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Income Inequality and Self-Rated Health Status: Evidence from the European Community Household Panel

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Income Inequality and Self-Rated Health Status: Evidence from the European Community Household Panel*

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ABSTRACT

We examine the effect of income inequality on individual self-rated health status in a pooled sample of 10 member states of the European Union using longitudinal data from the European Community Household Panel (ECHP) survey. Taking advantage of the longitudinal and cross-national nature of our data, and carefully modelling the self-reported health information, we avoid several of the pitfalls suffered by earlier studies on this topic. We calculate income inequality indices measured at two standard levels of geography (NUTS-0 and NUTS-1) and find consistent evidence that income inequality is negatively related to self-rate health status in the European Union for both men and women. However, despite its statistical significance, the magnitude of the impact on inequality on health is small.

JEL Classification: D63, I12, I18
Key Words: Self-rated health; Income inquality; European Union; Panel data.

Inégalité Des Revenus Et Santé Subjective: Résultats Du Panel Communautaire Des Ménages

RÉSUMÉ

Nous examinons l'effet de l'inégalité des revenus sur la santé subjective dans 10 états membres de l'Union Européenne à partir des données longitudinales du Panel Communautaire des Ménages (ECHP). Capitalisant sur la nature transnationale et longitudinale de nos données, et modélisant rigoureusement notre variable de santé subjective, nous évitons plusieurs écueils dont ont souffert un grand nombre d'études antérieures ayant examiné cette question. Nous calculons nos indices d'inégalité en considérant deux niveaux standards d'agrégation géographique (NUTS-0 et NUTS-1) et mettons en évidence l'existence d'une association négative entre l'inégalité des revenus et la santé subjective parmi les hommes et les femmes résidant dans l'Union Européenne. Cependant, malgré que l'on ne puisse pas rejeter l'existence statistique de cette association, l'ampleur cette dernière est néanmoins très modeste.

Classification JEL: D63, I12, I18
Mots clés: Santé subjective, Inégalité des revenus, Union-Européenne, données de Panel.

1 Introduction

Numerous studies have reported the existence of an association between the level of income inequality in a population and aggregate health outcomes: average health among people living in high-inequality areas appears to be lower than their counterparts living in low-inequality areas. A statistically significant relationship has been reported using aggregate (macro-level) data both across countries (Rodgers, 1979; Wilkinson, 1992) and across regions within countries (Kawachi and Kennedy, 1997; Lynch et al., 1998). This observation has lead researchers to argue that increasing income dispersion directly translates into poor health, thereby suggesting additional welfare gains from more progressive income redistribution policies. This argument is embodied in Wilkinson's (1996) controversial 'income inequality hypothesis' (IIH) which posits that the primary determinant of differences in health performance among developed countries is the extent of differences in the disparity between the incomes of the rich and the poor within countries rather than differences in income levels.[1]

Recent studies have however cast doubts on the robustness of this 'ecological' association to model specifications and questioned the comparability of data sources both across countries (Judge et al., 1998; Gravelle, 1998; Gravelle et al., 2002) and across U.S. States (Mellor and Milyo, 2001). Furthermore, Rodgers (1979), and more recently Gravelle (1998) and Gravelle et al. (2002), cautioned that this apparent causal relationship may just be a statistical artefact if individual health is a non-linear function of income.[2] In order to identify the effect of income inequality on health, one needs to turn to individual-level data and to control for relevant confounders, in particular individual income. A number of recent studies have taken this approach, and the new evidence about an association between health and income inequality is mixed at best.

The majority of studies based on individual-level data have focused on the United States.[3] Kennedy et al. (1998) and Mellor and Milyo (2002) found that state-level income inequality significantly affects self-reported health status even after controlling for individual incomes and other demographic variables. However, Mellor and Milyo (2002) report that this association is no longer significant after controlling for regional fixed effects that take differences in diet, lifestyle and access to medical care into account. In fact, the finding that state-level inequality is detrimental to self-rated health is not robust to alternative health outcomes or different levels of aggregation. For instance, Daly et al. (1998) found very weak evidence that state-level income inequality translates into increased mortality. Furthermore, unlike Kawachi et al. (1997) and Lynch et al. (1998), they report that this association is not robust to different measures of income inequality.

Considering a lower level of geography, Mellor and Milyo (2002) and Blakely et al. (2002) do not find any significant association between metropolitan-area-level income inequality and self-rated health. Interestingly, some studies have found evidence of a statistically significant association between county-level income inequality and self reported health status (Soobadeer and LeClere, 1999; Fiscella and Franks, 2000). However, the relationship is no longer significant when the health outcome is measured by mortality (Fiscella and Franks, 1997). Overall, these studies present weak support to the assertion that greater income inequality is detrimental to individual health in the United States.

Few comparable micro-level studies have examined the robustness of this association outside the United States. Results from these studies generally corroborate U.S. findings. For instance, Shibuya et al. (2002) found no significant evidence supporting that income inequality measured at the *prefectures* level has a detrimental effect on self-rated health status in Japan. Likewise, Gerdtham and Johannesson (2004) found no significant effect of community level income inequality on mortality in Sweden.[4] Weich et al. (2001; 2002), however, found significant association between the Gini coefficient in Britain's regions and mental disorders and self-reported health status. But they also found that the results were highly sensitive to the choice of inequality measure (the association disappears with Generalized Entropy indices of inequality).

The objective of this paper is to investigate this issue on a large entity outside the United Sates by using individual-level data gathered in 10 European Union countries drawn from the European Community Household Panel (ECHP) survey data. Providing additional evidence for the European Union is of particular interest as its economic development is comparable to the United States while generally fostering more progressive social and health policies. At the same time, the European Union as a whole can be viewed as a fairly heterogeneous federation of independent States with pronounced regional identities. As a result, one should expect to observe non-negligible regional variations in income and income inequality across E.U. regions. This strongly enhances the possibility to test whether individual health outcomes are responsive to variation in inequality. To the best of our knowledge, this analysis is also the first focussing on cross-national variations in inequality using individual-level data.[5]

Following Mellor and Milyo (2002) and Weich et al. (2002), we examine two versions of the IIH. The strong IIH assumes that income inequality is detrimental to all individuals in the society –poor *and* rich–, while the weak IIH states that income inequality is detrimental to the least well-off in the society. Following Gerdtham and Johannesson (2004), we also explicitly test the absolute and the relative income hypotheses. The absolute income hypothesis posits that, *ceteris paribus*, higher individual income has a protective effect on individual health. By contrast, according to the relative income hypothesis, an individual's health is not so much affected by his absolute level of income than by his level of income *relative* to the average income in his reference community.[6]

Our empirical strategy follows and extends the framework of Mellor and Milyo (2002) to take advantage of the longitudinal nature of the ECHP data. The use of panel data limits the problem of omitted variable bias since it allows us to control for the potential confounding effects of unobservable fixed effects in the relationship between health income and income inequality. It also mitigates the problem of differences in norms and expectations that plague cross-regional studies on self-assessed health (Sadana et al., 2000).

To assess the robustness of our results, we consider two standardized levels of geography, NUTS-0 and NUTS-1. The NUTS classification is the European Union's official regional classification system. NUTS-0 is the country level and NUTS-1 is the first level of aggregation below the country level.[7] Since the health-inequality relationship has been reported to be sensitive to the way inequality is measured, we test the sensitivity of our results to a set of five measures of inequality.

The robustness of existing ecological cross-country studies has been undermined by the poor quality of their income distribution data which often lacked comparability across countries and across time (Judge et al., 1998; Macinko et al., 2003). In this paper, we overcome these limitations by using comparable longitudinal data gathered simultaneously and with a common questionnaire and methodology in different countries. Our self-reported health data and income inequality data should be (cross-nationally) comparable by construction. Nevertheless, there is a well-founded concern that measures of self-reported health, even when collected from surveys sharing common wording of the health question, can not be interpreted in a comparable fashion because of implicit variations in norms and health expectations between individuals (Sadana et al., 2000). An additional contribution of this paper is to offer a simple solution to correct for the potential bias arising from the lack of comparability of the self-rated variables in micro-level cross-country studies.

Distinguishing the effect by gender has been largely overlooked so far (Macintyre and Hunt, 1997). This is surprising since we know that life expectancy is shorter for males and that men's mortality has been found to be much more sensitive to deprivation than women's (McCarron et al., 1994; Raleigh and Kiri, 1997). In a macro-level international study of 13 OECD countries, McIsaac and Wilkinson (1997) did not find that the magnitude of the correlation between income inequality and mortality was significantly different across gender. Similar results from a within U.S. states study are reported by Kaplan et al. (1996). On the contrary, in a recent study, Regidor et al. (2003) found some evidence that female mortality in Spain might be more sensitive to income inequality than men's on 1980 data. However, they fail to confirm this finding on more recent data. We are not aware of any study using self-reported health status to explore the IIH separately on men and women.

To preview our results, unlike, e.g., Mellor and Milyo (2002), we find statistically significant evidence supporting the strong income inequality hypothesis regardless of gender, even after controlling for individual socioeconomic characteristics, income, and 'welfare state' regimes. Our results also support the idea that income inequality is more detrimental to low-income earners. However, we do not find support for a rigid interpretation of the weak IIH which stipulates that income inequality is *only* detrimental to the poorest. While we observe effects that are significantly different from zero in a statistical sense, the magnitude of the effect of inequality on health turns out to be small. The magnitude of the estimated gender differences is not overwhelming and is sensitive to model specification. Evidence supporting the absolute and the relative income hypotheses is weak and sensitive to model specification, especially once we control for regional differences in norms and individual fixed effects.

Data and methods used in this paper are outlined in the next section. Our empirical strategy and results are discussed in Section 3, followed by concluding remarks.

2 Data and Methods

2.1 The European Community Household Panel Survey

This study draws on data from the public use file of the European Community Household Panel survey (ECHP). The ECHP is a standardized multi-purpose annual longitudinal survey providing comparable micro-data about living conditions in the European Union Member States. The December 2003 release of the ECHP data used in this paper includes eight waves spanning the 1994–2001 time period. Over 60,000 households and 130,000 adults across the European Union were interviewed at each wave. The first wave covered all EU-15 Member States with the exception of Austria, Finland and Sweden. Austria joined in the second wave, Finland in the third, and Sweden in the fourth. From 1994 to 1996, the ECHP ran parallel to existing similar panel surveys in Germany, Luxembourg and the United Kingdom.[8] From the fourth wave onwards, the ECHP samples were replaced by data harmonized *ex post* from these three existing surveys ('cloned' datasets). The topics covered in the survey include income, employment, housing, health, and education. An harmonized (E.U.-wide) questionnaire was designed at Eurostat, and the survey was implemented in each Members States by 'National Data Collection Units'. The public-use database is derived from the data collected in each of the Member States and is created, maintained and centrally distributed by Eurostat.[9] The attractive feature of the ECHP data for the purpose of this study is that it provides individual-level data on income and demographics including individual health which are comparable across countries and over time.

In principle, the design of the ECHP should allow us to cover all EU-15 Member States. However, because of exceptions to the general ECHP design rules and missing information, we had to restrict our analysis to a subset of countries including Austria, Belgium, Denmark, Finland, France, Greece, Italy, Ireland, Portugal, Spain and the United Kingdom. The German, Luxembourgish and UK original ECHP samples were not used because they only cover three survey years and are therefore not appropriate for the estimation of our panel data models. By the same token, the Swedish dataset was dropped because it does not share the longitudinal design. Data for the Netherlands were excluded because information on NUTS-1 region of residence are not available, whereas the Luxembourg PSELL 'cloned' dataset does not contain information on self-reported health status. Additionally, after closer scrutiny and preliminary data checks, we dropped all data from the German SOEP 'cloned' dataset as well as from wave 6 of the UK BHPS clone because of departures in the wording of the survey questions about self-reported health compared to the original survey questionnaire. These departures resulted in largely distorted distributions of self-reported health (see Table 1 *supra* for the case of Germany).[10]

For comparability with earlier studies, we follow Fiscella and Franks (1997) and Mellor and Milyo (2002) and limit our sample to individuals aged 25 to 74.

