

POVERTY IS A PUBLIC BAD: PANEL EVIDENCE FROM SUBJECTIVE WELL-BEING DATA

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Previous research has found that subjective well-being (SWB) is lower for individuals classified as being in poverty. We extend the poverty-SWB literature by focusing on aggregate poverty. Using panel data for 39,239 individuals living in Germany from 2005–2013, we show that people's SWB is negatively correlated with the regional (state-level) poverty ratio while controlling for individual poverty status and poverty intensity. This suggests that poverty is a public bad. The negative relationship between aggregate poverty and SWB is more salient in the upper segments of the income distribution and is robust to controlling for the rate of unemployment and per capita GDP. The character of poverty as a public bad suggests that poverty alleviation is a matter not only of distributive justice, but of allocative efficiency.

JEL Codes: I31, I32, D60

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1. INTRODUCTION

The availability of data on subjective well-being (SWB) has greatly enhanced our ability to study the role for individual welfare of economic variables like income and unemployment. With respect to income, it is well known that richer individuals are more satisfied with their lives (Diener *et al.*, 2010). In addition, it has recently been shown that self-reported satisfaction with life is lower for those who are classified as being in poverty (Clark *et al.*, 2015, 2016). With respect to unemployment, it is well established that not only personally being unemployed, but also the aggregate level of unemployment negatively affects SWB (Di Tella *et al.*, 2001) or, in other words, that unemployment is not only a private bad, but a public bad.

In this paper, we focus on aggregate poverty and argue that the reasons put forward for why unemployment is a public bad may almost literally apply to poverty. With respect to unemployment, Frey and Stutzer (2002, p. 420) write: "People may be unhappy about unemployment even if they are not themselves put out of work. They may feel bad about the unfortunate fate of those unemployed and they may worry about the possibility of becoming unemployed themselves in the future. They may also feel repercussions on the economy and society as a whole. They may dislike the increase in unemployment contributions and

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taxes likely to happen in the future. They may fear that crime and social tensions increase, and they may even see the threat of violent protests and uprisings.”

In a similar vein, we argue that people may be unhappy about poverty even if they are not poor themselves: They may feel bad about the unfortunate fate of the poor and they may worry about the possibility of becoming poor themselves in the future. They may also feel repercussions on the economy and society as a whole. They may dislike the increase in taxes likely to happen in the future. They may fear that crime and social tensions increase, and they may even see the threat of violent protests and uprisings.

Such reasoning provides a first motivation for analyzing whether the degree of poverty prevailing in society affects the well-being of individuals even if they are not themselves classified as being in poverty.¹ If poverty negatively affects all citizens—thus constituting a public bad—welfare economic theory suggests that poverty alleviation is a matter not only of distributive justice, but of allocative efficiency. The next section will provide a more thorough motivation for our analysis in terms of the existing literature.

Controlling for potentially confounding factors (in particular aggregate unemployment and per capita GDP), we show in a fixed-effects framework that people’s satisfaction with life is lower if the regional (state-level) poverty ratio in Germany is higher, which suggests that poverty is indeed a public bad. The well-being repercussions from a 1-percentage point increase in aggregate poverty are about half as strong as the repercussions from a 1-percentage point increase in aggregate unemployment. The estimated coefficient suggests that a 10-percentage point rise in the poverty rate, which is well within sample, would reduce life satisfaction by 0.22 points or one-eighth of standard deviation, which is arguably not small. In addition, we find that the negative relationship between aggregate poverty and well-being is particularly salient for individuals from the upper segments of the income distribution. Negative effects of poverty on the non-poor are consistent with Acemoglu and Robinson (2000), who explain the emergence of redistributive programs in Western societies by a desire of the elite to prevent social unrest.

The paper is structured as follows. The next section reviews related literature and puts the present paper in perspective. Section 3 discusses methodological issues and the empirical background. Section 4 presents the empirical results. Section 5 provides a discussion and concludes.

2. LITERATURE BACKGROUND

This paper ties in with the literature on income inequality and SWB. Following Clark and D’Ambrosio (2015), income inequality can be viewed from two perspectives, the comparative view and the normative view. In the comparative view, an individual compares her own income with that of relevant others, whereas in the normative view an individual evaluates the overall degree of income

¹The effect of aggregate variables on individual-level outcomes is known as contextual effect. Contextual effects have been studied, e.g. with respect to the relation between health status and inequality (e.g. Wilkinson 1996; Kawachi and Kennedy 1997).

inequality, without making any comparisons to individuals who are richer or poorer than she is.

