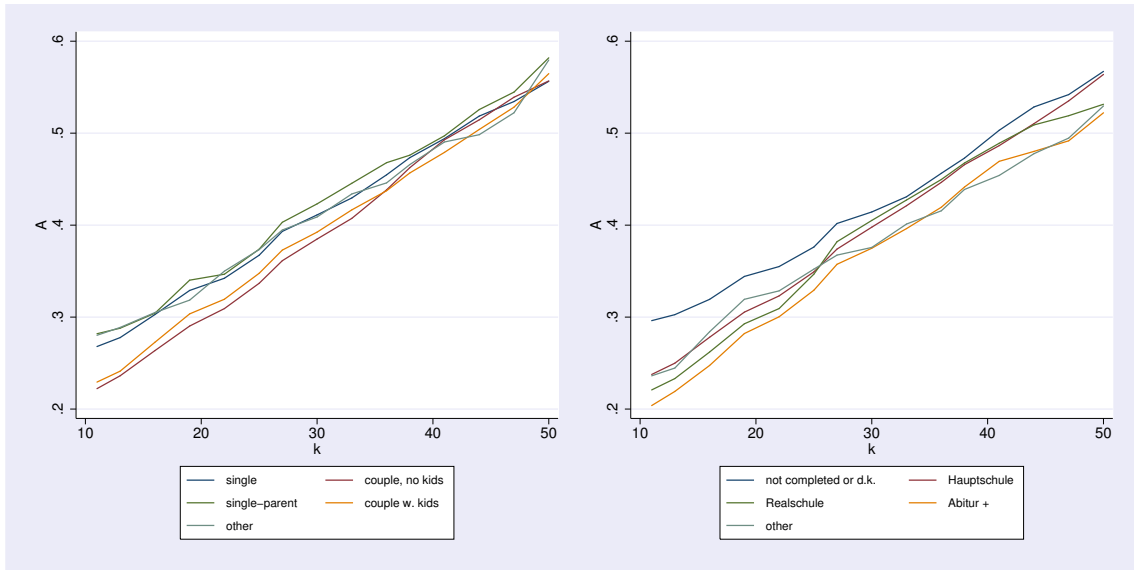
Notes: Data from SOEP v29.1. Calculations for 2011/12.