2.2 Regional Measures of Income Level and Income Inequality

The ECHP data identify the region of residence of respondents down to the NUTS-1 level. NUTS-0 is the country level and NUTS-1 is the first level of aggregation within countries. We are therefore able to consider the health-inequality relationship at these two levels of geography. The size of the regions defined by the NUTS-1 classification varies considerably across the European Union. However, since the NUTS is determined on the basis of population thresholds, it is reasonable to expect that these regions delimit relatively homogeneous territorial units.[11] Furthermore, the NUTS classification was precisely created to facilitate the collection, compiling and dissemination of comparable regional statistics in the European Union. This makes our analysis easily reproducible.

Concerns over the quality and comparability of existing international data on income distribution is one of the most severe drawback suffered by a majority of (aggregate-level) cross-national studies. Many studies relied on heterogeneous sources of income distribution data often collected at different points in time and/or failed to use an adequate measure of disposable income.[12] The ECHP survey allows us to circumvent these limitations since we are able to estimate our own regional income inequality measures across the E.U. using fully comparable individual-level income data.

The ECHP Users Database contains a measure of 'total net household income' expressed in national currency units. To make the household income data comparable across countries and over time, (i) all these data were expressed in 1995 prices using national consumer price indices, and (ii) cross-national differences in currency and price levels were normalized using the OECD purchasing power parity standards provided in the ECHP database.[13] In addition, in order to take economies of scale in household consumption and differences in needs between adults and children into account, we converted all household incomes into a 'single-adult equivalent household income' by applying the conventional modified-OECD equivalence scale (see, for example, the recommendations in Atkinson et al., 2002, p.99). In the sequel, we refer to respondents' 'single-adult equivalent household income' as to their household income for short.

In order to assess the sensitivity of our results to the choice of an inequality measure, we estimated a series of five measures: the Gini coefficient, two Generalized Entropy measures (the Theil index and the Mean Log-deviation index), the coefficient of variation, and the ratio of the 90th and 10th percentiles. All these widely-used measures of inequality are 'relative' in the sense that they are insensitive to changes in scale (equi-proportionate increases in everyone's income). The Gini and the percentile ratio are known to be relatively insensitive to extreme incomes.[14]

The indices were computed for all NUTS-0 and NUTS-1 regions and for all survey years for which we have sample data in the ECHP. The income variable used to estimate the indices was the 'single-adult equivalent income' and data for all individuals in the region were used regardless of age. To prevent estimates from being driven by a limited number of outlying observations, the top and bottom one percent of income observations were discarded in all regions. All sample observations were weighted using the cross-section sample weights provided in the database. We estimated mean income at the two NUTS level similarly. The number of households per region used for estimation at the NUTS-1 level ranges from 209 (East Anglia (UK) in wave 8) to 4055 (Finland in wave 3). In several countries, the estimated NUTS-1 level inequality measures in the first wave of the panel (1994) appeared to be at odds with the rest of the series (frequently substantially higher). In order to limit potential measurement error, we therefore decided not to include data from wave 1 in our models and restrict our estimation sample to data from waves 2 to 8.[15]

2.3 Health Indicators

The ECHP survey collects information on self-reported health status for all respondents older than 16. This subjective measure of non-fatal health is commonly used in the literature. It is measured on a standard 5-point scale labeled 'very good', 'good', 'fair', 'poor' and 'very poor'. In this paper, we use this variable to derive two proxy measures of individual health. We first define a dummy indicator of poor health equal to one for the bottom two modes of this self-reported health status variable making our study comparable to Fiscella and Franks (1997, 2000), Soobadeer and LeClere (1999), Mellor and Milyo (2002) and Weich et al. (2002). This indicator has become increasingly popular in the health literature comforted by the consistent finding of a significant association between this proxy measure of poor health and mortality.[16]

Table 1 presents the distribution of self-reported health and our proxy measure of poor health by country and gender. In all countries but Ireland and Finland, a larger proportion of women report being in poor health. However, more so than gender differences, cross-country differences in the probability of reporting poor health hit the eye. The prevalence of poor health among men ranges from 3% in Ireland up to 18% in Portugal. We report similar results for women ranging from just below 4% in Ireland to almost 25% in Portugal. Aside from genuine differences in health status across countries, a plausible explanation for these cross-national differences is the sensitivity of self-reported health responses to systematic reporting biases across countries. Efforts to achieve cross-country comparability are mostly concentrated on eliminating one source of systematic bias, language, by producing comparable wording of questions. In this respect, the original ECHP data is comparable in the sense that careful wording of questions should largely eliminate bias due to differences in survey methodologies: the questions and response items are identical in all countries (except for cloned surveys such as the German SOEP, see footnote 10). However, differences in the wording of questionnaires are not the only sources of systematic bias. Sadana et al. (2000) convincingly argue that reporting biases due to regional differences in norms and health expectations among individuals may be responsible for considerable variations in self-reported health across countries such as the one observed between Portugal and the Republic of Ireland. Differences in the prevalence of self-reported poor health may therefore not reflect genuine differences in 'absolute' levels of health.

To circumvent this potential problem, we consider an alternative proxy measure of health based on the 5-point scale self-reported health variable. This measure is a score of 'relative ill-health.' It does not attempt to measure an individual's 'absolute' level of health, but it reflects an individual's health level compared to people with similar characteristics. We define it specifically as the rank of the respondent in the distribution of health outcomes conditional on age, gender, education, marital status and, crucially, country of residence.

These scores of individual relative ill-health were calculated in several steps. For each country, we first ran an ordered probit model of the 5-point health scale on all seven waves of pooled data. The models were estimated separately for men and women with age entering in cubic form, and with dummy variables for marital status (single, married, divorced, separated, or widowed) and education (less than second stage of secondary level education, second stage of secondary level education, or third level education according to ISCED classifications) as well as with additional controls for the month of interview. We then used the coefficient estimates to predict for all respondents the (conditional) probability of reporting each of the five possible health outcomes. These probabilities were used to calculate, for each respondent, the cumulative probability of being in a better category than the one actually reported (plus half the probability of being in the reported category). Finally, the cumulative probability, i.e. the rank order of respondents in the conditional distribution of health, was mapped to a continuous scale using a normalizing transform (inverse Gaussian transformation) to create our score of relative ill-health.

The cumulative probability reflects how badly the respondent fares compared to individuals from the same country and sharing the same gender, education, etc. The score is therefore a *relative* indicator of health purged from systematic differences in self-reported health due to country of residence, age, gender, education, marital status, and month of interview.[17] As the score of relative ill-health is a continuous variable and is free from systematic country differences, we no longer need to be concerned about the equivalence of cut-off points across countries nor do we need to arbitrarily decide which cut-off point best captures poor health.

3 Empirical Strategy and Results

To estimate the effect of income inequality on self-reported health, we first estimate a random effects probit model using the standard dichotomous measure of poor health as dependent variable. This approach is similar to Mellor and Milyo (2002) and implicitly assumes that self-reported health is not contaminated by cultural differences or norms across countries (or, if it is, that it is adequately controlled for by the random effects component). However, we argued earlier that in the context of a multi-country study this assumption may not hold. In particular, this approach may yield biased estimates if part of the observed cross-country variations in the health responses originates from the above-mentioned non-health related factors.[18] In order to address this concern, we complement our analysis by estimating a fixed effects linear model using our score of individual relative ill-health as the dependent variable. The fixed effects specification comes with the additional benefit of eliminating the effect of unobserved time-constant covariates that are associated with health. This includes, in particular, fixed regional characteristics, such as differences in norms and expectations, or differences in the public provision of health care. Coefficient estimates obtained with the fixed effects specification remain consistent even if these unobserved components are correlated with our explanatory variables.

Given the large discrepancy in the distribution of self-reported health between Portugal and the remaining European countries included in our estimation sample (see Table 1), and given the fact that Portugal is known as a high-inequality country, we also excluded Portuguese respondents from our final estimation sample. The rationale for this exclusion is to avoid the risk of biasing our results in favour of the income inequality hypothesis by the impact of a single idiosyncratic high inequality/very poor health country. Arguably, Ireland is an outlier in the distribution of self-assessed health too in comparison with the rest of the E.U. countries. But since Ireland combines good aggregate health indicators and high inequality, we adopted a 'conservative' position least favourable *a priori* to the income inequality hypothesis and kept the Irish respondents in our estimation sample.[19] The resulting estimation sample contains a total number of 455,351 observations including 234,953 females. As in Mellor and Milyo (2002), our econometric analysis is based on unweighted data. Unweighted descriptive statistics of all variables used in our analysis are presented separately for men and women in Table 2.

3.1 Random Effects Probit Model Results

We base our analysis on three model specifications estimated using five different measures of income inequality. Given that each income inequality model yields comparable results, for expositional clarity, we restrict most of our discussion to commenting the estimation results of the 'Gini model.' To check the sensitivity of our results to the choice of geography, each model specification is estimated controlling for regional mean income and regional inequality measured at the NUTS-0 and the NUTS-1 levels respectively.

Our baseline specification explores the association between income inequality and self-reported health controlling for both the mean regional income and household income.[20] Our second specification is augmented by the addition of controls for individual characteristics (a cubic in age, dummies for highest level of education achieved and marital status dummies). Following Mellor and Milyo (2002), we add to our last specification regional dummies to control for various determinants of health which cannot be directly measured in the ECHP but could have an important regional component. We choose to define regional dummies following the classification of welfare regimes of Esping-Andersen (1990) which we believe is appropriate to capture relevant regional variations in access to health care, health care practices and provisions or social norms between the countries included in our sample. Results for the strong IIH from our Gini model are reported in Table 3. The first six columns of the table reports the results of the men sample followed by those of the women sample in the last six.[21]

Most of the earlier studies that we are aware of report estimated marginal effects (or simply coefficient estimates) and discuss signs and significance levels. Unfortunately, marginal effects often do not provide clear information about the order of magnitudes of the effect of inequality on individual health, and are difficult to compare across measures of inequality because of differences in the range of variation of these measures. For this reason, in addition to coefficient estimates, we report predicted changes of our health outcome variables for discrete changes in explanatory variables. The latter are constructed as predicted changes in the probability of reporting poor health for an increase in an explanatory variable from its 20th quantile to its 80th quantile in our sample (with all other explanatory variables set at their mean as in marginal effects estimation) . These estimates are reported at the bottom of the tables. For example, we report in the first column of Table 3 that the predicted change in the probability that a European man reports being in poor health due to a change in income inequality (captured by the Gini coefficient in this case) is 0.001. This indicates that the predicted difference in the probability of reporting poor health (according to our model), when comparing two individuals sharing identical characteristics but living in regions with either high or low inequality, is 0.1 percentage point.[22] A high (low) inequality region is defined as a region at the 80th (20th) quantile of the distribution of regional inequality estimates. This example corresponds to a Gini of 0.302 (0.225) for NUTS-0 regions. Predicted changes due to household and regional income are similarly defined (-0.2 and 0.1 percentage points respectively, in the same example). A high (low) income recipient has a household income at the 80th (20th) quantile of the distribution of income in our sample. These quantiles are at 6,600 and 17,000. In the remaining sections of the text, we refer to these predicted changes as marginal effects.