Following Samuelson (1983) we understand normative evaluations of inequality as manifestations of ethical beliefs. As suggested in the introduction, a high level of poverty may create feelings of empathy (consistent with a normative-ethical view), but also fear of becoming poor in the future (personal worries) as well as concern about tax increases or social tension (political worries). Since such worries are not ethical considerations, we will suggest that with respect to aggregate poverty (being a special kind of inequality) a third perspective can be taken on the relationship between income inequality and well-being: a signaling view.

We discuss the comparative, normative, and signaling views in turn.

In the comparative view, a distinction is usually made between relative deprivation and relative satisfaction. Relative deprivation is said to prevail if the income of the individual in question is lower than the relevant comparison income (disadvantageous inequality), whereas relative satisfaction prevails if the individual's income is higher than comparison income (advantageous inequality). Many notions of the "relevant" comparison group have been studied in the literature. Arguably, the comparison group most frequently studied consists of people with the same socio-demographic characteristics (in particular, sex, age, education level, and place of residence). Rather than selecting a comparison group *a priori*, Clark and Senik (2010) have investigated explicitly "who compares to whom" and found that the rich compare less and that colleagues are the most frequently-cited reference group.

A standard finding in the income comparison literature is that higher comparison income reduces the individual's well-being (Clark *et al.*, 2008) through either greater deprivation or lower satisfaction. The mechanism behind these effects is often referred to as "envy" (or "jealousy"). Another possible mechanism studied in the literature is "information". The information theory of income comparison asserts that, in situations of economic transition and uncertainty, increasing income of "similar" others is taken as a clue that one's own economic situation may improve. The information effect implies a positive relationship between well-being and comparison income. Evidence of a positive relationship has been found with respect to the transition economies of Russia and Eastern Europe in the 1990s (Senik, 2004, 2008) as well as in East Germany in the 1990s (Welsch and Kühling, 2015).

A positive relationship between well-being and comparison income may also arise if comparison income is defined as regional or local mean income. Mean income may represent the availability of local public goods. As such, it may affect well-being positively (as was found in some literature), but this effect is difficult to separate from mean income's potential role as comparison income.

An aspect that may mediate the well-being effect of comparison income is deservingness: others' income may have a less negative effect on my well-being if it is perceived as being "justified" by ability or effort (for a discussion, see Clark and D'Ambrosio, 2015). Some evidence on the mediating role of deservingness in income comparisons is provided by Welsch and Kühling (2015). Using data from Germany, they found that income comparison effects were attenuated as income became more strongly linked to education levels (as well as age and sex).

In contrast to the view that both greater relative deprivation and lower relative satisfaction reduce well-being, Fehr and Schmidt (1999) have postulated a utility function according to which *greater* relative satisfaction (advantageous inequality) reduces well-being, due to a general preference for equity and fairness. Numerous experimental studies of ultimatum, dictator and public good games have yielded evidence of behaviors that are consistent with such preferences (while being at odds with standard economic theory). One issue that such experiments typically disregard, however, is deservingness. Introducing deservingness into the experimental situation tends to bring results more in line with the standard view (Clark and D'Ambrosio, 2015).

Turning to the normative view of income inequality, the evidence on the inequality-SWB relationship is mixed, and there seems to exist some cross-cultural heterogeneity. In particular, Alesina *et al.* (2004) found inequality to reduce well-being amongst Europeans, but not Americans. The authors suggest greater perceived social mobility in the US as one potential explanation of this difference. They also found that inequality hurts richer individuals less than it hurts the poorer.

The normative inequality-SWB literature has almost universally used the Gini index to measure inequality. A more differentiated perspective on inequality and SWB was provided by Ebert and Welsch (2009). They considered a wide class of inequality measures comprising the Atkinson and Gini families of measures as sub-classes. Using European data, they found that both rank and level inequality negatively affect well-being and that the overall degree of inequality aversion is greater than that implied by the standard measures used in empirical analysis. Most importantly in the present context, their results indicate that inequality aversion focuses more on lower than on higher incomes.

A measure that, to our knowledge, does not seem to have been studied in well-being research is aggregate poverty.² As will be explained in the next section, aggregate poverty is conventionally measured by the proportion of individuals whose income is below a predefined poverty line, and the latter is defined as a fraction of mean income. This measure—the poverty ratio—is an indicator of *relative* poverty; as such it can be considered to be an inequality measure with special emphasis on the bottom part of the income distribution.