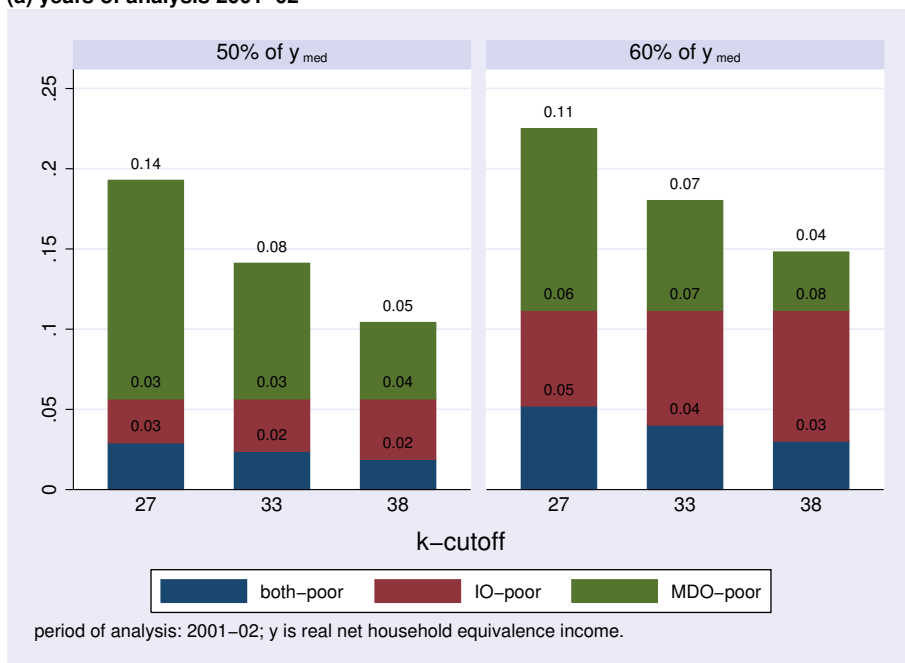**Figure A.2: Contributions to H by Subgroups**
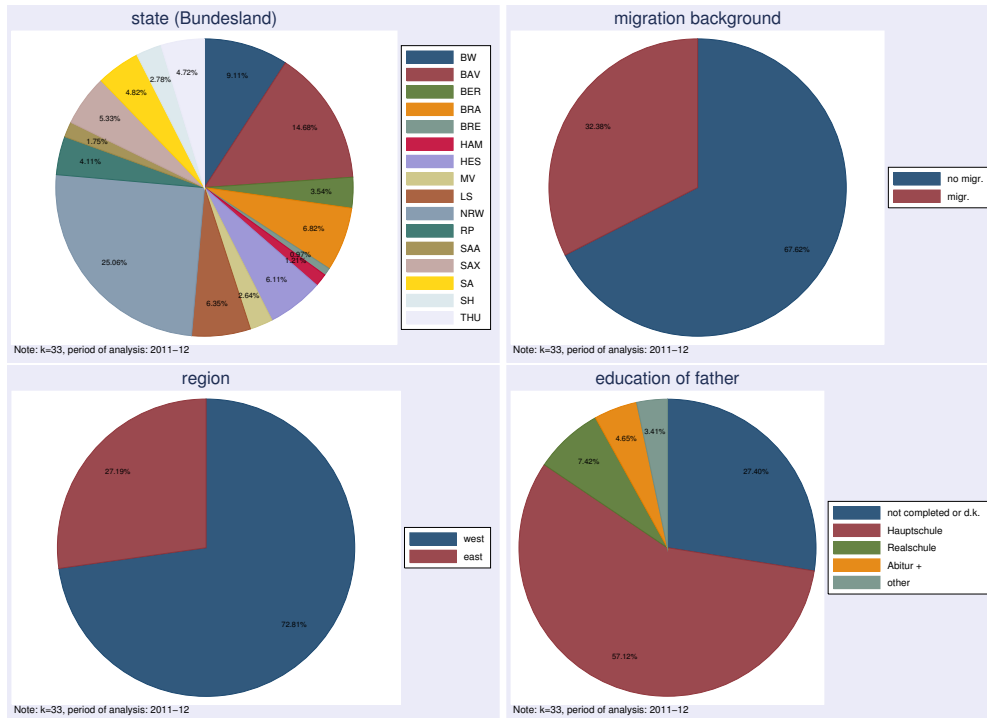
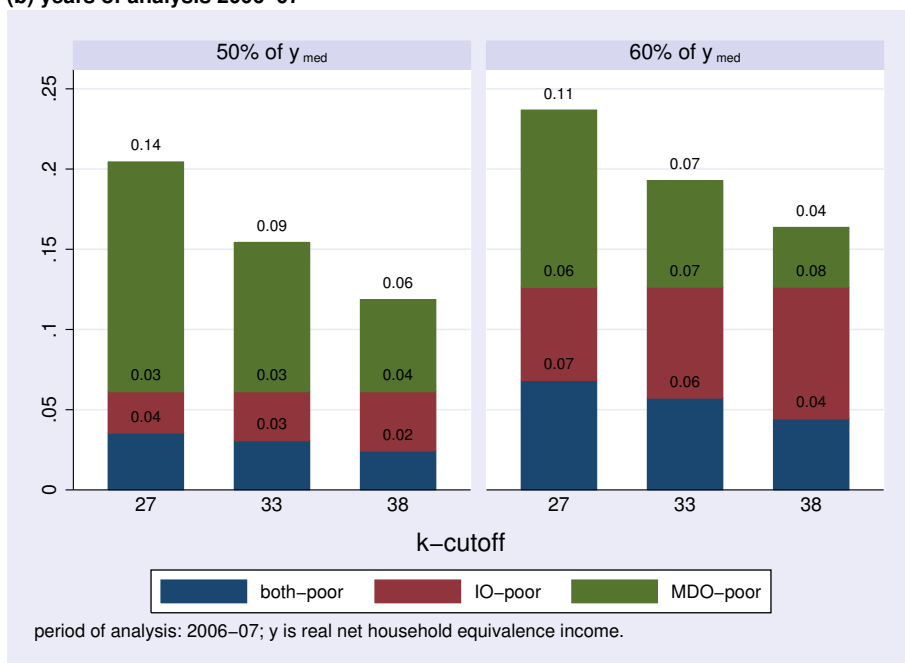**Notes:** Data from SOEP v29.1. Poverty cutoff $k = 33$.

Figure A.3: Income and Multidimensional Poverty—other years

(a) years of analysis 2001–02

period of analysis: 2001–02; y is real net household equivalence income.

(b) years of analysis 2006–07

period of analysis: 2006–07; y is real net household equivalence income.

Notes: Data from SOEP v29.1. Poverty cutoff $k = 33$. Threshold for income-poverty is 60% of median income. Underlying income concept is real net household equivalence income.