The signs and statistical significance of household income reported in Table 3 confirm the hypothesis of a concave positive non-linear relationship between household income and individual health and are consistent with the absolute income hypothesis. Higher household income leads to better health outcomes. This finding is robust to alternative choice of controls, the level of geography and across gender. On the contrary, evidence in support of the relative income inequality hypothesis - higher mean regional income implies a higher 'reference' income and therefore a lower health outcome for a given (absolute) income level - is weak. Although we find robust evidence for the latter at the NUTS-0 level, this finding no longer holds at the NUTS-1 level.[23]

Contrary to our prior expectations, the positive and significant coefficient on the Gini index reported in Table 3 are evidence in support for the strong IIH that an increase in income inequality is detrimental to all members of society. This finding is robust to model specifications, the level of geography and across gender. However, the small magnitude of their corresponding marginal effects, ranging from 0.1 to 0.5 percentage points (depending on model specifications, level of aggregration and gender) undermines the importance of this significant association. This observation is robust to the use of alternative income inequality measures. Their corresponding marginal effects are summarized in the upper portion of Table 5. Regardless of gender, the size of these marginal effects is further reduced, without losing their statistical significance, once income inequality is measured at the NUTS-1 level. This finding is in line with a number of US micro-level studies which found that the magnitude and significance of the detrimental effect of income inequality tends to disappear when it is measured at a lower level of aggregation than U.S. States. It would have been useful to investigate whether we would lose statistical significance when income inequality is measured at a lower level of geographical aggregation (such as NUTS-2). However, respondent's residence information at this level of geography is not available in the ECHP.

Following Mellor and Milyo (2002) and Gerdtham and Johannesson (2004), we explore whether income inequality is more detrimental to the least well-off in the society. To examine this weak version of the IIH, we allow the effect of income inequality to vary by the income level of the household as in Mellor and Milyo (2002). This is done by interacting our measure of inequality with a set of household income quintile group dummies. Quintile groups are defined within the income distribution for each separate country and year. The results of this exercise, reported in Table 4, indicate that these interaction terms are decreasing in size and statistical significance as income quintile groups increase. This is consistent with the weak IIH. However, the relevance of this statistically significant observation must again be tempered by the small magnitude of their corresponding marginal effects. This result is robust to model specifications, the level of geography considered and across gender. The marginal effects obtained from alternative measures of inequality yield very similar results and are reported in Table 5.

It is worth noting that European females –in particular those in the lower tail of the income distribution– appear to be more adversely affected than European men. This is surprising considering that mortality of women has been found to be less sensitive to deprivation than mortality of men and that self-reported health is considered a good predictor of mortality. Also, regardless of our choice of geography, we find that the addition of conditioning variables does not reduce the magnitude of the detrimental effect of income inequality. This finding is at odds with the findings of the previous above-mentioned micro-level studies.

As suggested earlier, the lack of genuine cross-country comparability in the self-reported health variable could potentially bias our random effects probit estimates. We address this issue empirically by re-estimating a linear fixed effects model of individual health scores.

3.2 Fixed Effects Results

Fixed effects results of the Gini model are reported in Tables 6 and 7. In this model, the predicted changes (or marginal effects) measure the change in the rank-order of individuals in the (conditional) distribution of ill-health implied by a change in the explanatory variables of the fixed effects model (i.e. regional inequality, regional income, or household income). The rank-order is the probability that an individual with the same age, education, marital status and country of residence reports being in better health than the respondent.

We consider two model specifications. In our baseline model, we simply regress individual health score on regional mean income and a regional income inequality index. Our second model specification is augmented by a quadratic function of household income to capture the potential non-linear relationship between income and health. Note that we purposely limit the number of additional control variables since the estimated scores have already been adjusted to individual characteristics and country of residence.

The fixed effects estimates reported in Table 6 now support the relative income hypothesis among men whereas no statistically significant association is found among women. This is robust to model specifications and the level of geography. By contrast, we find no support for the absolute income hypothesis: individual income has no significant impact on the health score once we control for individual unobserved heterogeneity with this fixed effects model.

The results reported in Table 6 corroborate our earlier key finding of a significant detrimental effect of income inequality on the health of all individuals regardless of the level of geography considered. Likewise, the size of the marginal effects remains very small (ranging from 1.3 percentage points for women at the NUTS-1 level to 4.1 percentage points at the NUTS-0 level for men).[24] As reported in Table 8, we find comparable results across all inequality measures considered. We also confirm that the magnitude of this detrimental effect is significantly reduced, without losing its statistical significance however, when income inequality is measured at a lower level of geography (NUTS-1).

We re-explore the weak IIH and report the results in Table 7. Unlike in the random effects probit results, we only find statistically significant evidence that income inequality is more hazardous to the health of the least well-off men.

Despite being statistically significant, the size of reported differences between the lower and the upper quintiles are also very small ranging from 0.3 to 0.4 percentage points.[25] No significant differences are observed among women who appear to be equally affected regardless of their household income. In contrast to earlier results, our fixed effect estimates suggest that men are more affected by inequality. The observed difference is small however and becomes negligible once income inequality is measured at the NUTS-1 level.

In sum, explicitly controlling for country specific fixed effects (such as responding bias) does not substantially alter our key finding of a statistically significant association between income inequality and individual health of negligible magnitude. This result is robust to model specifications, the level of geography and across gender. However, both models provide divergent evidence regarding the absolute and the relative income hypotheses and the effects across gender.

4 Conclusion

This is the first study which formally has explored, separately on men and women, the robustness of the income inequality hypothesis using individual multi-country data of Member States of the European Union. By carefully modelling the self-assessed health variable, and taking profit of both the large geographical coverage and the longitudinal nature of the European Community Household Panel survey, this paper avoids several pitfalls suffered by many earlier studies on the association between health and income inequality. In particular, the common design of the ECHP for all countries minimizes data comparability problems (of health outcomes, of income). The large coverage offers observation of heterogenous regions with substantial variation in inequality levels and the longitudinal nature of the data allow us to avoid bias due to time-invariant omitted variables (access to health care facilities, social protection provision). Furthermore, we offer a simple solution to a major concern that is specific to individual multi-country studies using the self-reported health variable as proxy measure of health, namely that individual responses to self-reported health could be contaminated by systematic cross-country reporting biases due to differences in norms and expectations across countries.

Whether we control for potential reporting bias or not, we generally find significant support in favour of the strong version of the income inequality hypothesis for both men and women in our pooled sample of 10 E.U. countries. This finding is seemingly at odds with comparable recent within-country studies in the United States (Mellor and Milyo, 2002) and in Sweden (Gerdtham and Johannesson, 2004). However, we also find that the magnitude of this detrimental effect is small, despite its statistical significance. The existence of a robust and significant gender differential of inequality on health does not clearly emerge. Overall, our results suggest that the potential welfare gains from lower inequality in the form of improved health outcomes are likely to be of a very limited magnitude.

Given the complexity surrounding the interpretation of self-reported health status across countries, one should carefully consider the results reported in this study. For the reasons mentioned above, we are confident that many of the usual problems of similar studies have been avoided. But it remains that we are only able to assess the impact of inequality on 'relative' health, not on 'absolute' levels of health (such as indicated by mortality or morbidity indicators). Also, our panel data models do not fully control for potential omitted variables that are volatile over time. However, we do not think of confounding regional variables that would vary substantially in the short time dimension of our panel (seven years). The choice of an appropriate level of regional aggregation also remains an open question. The ECHP only allows fairly highly aggregated analysis. In the absence of convincing pathway mechanisms, additional studies are needed, preferably from other data sources, to completely convince ourselves that our results are not driven by omitted variable bias (inequality being a proxy for other unobserved factors) or that inequality is not more (or less) strongly associated with health at more disaggregated levels of geography. Possible extensions of this paper could also examine the sensitivity of its results to objective measures of health or to mortality. However, objective health variables available in the ECHP data are too limited while a rigorous mortality study would require a much longer panel such as in Gerdtham and Johannesson (2004).

Notes

[1]An equally contentious issue is the characterization of the actual pathway by which greater income inequality translates into poor health. Many authors have hypothesized that inequality is a cause of some psycho-social stress detrimental to everyone's health in the society. See Deaton (2003) for a comprehensive review.

[2]Rodgers (1979) and Gravelle et al. (2002) show that, if a positive concave relationship between individual income and individual health exists, keeping average income constant, any increase in the dispersion of income must translate into poorer average population health.

[3]See Subramanian and Kawachi (2004) for a recent and detailed survey of existing individual-level studies.

[4]Similarly, Osler et al. (2002) did not find conclusive evidence supporting a robust relationship between income inequality measured at the *parish* level and various causes of mortality in a Danish study conducted in Copenhagen. However, this study only focuses on areas within Copenhagen and is therefore difficult to compare to within-country studies.

[5]None is referenced in the survey by Subramanian and Kawachi (2004).

[6]Individual-level data permit to distinguish clearly the relative income hypothesis and the income inequality hypothesis. Interestingly, the distinction is not as sharp in most aggregate-level studies since macro-level data do not permit to identify the two effects separately. Early tests of the relationship between health and inequality were often actually interpreted as tests of the 'relative income hypothesis'. See Deaton (2003)or Subramanian and Kawachi (2004) for more details.

[7]NUTS stands for 'Nomenclature des Unités Territoriales Statistiques'. The

number of NUTS-1 regions by country varies from 16 in Germany, 11 in Italy and the United Kingdom to only 1 in Denmark, Ireland, Sweden, and Luxembourg.

[8]The German Socio-Economic Panel (SOEP), the Luxembourg Socio-Economic Panel (PSELL), and the British Household Panel Survey (BHPS).

[9]See EUROSTAT (2003) or Lehmann and Wirtz (2003) for more information on the database, and Peracchi (2002) for an independent critical review.

[10]‘ The original ECHP questionnaire asks “How is your health in general?” (“Wie ist Ihr allgemeiner Gesundheitszustand?”) whereas in the SOEP questionnaire respondents are asked “How would you describe your current health?” (“Wie würden Sie Ihren gegenwärtigen Gesundheitszustand beschreiben?”). In the SOEP questionnaire, respondents have the choice to rate their health as either “very good”, “good”, “satisfactory”, “poor” or “bad” (in German, “sehr gut”, “gut”, “zufriedenstellend”, “weniger gut” or “schlecht”) whereas in the original ECHP questionnaire respondents could rate their health as either “very good”, “good”, “fair”, “bad” or “very bad” (in German “sehr gut”, “gut”, “mäßig”, “schlecht”, “sehr schlecht”). The SOEP-clone’s subjective health variable is evidently not strictly comparable to the original ECHP question. Similarly, in wave 6, the wording of the self-reported health question in the underlying BHPS was not consistent with the other waves (Taylor, 2003).

[11]The territorial units included at the NUTS-1 level are determined by a minimum population threshold of 3 million and a maximum of 7 million. As a consequence, NUTS-0 and NUTS-1 levels coincide in small countries such as Luxembourg, Ireland or Denmark.

[12]See Judge et al. (1998) and Macinko et al. (2003) for a comprehensive and critical review of these earlier cross-national studies.

[13]We did not find price indices at NUTS-1 for all regions so we were not able

to correct for within-country price differentials.

[14]See, for example, Cowell (1995) for a definition and detailed discussion of the properties of the inequality measures used in this paper.

[15]Information on the sample sizes by regions and waves, inequality indices estimates, as well as more detailed data checks are available from the authors upon request.

[16]See McCallum et al. (1994); Idler and Kasl (1995); Idler and Benyamini (1997); Strauss and Thomas (1998) among others.

[17]The relative ill-health score can also be understood as a residual from an ordered probit model on the 5-points self-reported health variable with flexible controls for gender, country of residence, and other demographic characteristics.