With respect to this kind of inequality, we suggest that, in addition to the comparative and normative views, a third perspective can be taken on income inequality and well-being: the signaling view. As suggested in the introduction, a high level of poverty may create not only feelings of empathy (in line with a normative-ethical view), but fear of becoming poor in the future (personal worries) as well as concern about tax increases or social tension (political worries). If existing, personal worries should mainly affect individuals living in uncertain conditions, due to age or the family situation, say. Political worries should arguably be more salient among the rich than among the poor. Such reasoning is consistent with the theory of institutional reform of Acemoglu and Robinson (2000), which

²As noted in the introduction, Clark *et al.* (2015, 2016) have studied the relationships between SWB and the *individual-level* poverty status and intensity and found those relationships to be significantly negative. In addition, Clark *et al.* (2016) found that past poverty experience has a lasting (“scarring”) effect on well-being.

explains the emergence of redistributive programs in Western societies by a desire of the elite to prevent social unrest. It is also consistent with the finding of Yamamura (2016) that high-income earners' stated preference for income redistribution is related to their perceived degree of conflict between the rich and the poor. The signaling view of the relationship between aggregate poverty and well-being is to be distinguished from the information theory of income comparisons.

As noted by Clark and D'Ambrosio (2015) in their review of the empirical literature, it is difficult to disentangle the comparative and normative channels through which inequality may affect well-being. Arguably, this problem is aggravated when a third factor—signaling—is added. To at least partially respond to this concern, our empirical analysis of the relationship between aggregate (regional) poverty and SWB will control for regional per capita income. The latter is supposed to capture the comparison channel (net of effects of regional public goods, though), whereas the poverty ratio is likely to represent the normative-ethical and/or signaling channel.

Based on this discussion, we expect the prevalence of poverty to affect well-being negatively through the normative-ethical and signal channels, whereas (negative) comparison effects should be captured by per capita income (unless attenuated by regional public good effects).

3. METHOD

3.1. *Poverty Measures*

The measurement of income poverty involves defining as poor all individuals whose income is below a certain threshold, referred to as the poverty line. In this paper we follow the convention applied in documents of the European Union (as do Clark *et al.*, 2015, 2016), in which the poverty line equals 60 percent of the median equivalent income. Given an individual's status as being poor (incidence of poverty), her relative shortfall from the poverty line measures her normalized income deprivation (intensity of poverty).

Regarding the measurement of poverty at the aggregate (societal) level, a variety of measures were discussed in the literature (Foster *et al.*, 1984). In this paper we use the poverty ratio (headcount ratio), i.e. the fraction of the population that is classified as poor, because it arguably is the poverty measure most frequently supplied by statistical offices (such as the German Federal Statistical Office) and most frequently referred to in public debates.

3.2. *Data and Empirical Background*

We analyze the relationship between the annual poverty ratios prevailing in the 16 states of Germany and citizens' subjective well-being, controlling for individuals' socio-demographic characteristics, the individual-level incidence and intensity of poverty, and state-level economic conditions (unemployment rate and per capita GDP).

The data used in this analysis comes from several sources. People's subjective well-being (measured as reported life satisfaction), their socio-demographic characteristics, and the individual-level incidence and intensity of poverty are taken from

TABLE 1
POVERTY RATIO BY STATE (NUTS1) AND YEAR (PERCENT)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Germany	14.7	14	14.3	14.4	14.6	14.5	15	15	15.5
Schleswig – Holstein	13.3	12	12.5	13.1	14	13.8	13.6	13.8	14
Hamburg	15.7	14.3	14.1	13.1	14	13.3	14.7	14.8	16.9
Lower Saxony	15.5	15.3	15.5	15.8	15.3	15.3	15.5	15.7	16.1
Bremen	22.3	20.4	19.1	22.2	20.1	21.1	22	22.9	24.6
North Rhine-Westphalia	14.4	13.9	14.6	14.7	15.2	15.4	16.4	16.3	17.1
Hesse	12.7	12	12	12.7	12.4	12.1	12.8	13.3	13.7
Rhineland Palatinate	14.2	13.2	13.5	14.5	14.2	14.8	15.1	14.6	15.4
Baden-Wuerttemberg	10.6	10.1	10	10.2	10.9	11	11.1	11.1	11.4
Bavaria	11.4	10.9	11	10.8	11.1	10.8	11.1	11	11.3
Saarland	15.5	16	16.8	15.8	16	14.3	15.2	15.4	17.1
Berlin	19.7	17	17.5	18.7	19	19.2	20.6	20.8	21.4
Brandenburg	19.2	18.9	17.5	16.8	16.7	16.3	16.8	18.1	17.7
Mecklenburg Western Pomerania	24.1	22.9	24.3	24	23.1	22.4	22.1	22.8	23.6
Saxony	19.2	18.5	19.6	19	19.5	19.4	19.5	18.8	18.8
Saxony-Anhalt	22.4	21.6	21.5	22.1	21.8	19.8	20.6	21.1	20.9
Thuringia	19.9	19	18.9	18.5	18.1	17.6	16.7	16.8	18

Source: German Federal Statistical Office. Data based on Microcensus.