[18]In fact, even within-country studies, such as the one by Mellor and Milyo (2002), could potentially be affected by reporting biases across States due to differences in norms and expectations.

[19]We tested the robustness of our results to the exclusion/inclusion of countries. We ran our models with and without Portugal and excluding both Ireland and Portugal. In fact, much of the effect is absorbed by the random/fixed effect component so that that the impact on the coefficient of the inequality is usually small. However, we prefer to report in the paper only the most 'conservative' results based on excluding the Portuguese sample.

[20]We considered several specifications for household income to allow for the non-linear relationship between income and health, including a spline function in income as in Mellor and Milyo (2002). As it did not affect our results, we opted for a more parsimonious quadratic function.

[21]Tables of results derived from alternative income inequality measures are available in the appendix.

[22]'Identical individuals' share the same regional income environment, the same household income, etc.; all set at their sample means.

[23]Note that, as in Mellor and Milyo (2002) and Gerdtham and Johannesson (2004), our model implies that individuals belonging to the same NUTS-0/NUTS-1 region constitute the reference group. In the absence of clear theoretical foundations, it is difficult to assess which community level is the most relevant to test the validity of the relative income hypothesis. Also, Deaton (2003) for example argues that reference groups do not have to be limited to geography, and Deaton and Paxson (2001) suggest educational groups as another possibility.

[24]Note that these marginal effects are not comparable to those derived from the random effects probit model because of the different nature of the dependent variable.

[25]For all models, we reject the null hypothesis of an equal marginal effects between men in the lower and the upper income quintiles at standard confidence levels (p-values less than 0.001).

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Tables and Regression Results

Table 1: Distribution of self-reported health level (in percent)

Country	Very good	Good	Fair	Poor	Very poor	Poor/ Very poor
			Men			
Austria	31.3	43.0	19.6	5.0	1.0	6.0
Belgium	24.6	53.2	18.0	3.4	0.7	4.2
Denmark	47.3	32.7	15.5	3.4	1.1	4.5
Finland	16.6	45.4	31.6	5.7	0.8	6.4
France	13.5	49.0	30.8	3.2	3.4	6.7
Germany (ECHP)	13.3	54.0	25.0	6.1	1.6	7.7
Germany (SOEP)	7.5	41.4	34.8	12.7	3.6	16.3
Ireland	44.1	37.8	15.1	2.3	0.7	3.0
Greece	52.5	27.1	13.3	5.2	1.9	7.1
Italy	16.7	46.5	28.2	7.2	1.5	8.7
Luxembourg (ECHP)	25.3	45.2	23.2	4.8	1.5	6.3
Netherlands	20.3	56.5	19.6	3.1	0.5	3.6
Portugal	4.1	46.4	31.9	13.8	3.7	17.6
Spain	16.7	53.0	21.3	7.7	1.3	9.0
Sweden	40.7	37.2	16.6	4.4	1.1	5.4
UK (ECHP)	35.6	39.2	19.2	4.6	1.4	6.0
UK (BHPS)	25.5	46.6	19.8	6.4	1.8	8.2
			Women			
Austria	28.2	44.2	21.0	5.4	1.3	6.6
Belgium	18.9	51.4	24.4	4.4	0.9	5.3
Denmark	43.1	32.5	18.1	4.8	1.4	6.3
Finland	14.9	45.9	32.1	6.2	0.9	7.1
France	10.8	46.3	34.6	4.2	4.2	8.3
Germany (ECHP)	10.3	50.7	29.1	7.7	2.2	9.9
Germany (SOEP)	6.1	36.9	36.7	16.4	3.8	20.2
Ireland	44.3	35.5	16.6	2.8	0.7	3.5
Greece	44.2	29.3	17.9	6.6	2.0	8.6
Italy	11.5	43.3	33.7	9.8	1.8	11.5
Luxembourg (ECHP)	20.9	42.6	28.3	6.6	1.6	8.2
Netherlands	15.5	55.0	24.0	4.7	0.8	5.4
Portugal	2.0	36.4	36.9	20.6	4.2	24.7
Spain	14.5	48.7	24.0	10.8	2.0	12.8
Sweden	36.9	35.8	20.6	5.3	1.4	6.7
UK (ECHP)	32.3	38.8	22.2	5.2	1.6	6.8
UK (BHPS)	20.2	48.1	21.9	7.5	2.3	9.8

Notes: All waves of data pooled (except UK (BHPS) wave 6). Individuals aged between 24 and 75. Sample weights used.

Table 2: Descriptive statistics for estimation sample

Variable	Mean	P25	P75	Min	Max
Men					
Poor health binary indicator	0.07	0.00	0.00	0.00	1.00
Score of relative ill-health (raw)	0.50	0.29	0.70	0.01	1.00
Score of relative ill-health	0.02	-0.54	0.53	-2.50	4.02
Household income (in single-adult equivalent units)	12804.26	7504.23	15954.24	100.88	1.25e+06
Age of individual	46.69	35.00	58.00	25.00	74.00
Upper secondary education level (ISCED 3)	0.32	0.00	1.00	0.00	1.00
Less than upper secondary education level (ISCED 0-2)	0.47	0.00	1.00	0.00	1.00
Separated	0.01	0.00	0.00	0.00	1.00
Divorced	0.03	0.00	0.00	0.00	1.00
Widowed	0.02	0.00	0.00	0.00	1.00
Never married	0.21	0.00	0.00	0.00	1.00
Sample size	220 398				
Women					
Poor health binary indicator	0.08	0.00	0.00	0.00	1.00
Score of relative ill-health (raw)	0.50	0.29	0.71	0.00	1.00
Score of relative ill-health	0.02	-0.54	0.56	-2.82	3.85
Household income (in single-adult equivalent units)	12350.84	7224.84	15440.92	103.28	1.25e+06
Age of individual	47.09	35.00	58.00	25.00	74.00
Upper secondary education level (ISCED 3)	0.28	0.00	1.00	0.00	1.00
Less than upper secondary education level (ISCED 0-2)	0.53	0.00	1.00	0.00	1.00
Separated	0.02	0.00	0.00	0.00	1.00
Divorced	0.05	0.00	0.00	0.00	1.00
Widowed	0.08	0.00	0.00	0.00	1.00
Never married	0.15	0.00	0.00	0.00	1.00
Sample size	234 953				
Regional estimates					
Mean income at NUTS 0	11653.63	10091.68	13824.06	7570.57	15782.92
Gini coefficient at NUTS 0	0.27	0.25	0.30	0.19	0.33
Ratio of 90th to 10th percentile at NUTS 0	3.76	3.29	4.34	2.42	5.12
Mean Log Deviation index at NUTS 0	0.13	0.11	0.16	0.06	0.19
Theil index at NUTS 0	0.12	0.10	0.15	0.06	0.17
Coefficient of variation at NUTS 0	0.51	0.47	0.57	0.35	0.61
Mean income at NUTS 1	11501.77	9256.23	13485.16	6383.69	18939.36
Gini coefficient at NUTS 1	0.27	0.24	0.29	0.19	0.36
Ratio of 90th to 10th percentile at NUTS 1	3.62	3.02	4.02	2.42	6.26
Mean Log Deviation index at NUTS 1	0.12	0.09	0.15	0.06	0.28
Theil index at NUTS 1	0.12	0.09	0.14	0.06	0.22
Coefficient of variation at NUTS 1	0.50	0.45	0.55	0.35	0.75
Conservative regime	0.27	0.00	1.00	0.00	1.00
Social-Democratic regime	0.12	0.00	0.00	0.00	1.00
Southern regime	0.46	0.00	1.00	0.00	1.00
Total sample size	455 351				
Number of distinct NUTS 0 regions	10				
Number of distinct NUTS 1 regions	49				

Table 3: Random effects probit models of the probability of reporting poor health with the Gini coefficient as regional inequality measure; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	4.60*	6.14*	10.82*	-0.30	1.13†	1.67†	4.49*	4.69*	12.02*	-0.52	0.01	2.18*
	(6.07)	(8.16)	(10.25)	(0.52)	(2.06)	(2.43)	(6.55)	(7.15)	(12.95)	(1.04)	(0.02)	(3.62)
Gini coefficient	4.00*	4.48*	6.81*	1.12*	1.72*	1.36*	4.64*	4.82*	7.02*	1.25*	1.81*	1.23*
	(8.58)	(9.28)	(8.55)	(2.97)	(4.52)	(2.87)	(10.67)	(11.25)	(9.98)	(3.66)	(5.32)	(2.95)
Household income	-3.64*	-2.64*	-2.62*	-3.48*	-2.53*	-2.53*	-2.94*	-1.78*	-1.77*	-2.83*	-1.67*	-1.67*
	(23.12)	(17.00)	(16.85)	(21.98)	(16.15)	(16.14)	(20.87)	(13.12)	(13.05)	(20.35)	(12.15)	(12.13)
Household income squared	0.30*	0.21*	0.21*	0.29*	0.21*	0.21*	0.27*	0.17*	0.17*	0.27*	0.16*	0.16*
	(14.87)	(10.39)	(10.40)	(14.09)	(9.82)	(9.85)	(15.90)	(9.98)	(10.00)	(15.17)	(9.30)	(9.33)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.001*	0.001*	0.002*	-0.000	0.000†	0.000†	0.002*	0.003*	0.005*	-0.000	0.000	0.001*
Inequality effect	0.001*	0.002*	0.003*	0.000*	0.001*	0.000*	0.004*	0.005*	0.005*	0.001*	0.001*	0.001*
Household income effect	-0.002*	-0.002*	-0.001*	-0.002*	-0.002*	-0.002*	-0.003*	-0.002*	-0.001*	-0.003*	-0.002*	-0.002*

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table 4: Random effects probit models of the probability of reporting poor health with the Gini coefficient as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
Explanatory variable	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	1.99*	4.18*	8.92*	-1.75*	0.06	1.22	2.23*	3.34*	10.74*	-1.61*	-0.67	1.90*
	(2.60)	(5.40)	(8.37)	(3.08)	(0.11)	(1.77)	(3.18)	(4.99)	(11.47)	(3.20)	(1.37)	(3.18)
Gini coefficient times lowest fifth	5.17*	5.25*	7.50*	2.27*	2.54*	2.11*	5.37*	5.30*	7.49*	2.08*	2.31*	1.72*
	(10.94)	(10.74)	(9.39)	(5.90)	(6.53)	(4.41)	(12.30)	(12.24)	(10.62)	(6.01)	(6.70)	(4.11)
Gini coefficient times second fifth	4.70*	4.89*	7.14*	1.80*	2.18*	1.74*	4.99*	5.06*	7.24*	1.70*	2.07*	1.46*
	(9.99)	(10.06)	(8.95)	(4.70)	(5.65)	(3.64)	(11.48)	(11.73)	(10.29)	(4.96)	(6.05)	(3.47)
Gini coefficient times third fifth	3.99*	4.35*	6.61*	1.08*	1.62*	1.16†	4.56*	4.79*	6.97*	1.28*	1.81*	1.16*
	(8.49)	(8.96)	(8.27)	(2.80)	(4.20)	(2.42)	(10.47)	(11.10)	(9.89)	(3.72)	(5.28)	(2.77)
Gini coefficient times fourth fifth	3.44*	4.04*	6.29*	0.51	1.29*	0.81	3.96*	4.42*	6.59*	0.67	1.43*	0.74
	(7.30)	(8.31)	(7.87)	(1.33)	(3.34)	(1.68)	(9.06)	(10.21)	(9.34)	(1.94)	(4.14)	(1.75)
Gini coefficient times highest fifth	2.70*	3.50*	5.74*	-0.25	0.70	0.18	3.45*	4.13*	6.30*	0.15	1.11*	0.37
	(5.63)	(7.05)	(7.13)	(0.64)	(1.75)	(0.36)	(7.73)	(9.36)	(8.87)	(0.42)	(3.16)	(0.87)
Household income	-0.82*	-0.71*	-0.68*	-0.73*	-0.59*	-0.49†	-0.75*	-0.52*	-0.49*	-0.75*	-0.45†	-0.31
	(3.57)	(3.05)	(3.00)	(3.20)	(2.61)	(2.21)	(3.62)	(2.83)	(2.71)	(3.68)	(2.57)	(1.83)
Household income squared	0.07†	0.05	0.05	0.06†	0.04	0.04	0.08*	0.06*	0.06*	0.08*	0.05*	0.04†
	(2.22)	(1.70)	(1.64)	(1.96)	(1.34)	(1.02)	(3.85)	(3.16)	(3.07)	(3.91)	(2.95)	(2.39)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.000†	0.001*	0.002*	-0.000*	0.000	0.000	0.001*	0.002*	0.004*	-0.001*	-0.001	0.001*
Inequality effect (lower quintile)	0.004*	0.004*	0.005*	0.002*	0.002*	0.001*	0.008*	0.007*	0.007*	0.003*	0.003*	0.001*
Inequality effect (upper quintile)	0.000*	0.001*	0.001*	-0.000	0.000	0.000	0.001*	0.003*	0.002*	0.000	0.001*	0.000
Household income effect	-0.000*	-0.000*	-0.000*	-0.000*	-0.000†	-0.000†	-0.001*	-0.001*	-0.000*	-0.001*	-0.001†	-0.000

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table 5: Random Effect Probit Model: Predicted change in probability of poor health using alternative income inequality measures

	Men						Women					
		NUTS 0			NUTS 1			NUTS 0			NUTS 1	
Strong IIH												
Gini coefficient	0.001*	0.002*	0.003*	0.000*	0.001*	0.000*	0.004*	0.005*	0.005*	0.001*	0.001*	0.001*
Ratio of 90th to 10th percentile	0.001*	0.001*	0.001*	0.000*	0.000*	0.000†	0.004*	0.004*	0.002*	0.001*	0.001*	0.000
Theil Index	0.001*	0.002*	0.002*	0.000*	0.001*	0.001*	0.004*	0.005*	0.004*	0.001*	0.002*	0.001*
Mean Log Deviation index	0.001*	0.002*	0.002*	0.000*	0.001*	0.001*	0.004*	0.005*	0.004*	0.001*	0.002*	0.001*
Coefficient of variation	0.001*	0.002*	0.002*	0.000*	0.001*	0.000*	0.003*	0.004*	0.004*	0.001*	0.001*	0.001*
Weak IIH												
Gini coefficient (lower quintile)	0.004*	0.004*	0.005*	0.002*	0.002*	0.001*	0.008*	0.007*	0.007*	0.003*	0.003*	0.001*
Gini coefficient (upper quintile)	0.000*	0.001*	0.001*	-0.000	0.000	0.000	0.001*	0.003*	0.002*	0.000	0.001*	0.000
Ratio of 90th to 10th percentile (lower quintile)	0.004*	0.003*	0.002*	0.001*	0.001*	0.001*	0.007*	0.006*	0.003*	0.002*	0.002*	0.001*
Ratio of 90th to 10th percentile (upper quintile)	0.000*	0.000*	0.000	-0.000*	-0.000	-0.000†	0.001*	0.002*	0.001†	-0.000†	0.000	-0.000
Theil Index (lower quintile)	0.005*	0.004*	0.005*	0.002*	0.002*	0.001*	0.008*	0.008*	0.007*	0.003*	0.003*	0.002*
Theil Index (upper quintile)	0.000*	0.001*	0.001*	-0.000*	-0.000	-0.000	0.001*	0.002*	0.002*	-0.000†	0.000	-0.000
Mean Log Deviation index (lower quintile)	0.005*	0.005*	0.005*	0.002*	0.002*	0.002*	0.008*	0.008*	0.006*	0.003*	0.003*	0.002*
Mean Log Deviation index (upper quintile)	0.000†	0.001*	0.001*	-0.000*	0.000	-0.000	0.001*	0.003*	0.002*	-0.000*	0.000	0.000
Coefficient of variation (lower quintile)	0.004*	0.004*	0.004*	0.001*	0.002*	0.001*	0.007*	0.007*	0.006*	0.003*	0.003*	0.002*
Coefficient of variation (upper quintile)	0.000*	0.001*	0.001*	-0.000	0.000	0.000	0.001*	0.002*	0.002*	0.000	0.001*	0.000

Notes: † and * indicate significance at 5% and 1% levels respectively. See text for an explanation on the construction of predicted probability change.

Table 6: Fixed effects linear models of the relative ill-health score with the Gini coefficient as regional inequality measure; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.95*	1.99*	1.16*	1.20*	0.36	0.40	0.25	0.29
	(6.94)	(7.06)	(4.80)	(4.93)	(1.33)	(1.49)	(1.06)	(1.24)
Gini coefficient	1.35*	1.35*	0.56*	0.56*	0.94*	0.94*	0.55*	0.55*
	(6.96)	(6.97)	(4.11)	(4.12)	(4.95)	(4.97)	(4.14)	(4.14)
Household income		-0.04		-0.04		-0.05		-0.06
		(1.29)		(1.19)		(1.69)		(1.77)
Household income squared		-0.00		-0.00		0.01*		0.01*
		(0.37)		(0.43)		(3.08)		(3.12)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.033*	0.034*	0.025*	0.026*	0.006	0.007	0.005	0.006
Inequality effect	0.041*	0.041*	0.013*	0.013*	0.029*	0.029*	0.013*	0.013*
Household income effect		-0.002		-0.002		-0.002		-0.002

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table 7: Fixed effects linear models of the relative ill-health score with the Gini coefficient as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.93*	1.89*	1.16*	1.13*	0.35	0.41	0.25	0.30
	(6.89)	(6.67)	(4.79)	(4.60)	(1.31)	(1.49)	(1.06)	(1.27)
Gini coefficient times lowest fifth	1.43*	1.44*	0.64*	0.65*	0.96*	0.94*	0.56*	0.55*
	(7.37)	(7.40)	(4.66)	(4.72)	(5.03)	(4.97)	(4.23)	(4.11)
Gini coefficient times second fifth	1.36*	1.36*	0.56*	0.57*	0.93*	0.92*	0.53*	0.53*
	(7.01)	(7.02)	(4.13)	(4.17)	(4.88)	(4.86)	(4.02)	(3.95)
Gini coefficient times third fifth	1.35*	1.35*	0.56*	0.56*	0.95*	0.95*	0.56*	0.56*
	(6.96)	(6.96)	(4.08)	(4.09)	(5.04)	(5.04)	(4.25)	(4.23)
Gini coefficient times fourth fifth	1.32*	1.32*	0.53*	0.53*	0.92*	0.93*	0.53*	0.54*
	(6.81)	(6.79)	(3.87)	(3.85)	(4.86)	(4.89)	(4.01)	(4.05)
Gini coefficient times highest fifth	1.31*	1.30*	0.52*	0.51*	0.93*	0.95*	0.54*	0.56*
	(6.76)	(6.68)	(3.80)	(3.70)	(4.89)	(4.97)	(4.05)	(4.18)
Household income		0.04		0.04		-0.06		-0.07
		(1.01)		(1.00)		(1.45)		(1.65)
Household income squared		-0.01		-0.01		0.01*		0.01*
		(1.71)		(1.71)		(2.88)		(3.01)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.033*	0.032*	0.025*	0.024*	0.006	0.007	0.005	0.006
Inequality effect (lower quintile)	0.044*	0.044*	0.015*	0.015*	0.029*	0.029*	0.013*	0.013*
Inequality effect (upper quintile)	0.040*	0.040*	0.012*	0.012*	0.028*	0.029*	0.013*	0.013*
Household income effect		0.002		0.002		-0.002		-0.003

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table 8: Fixed effects linear models: Predicted change in ill-health (conditional) rank using alternative income inequality measures

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Strong IIH								
Gini coefficient	0.041*	0.041*	0.013*	0.013*	0.029*	0.029*	0.013*	0.013*
Ratio of 90th to 10th percentile	0.026*	0.026*	0.008*	0.008*	0.012†	0.012†	0.008*	0.008*
Theil index	0.038*	0.038*	0.012*	0.012*	0.028*	0.028*	0.011*	0.011*
Mean Log Deviation index	0.032*	0.032*	0.011*	0.011*	0.021*	0.021*	0.010*	0.010*
Coefficient of variation	0.036*	0.036*	0.010*	0.010*	0.028*	0.028*	0.011*	0.011*
Weak IIH								
Gini coefficient (lower quintile)	0.044*	0.044*	0.015*	0.015*	0.029*	0.029*	0.013*	0.013*
Gini coefficient (upper quintile)	0.040*	0.040*	0.012*	0.012*	0.028*	0.029*	0.013*	0.013*
Ratio of 90th to 10th percentile(lower quintile)	0.029*	0.030*	0.010*	0.010*	0.013†	0.013†	0.009*	0.008*
Ratio of 90th to 10th percentile(upper quintile)	0.024*	0.024*	0.007*	0.006†	0.012†	0.013†	0.008*	0.009*
Theil index (lower quintile)	0.043*	0.043*	0.015*	0.016*	0.029*	0.029*	0.012*	0.012*
Theil index (upper quintile)	0.035*	0.035*	0.010*	0.010*	0.027*	0.028*	0.011*	0.012*
Mean Log Deviation index (lower quintile)	0.038*	0.038*	0.014*	0.015*	0.023*	0.022*	0.010*	0.010*
Mean Log Deviation index (upper quintile)	0.030*	0.029*	0.009*	0.008*	0.020*	0.021*	0.009*	0.010*
Coefficient of variation (lower quintile)	0.038*	0.039*	0.012*	0.012*	0.028*	0.028*	0.011*	0.011*
Coefficient of variation (upper quintile)	0.035*	0.034*	0.009*	0.009*	0.028*	0.028*	0.011*	0.011*

Notes: † and * indicate significance at 5% and 1% levels respectively. See text for an explanation on the construction of change in predicted ill-health rank.