(or computed from) the German Socio-Economic Panel (SOEP), one of the most widely used panel data sets in the subjective well-being literature. The SOEP is a panel survey based on a multi-stage random design with yearly re-interviewing (Wagner *et al.*, 2007). Annual waves of the survey involve more than 20,000 individuals aged 16 and over in about 11,000 households. We use SOEP version 30.

The dependent variable in our well-being regressions is the answer to the following question: “How satisfied are you at present with your life, all things considered? Please respond using the following scale, where ‘0’ indicates *not at all satisfied* and ‘10’ indicates *completely satisfied*.” The individual income measure we employ to create individual-level poverty measures is equivalent income, i.e. net household income divided by the square root of household size (OECD, 2008). Following official EU practice, we classify individuals as poor if their equivalent income is below 60 percent of the country-level median equivalent income. We define “poverty intensity” of an individual classified as poor as her relative shortfall from the poverty line, whereas this variable is set to zero for the non-poor.

The state-level poverty ratios and the macroeconomic control variables used in this study are taken from the German Federal Statistical Office.³ Poverty ratios are based on the Microcensus, an official representative household survey involving about 830,000 individuals in 370,000 private households.⁴

Accounting for availability of comparable poverty ratios at the state level, the data set used in this paper refers to 2005–2013 and includes 172,965 observations for 39,239 individuals. The summary statistics are displayed in Table A1 in

³<https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/Soziales/Sozialberichterstattung/Tabellen/ArmutsgefahrungsquoteBundeslaender.html> and https://www.genesis.destatis.de/genesis/online/data;jsessionid=62C851D497B8C4AB4000449053F8324D.tomcat_GO_1_1?operation=statistikAbruftabellen&levelindex=0&levelid=1477812054692&index=2

⁴We use poverty ratios from official statistics to enhance the policy credibility of our analysis. Our qualitative results are the same when we use poverty ratios computed from SOEP.

the appendix. The mean of the variable “poor” reveals that about 12 percent of the observations refer to situations in which individuals lived in poverty (i.e. their equivalent income was below 60 percent of the median equivalent income in the respective year).⁵ The (unweighted) mean of state-year poverty ratios is somewhat higher (15 percent) because the poverty ratio tends to be high in some states with small populations.⁶

Table 1 presents the poverty ratios by state (NUTS1) and year in more detail. In Germany overall, the poverty ratio increased monotonically from 14 percent in 2006 to 15.5 percent in 2013. At the state level, a certain fluctuation over time can be observed, but some general trends exist: while the degree of poverty was higher in 2013 than in 2005 in all West German states (except for Bavaria) and in Berlin, it was lower in 2013 than in 2005 in the East German states. Nevertheless, the overall level of poverty was higher in East Germany than in West Germany (except for the city-state of Bremen) even by 2013. Moreover, the level of poverty was above average in regions with “old” industrial structures (e.g. former coal-mining regions of North Rhine-Westphalia) and in the city-states Berlin, Bremen and Hamburg. Interregional differences in poverty levels may be related to differences in the employment structure (e.g. manufacturing versus low-paid services) as well as the demographic structure (e.g. age and education level). The econometric analysis will capture structural differences (if persistent) by state dummies.

It should also be noted that the poverty ratio is strongly correlated with the state-level unemployment rate ($r = 0.80$) and per capita GDP ($r = -0.65$); it is therefore important to control for these macro-variables in the econometric analysis.

3.3. Empirical Strategy

We estimated micro-econometric life satisfaction regressions in which life satisfaction (LS) of individual i in state s and year t depends on several sets of explanatory variables:

- (i) a standard set of time-variant individual-level controls (age, marital status, whether unemployed, years of education, number of children in the household, and whether the individual has moved between states in the year preceding the interview);
- (ii) state-level controls (unemployment rate, per capita GDP);
- (iii) being in poverty (dummy variable) and intensity of poverty (an individual’s relative shortfall from the poverty line);
- (iv) the state-level poverty ratio.

To account for possible endogeneity of the poverty ratio with respect to migration between states, we include among the time-varying individual controls a dummy variable indicating whether the individual has moved between states in the year preceding the interview. Out-migration from a state may be positively correlated

⁵The fact that the poverty rate in the SOEP is lower than the official poverty rate can be explained by selection effects and item non-response, as participation in the SOEP is non-mandatory, in contrast to the Microcensus (Frick and Grabka, 2005).