5 Tables Appendix

Table A1: Random effects probit models of the probability of reporting poor health with the 90th to 10th percentile ratio as regional inequality measure; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	4.97*	5.43*	7.85*	-0.28	0.89	1.46†	4.55*	3.93*	8.59*	-0.75	-0.39	1.85*
	(6.30)	(6.90)	(7.75)	(0.50)	(1.63)	(2.15)	(6.35)	(5.72)	(9.66)	(1.52)	(0.80)	(3.11)
Ratio of 90th to 10th percentile	0.21*	0.19*	0.16*	0.05*	0.07*	0.05†	0.23*	0.20*	0.13*	0.05*	0.06*	0.03
	(8.49)	(7.23)	(4.06)	(3.02)	(3.79)	(2.36)	(9.94)	(8.73)	(3.96)	(2.93)	(3.89)	(1.84)
Household income	-3.62*	-2.63*	-2.63*	-3.48*	-2.53*	-2.53*	-2.93*	-1.77*	-1.77*	-2.83*	-1.67*	-1.67*
	(23.03)	(16.93)	(16.88)	(21.94)	(16.15)	(16.15)	(20.72)	(13.01)	(12.98)	(20.32)	(12.13)	(12.14)
Household income squared	0.30*	0.21*	0.21*	0.29*	0.21*	0.21*	0.27*	0.17*	0.17*	0.27*	0.16*	0.16*
	(14.80)	(10.38)	(10.42)	(14.08)	(9.85)	(9.87)	(15.84)	(9.94)	(9.96)	(15.19)	(9.31)	(9.35)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.001*	0.001*	0.002*	-0.000	0.000	0.000†	0.002*	0.002*	0.003*	-0.000	-0.000	0.001*
Inequality effect	0.001*	0.001*	0.001*	0.000*	0.000*	0.000†	0.004*	0.004*	0.002*	0.001*	0.001*	0.000
Household income effect	-0.002*	-0.002*	-0.001*	-0.002*	-0.002*	-0.002*	-0.003*	-0.002*	-0.002*	-0.003*	-0.002*	-0.002*

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table A2: Random effects probit models of the probability of reporting poor health with the Theil index as regional inequality measure; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	4.67*	6.69*	10.66*	-0.32	1.28†	1.80*	4.65*	5.25*	11.83*	-0.51	0.16	2.31*
	(6.05)	(8.70)	(10.29)	(0.56)	(2.31)	(2.65)	(6.66)	(7.84)	(12.97)	(1.01)	(0.33)	(3.88)
Theil index	4.59*	5.61*	7.30*	1.22*	2.11*	1.76*	5.38*	5.99*	7.43*	1.41*	2.22*	1.61*
	(8.34)	(9.89)	(8.81)	(2.88)	(4.96)	(3.51)	(10.58)	(11.94)	(10.18)	(3.71)	(5.86)	(3.66)
Household income	-3.64*	-2.63*	-2.62*	-3.48*	-2.53*	-2.53*	-2.94*	-1.78*	-1.77*	-2.83*	-1.67*	-1.67*
	(23.12)	(16.98)	(16.86)	(21.97)	(16.14)	(16.13)	(20.88)	(13.12)	(13.04)	(20.35)	(12.15)	(12.13)
Household income squared	0.30*	0.21*	0.21*	0.29*	0.21*	0.21*	0.27*	0.17*	0.17*	0.27*	0.16*	0.16*
	(14.89)	(10.39)	(10.40)	(14.09)	(9.81)	(9.84)	(15.92)	(9.98)	(9.99)	(15.17)	(9.29)	(9.32)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.001*	0.002*	0.002*	-0.000	0.000†	0.001*	0.002*	0.003*	0.005*	-0.000	0.000	0.001*
Inequality effect	0.001*	0.002*	0.002*	0.000*	0.001*	0.001*	0.004*	0.005*	0.004*	0.001*	0.002*	0.001*
Household income effect	-0.002*	-0.002*	-0.001*	-0.002*	-0.002*	-0.002*	-0.003*	-0.002*	-0.002*	-0.003*	-0.002*	-0.002*

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table A3: Random effects probit models of the probability of reporting poor health with the Mean Log-deviation index as regional inequality measure; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	4.85*	7.06*	9.91*	-0.18	1.61*	2.12*	4.73*	5.51*	10.81*	-0.44	0.39	2.53*
	(6.27)	(9.14)	(9.97)	(0.32)	(2.92)	(3.15)	(6.76)	(8.19)	(12.33)	(0.88)	(0.81)	(4.27)
Mean Log Deviation index	4.07*	5.12*	6.04*	1.17*	2.16*	1.92*	4.68*	5.35*	5.74*	1.26*	2.12*	1.66*
	(8.61)	(10.49)	(8.79)	(3.33)	(6.12)	(4.82)	(10.71)	(12.39)	(9.46)	(4.01)	(6.74)	(4.71)
Household income	-3.63*	-2.64*	-2.63*	-3.48*	-2.52*	-2.53*	-2.94*	-1.79*	-1.78*	-2.83*	-1.67*	-1.67*
	(23.08)	(16.98)	(16.89)	(21.96)	(16.12)	(16.10)	(20.82)	(13.14)	(13.06)	(20.34)	(12.14)	(12.12)
Household income squared	0.30*	0.21*	0.22*	0.29*	0.21*	0.21*	0.27*	0.17*	0.17*	0.27*	0.16*	0.16*
	(14.88)	(10.42)	(10.45)	(14.09)	(9.80)	(9.83)	(15.93)	(10.01)	(10.02)	(15.16)	(9.30)	(9.32)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.001*	0.002*	0.002*	-0.000	0.000*	0.001*	0.002*	0.003*	0.004*	-0.000	0.000	0.001*
Inequality effect	0.001*	0.002*	0.002*	0.000*	0.001*	0.001*	0.004*	0.005*	0.004*	0.001*	0.002*	0.001*
Household income effect	-0.002*	-0.002*	-0.001*	-0.002*	-0.002*	-0.002*	-0.003*	-0.002*	-0.002*	-0.003*	-0.002*	-0.002*

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table A4: Random effects probit models of the probability of reporting poor health with the Coefficient of variation as regional inequality measure; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	4.10*	5.95*	10.65*	-0.38	1.09†	1.62†	3.88*	4.41*	11.83*	-0.52	0.01	2.19*
	(5.52)	(8.09)	(10.24)	(0.69)	(2.01)	(2.41)	(5.80)	(6.86)	(12.94)	(1.06)	(0.03)	(3.72)
Coefficient of variation	1.86*	2.26*	3.17*	0.53*	0.86*	0.68*	2.15*	2.39*	3.26*	0.65*	0.94*	0.67*
	(7.94)	(9.37)	(8.68)	(2.89)	(4.68)	(3.10)	(9.88)	(11.14)	(10.10)	(3.95)	(5.75)	(3.46)
Household income	-3.64*	-2.64*	-2.62*	-3.48*	-2.53*	-2.53*	-2.95*	-1.78*	-1.77*	-2.83*	-1.67*	-1.67*
	(23.13)	(17.01)	(16.87)	(21.98)	(16.16)	(16.14)	(20.95)	(13.12)	(13.05)	(20.38)	(12.16)	(12.14)
Household income squared	0.30*	0.21*	0.21*	0.29*	0.21*	0.21*	0.28*	0.17*	0.17*	0.27*	0.16*	0.16*
	(14.89)	(10.39)	(10.39)	(14.10)	(9.82)	(9.85)	(15.93)	(9.96)	(9.97)	(15.16)	(9.29)	(9.32)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.001*	0.001*	0.002*	-0.000	0.000†	0.000†	0.002*	0.002*	0.004*	-0.000	0.000	0.001*
Inequality effect	0.001*	0.002*	0.002*	0.000*	0.001*	0.000*	0.003*	0.004*	0.004*	0.001*	0.001*	0.001*
Household income effect	-0.002*	-0.002*	-0.001*	-0.002*	-0.002*	-0.002*	-0.004*	-0.002*	-0.001*	-0.003*	-0.002*	-0.002*

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table A5: Random effects probit models of the probability of reporting poor health with the 90th to 10th percentile ratio as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
Explanatory variable	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	2.44*	3.54*	6.00*	-1.74*	-0.18	0.95	2.39*	2.63*	7.32*	-1.84*	-1.07†	1.53*
	(3.04)	(4.39)	(5.86)	(3.06)	(0.33)	(1.40)	(3.26)	(3.76)	(8.15)	(3.69)	(2.21)	(2.59)
90/10 perc. ratio times lowest fifth	0.29*	0.24*	0.20*	0.11*	0.11*	0.09*	0.28*	0.23*	0.16*	0.09*	0.09*	0.06*
	(11.25)	(9.08)	(5.22)	(6.43)	(6.19)	(4.45)	(11.97)	(9.99)	(4.82)	(5.64)	(5.58)	(3.46)
90/10 perc. ratio times second fifth	0.25*	0.21*	0.18*	0.08*	0.09*	0.06*	0.25*	0.21*	0.15*	0.07*	0.07*	0.04†
	(10.03)	(8.19)	(4.58)	(4.70)	(4.93)	(3.21)	(10.94)	(9.33)	(4.33)	(4.13)	(4.62)	(2.42)
90/10 perc. ratio times third fifth	0.21*	0.18*	0.14*	0.03	0.05*	0.02	0.23*	0.20*	0.13*	0.04†	0.06*	0.02
	(8.09)	(6.75)	(3.59)	(1.87)	(2.73)	(1.17)	(9.65)	(8.50)	(3.76)	(2.34)	(3.49)	(1.27)
90/10 perc. ratio times fourth fifth	0.17*	0.15*	0.12*	-0.01	0.03	-0.00	0.18*	0.17*	0.10*	-0.01	0.03	-0.01
	(6.51)	(5.88)	(2.99)	(0.29)	(1.48)	(0.03)	(7.80)	(7.32)	(2.96)	(0.37)	(1.72)	(0.47)
90/10 perc. ratio times highest fifth	0.11*	0.12*	0.08	-0.06*	-0.01	-0.04†	0.15*	0.15*	0.08†	-0.04†	0.01	-0.03
	(4.31)	(4.26)	(1.95)	(2.99)	(0.72)	(2.05)	(6.05)	(6.20)	(2.28)	(2.37)	(0.37)	(1.80)
Household income	-0.91*	-0.77*	-0.75*	-0.91*	-0.74*	-0.64*	-0.85*	-0.55*	-0.52*	-0.92*	-0.53*	-0.38†
	(3.99)	(3.38)	(3.32)	(4.02)	(3.32)	(2.88)	(4.10)	(3.01)	(2.88)	(4.61)	(2.96)	(2.22)
Household income squared	0.07†	0.06	0.06	0.07†	0.06	0.05	0.09*	0.06*	0.06*	0.10*	0.06*	0.05*
	(2.50)	(1.93)	(1.87)	(2.57)	(1.87)	(1.51)	(4.22)	(3.31)	(3.21)	(4.54)	(3.27)	(2.69)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.000*	0.001*	0.001*	-0.000*	-0.000	0.000	0.001*	0.001*	0.003*	-0.001*	-0.001†	0.001*
Inequality effect (lower quintile)	0.004*	0.003*	0.002*	0.001*	0.001*	0.001*	0.007*	0.006*	0.003*	0.002*	0.002*	0.001*
Inequality effect (upper quintile)	0.000*	0.000*	0.000	-0.000*	-0.000	-0.000†	0.001*	0.002*	0.001†	-0.000†	0.000	-0.000
Household income effect	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.001*	-0.001*	-0.000*	-0.001*	-0.001*	-0.000†