⁶For instance, in 2015 the poverty ratio was 24.8 percent in Bremen (population share: 0.7 percent) and 22.4 percent in Berlin (population share: 3.7 percent), both of which are city-states, and 21.7 percent in Mecklenburg-Western Pomerania (population share: 2.4 percent). We use state dummies to control for state size.

with the prevalence of regional poverty. Inclusion of a dummy variable that indicates whether an individual has moved between states serves to prevent omitted variable bias resulting from such correlation.

Regional per capita GDP plays a twin role in the well-being regression. On the one hand, it may act as a measure of comparison income, which should affect well-being negatively in a mature economy like Germany. On the other hand, it may represent regional differences in public goods and infrastructures. The coefficient on per capita GDP is ambiguous as it represents a mixture of the two effects.

Time-invariant factors (observed and unobserved) are captured through person-fixed effects. In addition, we use state dummies and year dummies. The estimating equation can be stated as follows:

$$(1) \quad LS_{ist} = \alpha' \mathbf{micro}_{ist} + \beta' \mathbf{macro}_{st} + \gamma^* \mathbf{poor}_{ist} + \delta^* \mathbf{deprivation}_{ist} + \phi^* \mathbf{PR}_{st} \\ + \mathbf{person}_i + \mathbf{state}_s + \mathbf{year}_t + \varepsilon_{ist}$$

where *micro* and *macro* denote the individual-level and state-level controls, respectively, *poor* is a dummy variable taking the value 1 if an individual is poor, *deprivation* is a poor individual's relative shortfall from the poverty line (set to zero for the non-poor), and *PR* is the poverty ratio; *person*, *state* and *year* denote person-fixed effects and state and year dummies respectively, and ε is the error term. Person fixed effects control for time-invariant characteristics, both observed (sex, birth cohort, immigration status) and unobserved. State dummies capture factors such as size, population density and the degree of urbanization.

With respect to identification, we acknowledge that we are unable to establish causation in a rigorous way, for lack of adequate instruments. This is a situation common to studies of the relationship between SWB and aggregate socio-economic phenomena (which was noted, e.g. in one of the best-known studies of this kind, Di Tella *et al.*, 2001). It can be argued, however, that an aggregate-level phenomenon like regional poverty is likely to influence individual-level well-being (if at all) rather than the other way round. Regarding the possibility of spurious regression results due to omitted variables, we note that we control for observed regional factors (such as GDP per capita and regional unemployment) as well as for unobserved regional characteristics (e.g. economic uncertainty in economically depressed areas). Assuming that they show little inter-temporal variation over the period studied (2005–2013), the latter are captured by state dummies.

As is common in the SWB literature (Ferrer-i-Carbonell and Frijters, 2004), we estimate equ. (1) using a linear fixed-effects estimator and report standard errors adjusted for clustering at the state-year level.

4. RESULTS

Table 2 shows the results from versions of fixed-effect regressions corresponding to equ. (1). The first regression includes individual-level controls only (*micro*), whereas the following regressions also include state-level controls (*macro*).

In the overall sample (Regressions 1 and 2), the individual-level controls attract the expected coefficients (Clark *et al.*, 2015): life satisfaction is u-shaped in