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table A6: Random effects probit models of the probability of reporting poor health with the Theil index as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
Explanatory variable	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	2.36*	4.91*	8.95*	-1.55*	0.34	1.39†	2.73*	4.03*	10.68*	-1.39*	-0.43	2.05*
	(3.03)	(6.24)	(8.56)	(2.72)	(0.60)	(2.04)	(3.83)	(5.91)	(11.62)	(2.78)	(0.88)	(3.46)
Theil index times lowest fifth	6.86*	7.18*	8.76*	3.27*	3.60*	3.15*	6.87*	6.95*	8.39*	2.79*	3.10*	2.51*
	(12.02)	(12.22)	(10.42)	(7.32)	(7.97)	(6.08)	(13.15)	(13.45)	(11.33)	(7.02)	(7.81)	(5.56)
Theil index times second fifth	5.90*	6.43*	8.02*	2.38*	2.91*	2.43*	6.17*	6.48*	7.91*	2.14*	2.68*	2.03*
	(10.51)	(11.11)	(9.59)	(5.39)	(6.55)	(4.72)	(11.98)	(12.70)	(10.75)	(5.45)	(6.82)	(4.49)
Theil index times third fifth	4.49*	5.35*	6.93*	0.93†	1.77*	1.26†	5.34*	5.94*	7.36*	1.36*	2.19*	1.47*
	(8.00)	(9.25)	(8.28)	(2.09)	(3.97)	(2.42)	(10.34)	(11.62)	(9.99)	(3.45)	(5.54)	(3.23)
Theil index times fourth fifth	3.33*	4.69*	6.26*	-0.25	1.09†	0.53	4.12*	5.17*	6.57*	0.12	1.38*	0.58
	(5.90)	(8.05)	(7.45)	(0.56)	(2.39)	(0.99)	(7.89)	(10.00)	(8.86)	(0.29)	(3.43)	(1.25)
Theil index times highest fifth	1.80*	3.57*	5.12*	-1.82*	-0.13	-0.77	3.10*	4.55*	5.95*	-0.92†	0.73	-0.18
	(3.01)	(5.76)	(5.91)	(3.65)	(0.26)	(1.35)	(5.61)	(8.33)	(7.81)	(2.07)	(1.66)	(0.36)
Household income	-1.03*	-0.84*	-0.81*	-1.02*	-0.80*	-0.71*	-1.00*	-0.60*	-0.57*	-1.06*	-0.59*	-0.45*
	(4.61)	(3.73)	(3.68)	(4.56)	(3.62)	(3.25)	(5.11)	(3.29)	(3.17)	(5.66)	(3.26)	(2.63)
Household income squared	0.08*	0.06†	0.06†	0.08*	0.06†	0.05	0.10*	0.07*	0.06*	0.11*	0.07*	0.05*
	(2.94)	(2.14)	(2.08)	(2.95)	(2.05)	(1.77)	(4.82)	(3.52)	(3.42)	(5.12)	(3.52)	(3.01)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.000*	0.001*	0.002*	-0.000*	0.000	0.000†	0.001*	0.002*	0.004*	-0.001*	-0.000	0.001*
Inequality effect (lower quintile)	0.005*	0.004*	0.005*	0.002*	0.002*	0.001*	0.008*	0.008*	0.007*	0.003*	0.003*	0.002*
Inequality effect (upper quintile)	0.000*	0.001*	0.001*	-0.000*	-0.000	-0.000	0.001*	0.002*	0.002*	-0.000†	0.000	-0.000
Household income effect	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.001*	-0.001*	-0.000*	-0.001*	-0.001*	-0.000†

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table A7: Random effects probit models of the probability of reporting poor health with the Mean Log-deviation index as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
Explanatory variable	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	2.61*	5.35*	8.27*	-1.42†	0.67	1.67†	2.88*	4.33*	9.69*	-1.34*	-0.20	2.25*
	(3.34)	(6.79)	(8.25)	(2.50)	(1.20)	(2.48)	(4.05)	(6.33)	(10.97)	(2.68)	(0.41)	(3.82)
MLD times lowest fifth	6.08*	6.56*	7.38*	2.83*	3.38*	3.06*	6.02*	6.24*	6.61*	2.37*	2.86*	2.41*
	(12.35)	(12.90)	(10.55)	(7.63)	(8.98)	(7.34)	(13.36)	(13.95)	(10.71)	(7.19)	(8.62)	(6.60)
MLD times second fifth	5.23*	5.89*	6.70*	2.06*	2.78*	2.43*	5.40*	5.81*	6.18*	1.81*	2.49*	1.99*
	(10.80)	(11.76)	(9.66)	(5.63)	(7.52)	(5.89)	(12.15)	(13.17)	(10.08)	(5.54)	(7.58)	(5.44)
MLD times third fifth	3.95*	4.89*	5.71*	0.77†	1.76*	1.38*	4.65*	5.32*	5.67*	1.13*	2.06*	1.49*
	(8.15)	(9.80)	(8.22)	(2.07)	(4.72)	(3.30)	(10.45)	(12.04)	(9.25)	(3.42)	(6.20)	(4.04)
MLD times fourth fifth	2.91*	4.30*	5.10*	-0.29	1.16*	0.73	3.53*	4.60*	4.94*	-0.01	1.31*	0.67
	(5.94)	(8.54)	(7.30)	(0.76)	(3.01)	(1.70)	(7.83)	(10.29)	(7.99)	(0.04)	(3.84)	(1.77)
MLD times highest fifth	1.53*	3.28*	4.08*	-1.67*	0.07	-0.42	2.63*	4.05*	4.39*	-0.92†	0.74	0.00
	(2.93)	(6.09)	(5.62)	(3.88)	(0.17)	(0.88)	(5.48)	(8.51)	(6.86)	(2.39)	(1.95)	(0.01)
Household income	-1.12*	-0.89*	-0.87*	-1.15*	-0.89*	-0.80*	-1.07*	-0.63*	-0.60*	-1.16*	-0.63*	-0.50*
	(5.03)	(4.00)	(3.96)	(5.21)	(4.06)	(3.70)	(5.62)	(3.42)	(3.30)	(6.32)	(3.49)	(2.88)
Household income squared	0.09*	0.07†	0.07†	0.09*	0.07†	0.06†	0.11*	0.07*	0.07*	0.12*	0.07*	0.06*
	(3.24)	(2.33)	(2.30)	(3.41)	(2.37)	(2.09)	(5.10)	(3.64)	(3.54)	(5.52)	(3.71)	(3.21)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.001*	0.001*	0.002*	-0.000†	0.000	0.000*	0.001*	0.002*	0.004*	-0.001*	-0.000	0.001*
Inequality effect (lower quintile)	0.005*	0.005*	0.005*	0.002*	0.002*	0.002*	0.008*	0.008*	0.006*	0.003*	0.003*	0.002*
Inequality effect (upper quintile)	0.000†	0.001*	0.001*	-0.000*	0.000	-0.000	0.001*	0.003*	0.002*	-0.000*	0.000	0.000
Household income effect	-0.001*	-0.000*	-0.000*	-0.001*	-0.000*	-0.000*	-0.001*	-0.001*	-0.001*	-0.001*	-0.001*	-0.001*

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table A8: Random effects probit models of the probability of reporting poor health with the Coefficient of variation as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted probability (bottom).

	Men						Women					
Explanatory variable	NUTS 0			NUTS 1			NUTS 0			NUTS 1		
Coefficient estimates on												
Mean income in region	1.49†	3.97*	8.75*	-1.83*	0.01	1.16	1.64†	3.06*	10.55*	-1.60*	-0.66	1.91*
	(1.98)	(5.25)	(8.33)	(3.29)	(0.03)	(1.73)	(2.39)	(4.67)	(11.44)	(3.25)	(1.39)	(3.27)
Coefficient of variation times lowest fifth	2.49*	2.67*	3.55*	1.13*	1.29*	1.08*	2.55*	2.65*	3.51*	1.08*	1.20*	0.92*
	(10.46)	(10.91)	(9.66)	(6.08)	(6.87)	(4.84)	(11.66)	(12.19)	(10.84)	(6.48)	(7.23)	(4.75)
Coefficient of variation times second fifth	2.24*	2.48*	3.35*	0.88*	1.10*	0.88*	2.34*	2.52*	3.38*	0.88*	1.08*	0.78*
	(9.45)	(10.18)	(9.15)	(4.77)	(5.90)	(3.96)	(10.79)	(11.64)	(10.46)	(5.34)	(6.52)	(4.03)
Coefficient of variation times third fifth	1.86*	2.19*	3.07*	0.50*	0.80*	0.57†	2.11*	2.37*	3.24*	0.65*	0.94*	0.63*
	(7.86)	(9.00)	(8.36)	(2.68)	(4.29)	(2.56)	(9.70)	(10.97)	(10.00)	(3.97)	(5.67)	(3.22)
Coefficient of variation times fourth fifth	1.56*	2.02*	2.89*	0.20	0.62*	0.38	1.79*	2.17*	3.03*	0.33†	0.73*	0.40†
	(6.58)	(8.29)	(7.88)	(1.05)	(3.33)	(1.70)	(8.19)	(10.02)	(9.36)	(2.01)	(4.42)	(2.06)
Coefficient of variation times highest fifth	1.17*	1.73*	2.60*	-0.21	0.30	0.04	1.52*	2.02*	2.88*	0.06	0.56*	0.21
	(4.82)	(6.93)	(7.00)	(1.09)	(1.58)	(0.19)	(6.77)	(9.10)	(8.79)	(0.32)	(3.31)	(1.04)
Household income	-0.82*	-0.71*	-0.68*	-0.73*	-0.59*	-0.50†	-0.76*	-0.52*	-0.49*	-0.77*	-0.46*	-0.31
	(3.57)	(3.05)	(3.00)	(3.24)	(2.63)	(2.23)	(3.65)	(2.85)	(2.72)	(3.76)	(2.60)	(1.87)
Household income squared	0.07†	0.05	0.05	0.06†	0.04	0.04	0.08*	0.06*	0.06*	0.08*	0.06*	0.04†
	(2.22)	(1.70)	(1.62)	(1.99)	(1.35)	(1.03)	(3.87)	(3.16)	(3.05)	(3.97)	(2.97)	(2.42)
Control for individual char.	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Control for regime-type effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
Predicted change in probability of poor health												
Mean income effect	0.000	0.001*	0.002*	-0.000*	0.000	0.000	0.001†	0.002*	0.004*	-0.001*	-0.001	0.001*
Inequality effect (lower quintile)	0.004*	0.004*	0.004*	0.001*	0.002*	0.001*	0.007*	0.007*	0.006*	0.003*	0.003*	0.002*
Inequality effect (upper quintile)	0.000*	0.001*	0.001*	-0.000	0.000	0.000	0.001*	0.002*	0.002*	0.000	0.001*	0.000
Household income effect	-0.000*	-0.000*	-0.000*	-0.000*	-0.000*	-0.000†	-0.001*	-0.001*	-0.000*	-0.001*	-0.001†	-0.000

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of predicted probability change.

Table A9: Fixed effects linear models of the relative ill-health score with the 90th to 10th percentile ratio as regional inequality measure; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.42*	1.47*	1.04*	1.08*	-0.08	-0.04	0.14	0.18
	(5.42)	(5.54)	(4.37)	(4.50)	(0.31)	(0.14)	(0.60)	(0.78)
Ratio of 90th to 10th percentile	0.05*	0.05*	0.02*	0.02*	0.02†	0.02†	0.02*	0.02*
	(4.44)	(4.45)	(3.23)	(3.23)	(2.16)	(2.17)	(3.48)	(3.49)
Household income		-0.04		-0.04		-0.05		-0.06
		(1.27)		(1.18)		(1.66)		(1.76)
Household income squared		-0.00		-0.00		0.01*		0.01*
		(0.38)		(0.44)		(3.07)		(3.12)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.024*	0.025*	0.022*	0.023*	-0.001	-0.001	0.003	0.004
Inequality effect	0.026*	0.026*	0.008*	0.008*	0.012†	0.012†	0.008*	0.008*
Household income effect		-0.002		-0.002		-0.002		-0.002

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table A10: Fixed effects linear models of the relative ill-health score with the Theil index as regional inequality measure; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.99*	2.03*	1.15*	1.19*	0.43	0.48	0.23	0.27
	(7.07)	(7.18)	(4.76)	(4.88)	(1.60)	(1.75)	(0.99)	(1.16)
Theil index	1.43*	1.44*	0.58*	0.58*	1.07*	1.07*	0.56*	0.56*
	(7.16)	(7.17)	(4.17)	(4.17)	(5.45)	(5.46)	(4.14)	(4.15)
Household income		-0.04		-0.04		-0.05		-0.06
		(1.29)		(1.19)		(1.69)		(1.77)
Household income squared		-0.00		-0.00		0.01*		0.01*
		(0.38)		(0.44)		(3.08)		(3.12)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.034*	0.034*	0.025*	0.026*	0.007	0.008	0.005	0.006
Inequality effect	0.038*	0.038*	0.012*	0.012*	0.028*	0.028*	0.011*	0.011*
Household income effect		-0.002		-0.002		-0.002		-0.002