TABLE 2
 MAIN REGRESSION RESULTS. DEPENDENT VARIABLE: 11-POINT LIFE SATISFACTION

	(1)	(2)	(3)	(4)	(5)	(6)
	Overall	Overall	Poor	Not poor	Inc <median	Inc >median
Poor (yes = 1)	-0.120*** (0.0219)	-0.117*** (0.0219)			-0.114*** (0.0238)	
Poverty Intensity	-0.327*** (0.0817)	-0.325*** (0.0818)	-0.490*** (0.113)		-0.401*** (0.0852)	
Poverty Ratio	-0.0477*** (0.00695)	-0.0218*** (0.00689)	-0.00378 (0.0233)	-0.0247*** (0.00746)	-0.00971 (0.0117)	-0.0224** (0.0100)
Unempl. Rate		-0.0436*** (0.00617)	-0.0862*** (0.0224)	-0.0319*** (0.00664)	-0.0532*** (0.00981)	-0.0315*** (0.00866)
GDP p.c.		-0.0195** (0.00790)	-0.0105 (0.0250)	-0.0213** (0.00853)	-0.00965 (0.0125)	-0.0177* (0.0101)
Moved	0.110*** (0.0167)	0.108*** (0.0168)	0.143*** (0.0537)	0.0988*** (0.0167)	0.125*** (0.0326)	0.0973*** (0.0178)
Unemployed	-0.527*** (0.0235)	-0.522*** (0.0236)	-0.294*** (0.0444)	-0.532*** (0.0285)	-0.483*** (0.0257)	-0.436*** (0.0421)
Age 16–20	0.0954* (0.0502)	0.0941* (0.0504)	0.128 (0.172)	0.110** (0.0506)	0.168** (0.0834)	0.0494 (0.0646)
Age 21–30	0.0295 (0.0352)	0.0259 (0.0352)	0.101 (0.126)	0.00645 (0.0367)	0.114* (0.0593)	-0.0143 (0.0448)
Age 31–40	-0.0150 (0.0196)	-0.0198 (0.0195)	-0.112 (0.0842)	-0.00976 (0.0188)	-0.0360 (0.0337)	-0.0140 (0.0220)
Age 51–60	0.0450** (0.0183)	0.0433** (0.0183)	0.103 (0.0798)	0.0313* (0.0183)	0.0998*** (0.0376)	0.0261 (0.0213)
Age 61–70	0.153*** (0.0285)	0.151*** (0.0286)	0.0715 (0.124)	0.145*** (0.0289)	0.244*** (0.0597)	0.132*** (0.0345)
Age 71–80	0.0599 (0.0371)	0.0547 (0.0371)	-0.130 (0.172)	0.0676* (0.0363)	0.111 (0.0716)	0.0851* (0.0478)
Age >80	-0.123** (0.0542)	-0.128** (0.0543)	-0.498** (0.212)	-0.0711 (0.0578)	-0.126 (0.0967)	-0.0600 (0.0678)
Education	-0.0177** (0.00763)	-0.0179** (0.00767)	-0.0609* (0.0365)	-0.00568 (0.00809)	-0.0159 (0.0160)	-0.0211** (0.00962)
Married	0.139*** (0.0295)	0.142*** (0.0295)	-0.0798 (0.129)	0.164*** (0.0300)	0.238*** (0.0568)	0.112*** (0.0364)
Separated	-0.174*** (0.0585)	-0.169*** (0.0586)	0.0673 (0.194)	-0.215*** (0.0602)	0.0879 (0.0957)	-0.324*** (0.0721)
Divorced	0.217*** (0.0552)	0.219*** (0.0554)	0.489** (0.207)	0.208*** (0.0516)	0.372*** (0.0987)	0.230*** (0.0633)
Widowed	-0.210*** (0.0548)	-0.206*** (0.0549)	-0.441** (0.217)	-0.207*** (0.0552)	-0.0832 (0.0937)	-0.271*** (0.0822)
No. Of Children	0.0194* (0.0114)	0.0175 (0.0114)	0.103** (0.0463)	0.00576 (0.0121)	0.0264 (0.0183)	0.0161 (0.0141)
Year dummies	Yes	yes	yes	yes	yes	Yes
State dummies	Yes	yes	yes	yes	yes	Yes
N	172965	172965	20441	152524	77664	94102
R-squared	0.014	0.015	0.019	0.012	0.017	0.011

Note: Fixed-effects regressions with standard errors adjusted for state-year clustering. *p<0.10, **p<0.05, ***p<0.01. Reference categories: Age 40–50, Single. Observation numbers differ between Regressions 5 and 6 because subsamples are separated by yearly median income and observation numbers differ by year. Based on SOEP v30.

age up until the age of 70, and it is negatively correlated with being unemployed, separated and widowed, while being positively related to being married and being divorced. As suggested by Clark *et al.* (2015), the latter is consistent with higher well-being as compared to a failing marriage. Having moved in the year preceding

the interview is significantly associated with greater life satisfaction (consistent with Faßhauer and Rehdanz, 2015). With respect to poverty, we find that both its incidence and intensity are significantly negatively correlated with life satisfaction (as was found by Clark *et al.*, 2015, 2016).

Turning to aggregate poverty, we find that, even controlling for the incidence and intensity of poverty at the individual level, the poverty ratio is significantly negatively correlated with life satisfaction. In spite of the large correlation between the poverty ratio and the unemployment rate and per capita GDP, significance of the poverty ratio is obtained even when the latter are controlled for, but the coefficient size varies depending on whether the macro controls are included or not. It amounts to 0.0477 points when the macro controls are omitted (Regression 1) and drops to 0.0218 when the unemployment rate and per capita GDP are controlled for (Regression 2). In the latter specification, the effect of a 1-percentage point change in the poverty ratio amounts to one-half of the effect of a 1-percentage point change in the unemployment rate. The unemployment rate and per capita GDP both attract significantly negative coefficients. The coefficient of 0.0218 suggests that a 10-percentage point rise in the poverty rate, which is well within sample, would reduce life satisfaction by 0.22 points or one-eighth of standard deviation, which is arguably not small (holding own poverty status and regional GDP constant).

The negative coefficient on per capita GDP suggests that this variable incorporates negative income externalities as it may act as reference income in income comparisons (Clark *et al.*, 2008), and that the comparison effect dominates the effect of regional public goods and infrastructures.⁷ In this sense, including per capita GDP contributes to isolating comparison effects in the inequality-SWB relationship from the normative and signaling channels through which inequality affects well-being.

The following regressions split the overall sample into subsamples of poor and non-poor individuals and subsamples of individuals whose equivalent income is below and above the annual median income.⁸ Considering Regressions 3 and 4, a salient result is that a significantly negative relationship between life satisfaction and the poverty ratio exists only for those who are not themselves poor, whereas the respective coefficient is non-significant and of very small magnitude for the poor. In addition, per capita GDP is significant only for the non-poor (with a negative coefficient), not for the poor. The latter suggests that for the poor it is own income, not income comparison, that matters for well-being.⁹ In contrast to aggregate poverty, the labor market perspectives (the unemployment rate) affect the well-being of the poor much stronger than that of the non-poor.

⁷When we drop regional poverty from Regression (2), the coefficient on per capita GDP becomes less negative (-0.0149 instead of -0.0195) and weakly significant. In this modified regression, per capita GDP captures the (positive) effect of low regional poverty, in addition to the comparison and public good effects. Positive coefficients on mean income found in some of the literature may to some extent reflect low levels of poverty, as the latter are typically not controlled for.

⁸More precisely, the subsamples refer to situations (by year) in which the respective conditions prevailed.

⁹The non-significance of the poverty ratio and per capita GDP for the poor is not an artifact of the smaller size of this subsample; it survives when subsamples are of almost equal size (Regressions 5 and 6).

TABLE 3
COEFFICIENT HETEROGENEITY. DEPENDENT VARIABLE: 11-POINT LIFE SATISFACTION

	(7) Sex	(8) Age	(9) Family Status	(10) Poverty Length
Poor (yes = 1)	-0.117*** (0.0219)	-0.117*** (0.0220)	-0.117*** (0.0220)	
Poverty Intensity	-0.325*** (0.0818)	-0.327*** (0.0819)	-0.324*** (0.0819)	-0.489*** (0.113)
Poverty Ratio (PR)	-0.0238*** (0.00813)			
Female × PR	0.00380 (0.00760)			
Age 16–20 × PR		-0.0402*** (0.0145)		
Age 21–30 × PR		-0.0151 (0.0113)		
Age 31–40 × PR		-0.0231** (0.00992)		
Age 41–50 × PR		-0.0265*** (0.00889)		
Age 51–60 × PR		-0.0139* (0.00775)		
Age 61–70 × PR		-0.0186*** (0.00708)		
Age 71–80 × PR		-0.0291*** (0.00833)		
Age >80 × PR		-0.0342** (0.0146)		
Married × PR			-0.0232*** (0.00695)	
Separated × PR			-0.0264* (0.0155)	
Single × PR			-0.0133 (0.00994)	
Divorced × PR			-0.0267** (0.0116)	
Widowed × PR			-0.0220* (0.0125)	
Length>median × PR				-0.00603 (0.0232)
Lentgh<median × PR				-0.00262 (0.0234)
Unempl. Rate	-0.0436*** (0.00617)	-0.0439*** (0.00720)	-0.0443*** (0.00628)	-0.0863*** (0.0224)
GDP p.c.	-0.0195** (0.00791)	-0.0197** (0.00788)	-0.0198** (0.00793)	-0.0104 (0.0249)
N	172965	172965	172965	20441
R-squared	0.015	0.015	0.015	0.019

Note: Fixed-effects regressions with standard errors adjusted for state-year clustering. *p<0.10, **p<0.05, ***p<0.01. Regressions include socio-demographic controls (see Table 2) and year and state dummies. Additionally we control for the main effect of poverty duration (length>med). The coefficient on length>med is insignificant (coefficient = 0.0564679, standard error = 0.132). Based on SOEP v30.

Regressions 5 and 6 strengthen the results from Regressions 3 and 4: The well-being not only of poor individuals (with income lower than 60 percent of median income), but the well-being of individuals with income lower than the median income is not significantly affected by the poverty ratio. A significantly negative

relationship between life satisfaction and the poverty ratio exists only for those whose income is higher than the median income. In addition, only for the wealthier individuals does per capita GDP affect life satisfaction (weakly) significantly.

Table 3 studies other types of heterogeneity in the relationship between well-being and regional poverty. Regression (7) includes an interaction of the poverty ratio and being female and finds it to be non-significant. Regression (8) includes interactions with age blocks. The respective coefficients are all significantly negative except for the age group 21–30 (non-significant negative coefficient). The coefficients are largest for those still in education (16–20) and those in retirement ((age > 70), and they are significantly different from other age groups. Regression (9) includes interactions of regional poverty with indicators of family status. The respective coefficients are all negative and at least weakly significant except for the coefficient for singles (non-significant negative coefficient). The poor themselves, however, are not negatively affected by the regional poverty level no matter what the duration of their poverty spell (Regression 10).

5. DISCUSSION AND CONCLUSION

This study used fixed effect regressions to investigate the relationship between regional (state-level) poverty ratios in Germany and citizens' subjective well-being. Controlling for socio-demographic characteristics, the individual-level incidence and intensity of poverty, and potentially confounding macro-level factors, life satisfaction was found to be significantly negatively correlated with the poverty ratio, suggesting that poverty is a public bad. The well-being repercussions from a 1-percentage point increase in aggregate poverty were found to be about half as strong as the repercussions from a 1-percentage point increase in aggregate unemployment. Differentiating the analysis by sub-groups revealed that the negative relationship between well-being and aggregate poverty is more salient for individuals whose income falls into the upper segment of the income distribution. Furthermore, the negative relationship tends to be more salient for individuals still in education (the young) and in retirement (the elderly) and for divorced or separated persons.

Considering that the poverty ratio is an inequality measure with special emphasis on the bottom part of the income distribution, it may be useful to discuss our findings in the light of the literature on inequality and well-being (as reviewed in section 2). That literature has viewed inequality from a comparative and a normative perspective. In the comparative view, an individual compares her own income with that of relevant others, whereas in the normative view an individual evaluates income inequality with respect to equity and fairness (Clark and D'Ambrosio, 2015).

Studies of the comparative view typically found negative externalities from others' high income, suggesting that others' *low* income should *raise* the satisfaction of the non-poor. Studies of the normative view—conversely—found evidence that others' low income may reduce satisfaction, due to considerations of fairness and altruism. Viewed in terms of the comparative versus normative perspective, our findings on aggregate poverty are consistent with the latter. It should be noted, however, that we found a negative relationship between well-being and mean income (GDP per capita), which is consistent with the comparative view.

Including in the analysis both mean income and regional poverty thus seems to contribute to isolating comparison effects from the normative channels through which aggregate poverty may affect well-being.

In addition to the inequality literature, our analysis of aggregate poverty has been inspired by the literature on aggregate unemployment and SWB. That literature has emphasized aggregate unemployment's signaling role in explaining the common finding that SWB is negatively related to the unemployment rate, even controlling for individual unemployed status. From this perspective, high unemployment may trigger worries on the part of those not themselves unemployed. We have hypothesized that similar reasoning may apply to aggregate poverty.

Similar to unemployment, worries about aggregate poverty have a personal and a societal, political economy dimension. With respect to one's own individual prospects, a high level of poverty may spur people's fear of becoming poor themselves. With respect to the political level, aggregate poverty may spur fear of social tensions and unrest, consistent with the theory of institutional reform of Acemoglu and Robinson (2000) that explains the emergence of redistributive programs in Western societies by a desire of the elite to prevent social unrest.

Our results are consistent with both types of worry: Aggregate poverty (a) affects the well-being of those from the upper half of the income distribution, and (b) the effect is most salient for individuals whose economic prospects may be considered to be uncertain, such as people still in education and in retirement. Finding (a) is in line with political worries, while finding (b) is in line with personal worries (where the two considerations are not mutually exclusive).

Overall, our evidence is consistent with both a normative view of the SWB-poverty relationship, which emphasizes the role of altruism and equity, and a signaling view that focuses on personal and political worries. Testing the relative importance of those channels is not a straightforward matter.

Differentiating normative and signaling channels from the comparative channel also contributes to understanding the difference between our finding that aggregate poverty matters more for the rich (normative and political-signaling channel) and the result of Clark and Senik (2010) that income comparisons are less important for the rich (comparison channel). Moreover, our findings can be reconciled with those of Alesina *et al.* (2004) that the rich are less affected by inequality by pointing out that their results refer to the Gini index, whereas our result refers to poverty. In the case of poverty, the mechanisms of empathy as well as political worries may be stronger than in the case of the Gini index.

Irrespective of the specific mechanisms involved, our findings suggest that aggregate poverty negatively affects citizens in a non-rival and non-excludable way or, in other words, that poverty is a public bad. Welfare economic theory then suggests that poverty alleviation is a matter not only of distributive justice, but of allocative efficiency.

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SUPPORTING INFORMATION

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Table A1: Descriptive Statistics