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table A11: Fixed effects linear models of the relative ill-health score with the Mean Log-deviation index as regional inequality measure; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.90*	1.94*	1.15*	1.19*	0.30	0.34	0.22	0.26
	(6.81)	(6.92)	(4.78)	(4.91)	(1.11)	(1.26)	(0.92)	(1.09)
Mean Log Deviation index	1.09*	1.09*	0.45*	0.46*	0.72*	0.72*	0.41*	0.41*
	(6.75)	(6.76)	(4.21)	(4.22)	(4.54)	(4.55)	(3.86)	(3.86)
Household income		-0.04		-0.04		-0.05		-0.06
		(1.29)		(1.18)		(1.68)		(1.76)
Household income squared		-0.00		-0.00		0.01*		0.01*
		(0.38)		(0.44)		(3.07)		(3.11)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.032*	0.033*	0.025*	0.026*	0.005	0.006	0.005	0.006
Inequality effect	0.032*	0.032*	0.011*	0.011*	0.021*	0.021*	0.010*	0.010*
Household income effect		-0.002		-0.002		-0.002		-0.002

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table A12: Fixed effects linear models of the relative ill-health score with the Coefficient of variation as regional inequality measure; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.92*	1.96*	1.10*	1.14*	0.41	0.46	0.21	0.25
	(6.88)	(7.00)	(4.59)	(4.72)	(1.53)	(1.68)	(0.90)	(1.08)
Coefficient of variation	0.62*	0.62*	0.23*	0.23*	0.48*	0.48*	0.25*	0.25*
	(6.94)	(6.96)	(3.80)	(3.81)	(5.55)	(5.56)	(4.22)	(4.22)
Household income		-0.04		-0.04		-0.05		-0.06
		(1.29)		(1.19)		(1.69)		(1.77)
Household income squared		-0.00		-0.00		0.01*		0.01*
		(0.38)		(0.44)		(3.07)		(3.11)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.033*	0.033*	0.024*	0.025*	0.007	0.008	0.005	0.005
Inequality effect	0.036*	0.036*	0.010*	0.010*	0.028*	0.028*	0.011*	0.011*
Household income effect		-0.002		-0.002		-0.002		-0.002

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table A13: Fixed effects linear models of the relative ill-health score with the 90th to 10th percentile ratio as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.41*	1.37*	1.03*	1.01*	-0.09	-0.04	0.14	0.19
	(5.35)	(5.14)	(4.34)	(4.19)	(0.34)	(0.14)	(0.59)	(0.81)
90/10 perc. ratio times lowest fifth	0.05*	0.05*	0.02*	0.02*	0.02†	0.02†	0.02*	0.02*
	(5.01)	(5.06)	(4.03)	(4.09)	(2.28)	(2.20)	(3.62)	(3.43)
90/10 perc. ratio times second fifth	0.05*	0.05*	0.02*	0.02*	0.02†	0.02†	0.02*	0.02*
	(4.49)	(4.52)	(3.14)	(3.17)	(2.07)	(2.04)	(3.26)	(3.17)
90/10 perc. ratio times third fifth	0.05*	0.05*	0.02*	0.02*	0.02†	0.02†	0.02*	0.02*
	(4.42)	(4.42)	(3.04)	(3.05)	(2.28)	(2.28)	(3.63)	(3.63)
90/10 perc. ratio times fourth fifth	0.04*	0.04*	0.02*	0.02*	0.02†	0.02†	0.02*	0.02*
	(4.22)	(4.18)	(2.71)	(2.67)	(2.03)	(2.07)	(3.21)	(3.29)
90/10 perc. ratio times highest fifth	0.04*	0.04*	0.01*	0.01†	0.02†	0.02†	0.02*	0.02*
	(4.15)	(4.05)	(2.61)	(2.46)	(2.07)	(2.19)	(3.29)	(3.52)
Household income		0.04		0.03		-0.05		-0.07
		(1.04)		(0.78)		(1.38)		(1.68)
Household income squared		-0.01		-0.01		0.01*		0.01*
		(1.73)		(1.56)		(2.84)		(3.04)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.024*	0.023*	0.022*	0.022*	-0.001	-0.001	0.003	0.004
Inequality effect (lower quintile)	0.029*	0.030*	0.010*	0.010*	0.013†	0.013†	0.009*	0.008*
Inequality effect (upper quintile)	0.024*	0.024*	0.007*	0.006†	0.012†	0.013†	0.008*	0.009*
Household income effect		0.002		0.001		-0.002		-0.003

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table A14: Fixed effects linear models of the relative ill-health score with the Theil index as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.97*	1.93*	1.14*	1.11*	0.43	0.47	0.23	0.27
	(7.02)	(6.80)	(4.74)	(4.57)	(1.57)	(1.71)	(0.98)	(1.17)
Theil index times lowest fifth	1.62*	1.64*	0.75*	0.77*	1.11*	1.09*	0.60*	0.57*
	(7.97)	(8.03)	(5.23)	(5.30)	(5.59)	(5.46)	(4.30)	(4.06)
Theil index times second fifth	1.46*	1.47*	0.59*	0.60*	1.05*	1.04*	0.54*	0.52*
	(7.20)	(7.24)	(4.12)	(4.17)	(5.30)	(5.24)	(3.88)	(3.77)
Theil index times third fifth	1.43*	1.43*	0.57*	0.57*	1.11*	1.11*	0.60*	0.60*
	(7.07)	(7.08)	(3.98)	(4.00)	(5.61)	(5.61)	(4.34)	(4.31)
Theil index times fourth fifth	1.36*	1.35*	0.51*	0.50*	1.03*	1.04*	0.53*	0.54*
	(6.74)	(6.70)	(3.56)	(3.52)	(5.19)	(5.24)	(3.79)	(3.87)
Theil index times highest fifth	1.35*	1.32*	0.49*	0.47*	1.04*	1.07*	0.54*	0.58*
	(6.61)	(6.43)	(3.40)	(3.20)	(5.20)	(5.30)	(3.81)	(4.02)
Household income		0.04		0.03		-0.05		-0.06
		(1.09)		(0.91)		(1.23)		(1.54)
Household income squared		-0.01		-0.01		0.01*		0.01*
		(1.78)		(1.65)		(2.74)		(2.94)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.034*	0.033*	0.025*	0.024*	0.007	0.008	0.005	0.006
Inequality effect (lower quintile)	0.043*	0.043*	0.015*	0.016*	0.029*	0.029*	0.012*	0.012*
Inequality effect (upper quintile)	0.035*	0.035*	0.010*	0.010*	0.027*	0.028*	0.011*	0.012*
Household income effect		0.002		0.001		-0.002		-0.002

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table A15: Fixed effects linear models of the relative ill-health score with the Mean Log-deviation index as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.88*	1.84*	1.15*	1.12*	0.29	0.33	0.21	0.26
	(6.76)	(6.53)	(4.75)	(4.60)	(1.08)	(1.21)	(0.91)	(1.09)
MLD times lowest fifth	1.27*	1.28*	0.61*	0.62*	0.76*	0.75*	0.44*	0.42*
	(7.67)	(7.74)	(5.37)	(5.43)	(4.72)	(4.60)	(4.04)	(3.80)
MLD times second fifth	1.11*	1.12*	0.45*	0.46*	0.70*	0.70*	0.39*	0.37*
	(6.78)	(6.83)	(4.06)	(4.11)	(4.39)	(4.33)	(3.54)	(3.43)
MLD times third fifth	1.08*	1.08*	0.43*	0.44*	0.76*	0.76*	0.44*	0.44*
	(6.62)	(6.63)	(3.90)	(3.92)	(4.74)	(4.73)	(4.04)	(4.03)
MLD times fourth fifth	1.02*	1.01*	0.38*	0.38*	0.68*	0.69*	0.37*	0.38*
	(6.23)	(6.18)	(3.41)	(3.36)	(4.23)	(4.28)	(3.39)	(3.48)
MLD times highest fifth	1.00*	0.98*	0.37*	0.35*	0.69*	0.71*	0.38*	0.42*
	(6.08)	(5.87)	(3.24)	(3.02)	(4.22)	(4.33)	(3.41)	(3.64)
Household income		0.04		0.03		-0.04		-0.06
		(1.13)		(0.79)		(1.11)		(1.49)
Household income squared		-0.01		-0.01		0.01*		0.01*
		(1.80)		(1.58)		(2.66)		(2.91)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.032*	0.031*	0.025*	0.024*	0.005	0.006	0.005	0.006
Inequality effect (lower quintile)	0.038*	0.038*	0.014*	0.015*	0.023*	0.022*	0.010*	0.010*
Inequality effect (upper quintile)	0.030*	0.029*	0.009*	0.008*	0.020*	0.021*	0.009*	0.010*
Household income effect		0.002		0.001		-0.002		-0.002

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table A16: Fixed effects linear models of the relative ill-health score with the Coefficient of variation as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.90*	1.86*	1.09*	1.06*	0.41	0.46	0.21	0.26
	(6.83)	(6.61)	(4.57)	(4.38)	(1.51)	(1.69)	(0.89)	(1.11)
Coefficient of variation times lowest fifth	0.66*	0.67*	0.27*	0.28*	0.49*	0.48*	0.26*	0.25*
	(7.42)	(7.46)	(4.47)	(4.54)	(5.64)	(5.56)	(4.33)	(4.18)
Coefficient of variation times second fifth	0.62*	0.62*	0.23*	0.24*	0.48*	0.47*	0.24*	0.23*
	(6.99)	(7.01)	(3.83)	(3.88)	(5.46)	(5.42)	(4.07)	(3.99)
Coefficient of variation times third fifth	0.62*	0.62*	0.23*	0.23*	0.49*	0.49*	0.26*	0.25*
	(6.93)	(6.94)	(3.76)	(3.77)	(5.65)	(5.64)	(4.35)	(4.33)
Coefficient of variation times fourth fifth	0.60*	0.60*	0.21*	0.21*	0.47*	0.48*	0.24*	0.24*
	(6.76)	(6.73)	(3.51)	(3.49)	(5.44)	(5.47)	(4.06)	(4.10)
Coefficient of variation times highest fifth	0.60*	0.59*	0.21*	0.20*	0.48*	0.49*	0.24*	0.25*
	(6.69)	(6.60)	(3.41)	(3.29)	(5.46)	(5.55)	(4.10)	(4.25)
Household income		0.04		0.04		-0.06		-0.07
		(1.03)		(1.06)		(1.45)		(1.65)
Household income squared		-0.01		-0.01		0.01*		0.01*
		(1.73)		(1.75)		(2.88)		(3.00)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.032*	0.032*	0.024*	0.023*	0.007	0.008	0.004	0.006
Inequality effect (lower quintile)	0.038*	0.039*	0.012*	0.012*	0.028*	0.028*	0.011*	0.011*
Inequality effect (upper quintile)	0.035*	0.034*	0.009*	0.009*	0.028*	0.028*	0.011*	0.011*
Household income effect		0.002		0.002		-0.002		-0.003

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

Table A17: Fixed effects linear models of the relative ill-health score with the 50th to 10th percentile ratio as regional inequality measure and interaction effects with income quintile groups; coefficient estimates (top) and implied change in predicted rank (bottom).

	Men				Women			
Explanatory variable	NUTS 0		NUTS 1		NUTS 0		NUTS 1	
Coefficient estimates on								
Mean income in region	1.05*	1.01*	0.91*	0.88*	-0.27	-0.21	-0.01	0.05
	(4.20)	(4.00)	(3.93)	(3.76)	(1.10)	(0.86)	(0.03)	(0.21)
50/10 perc. ratio times lowest fifth	0.04	0.04	0.05*	0.05*	-0.03	-0.04	0.03†	0.03†
	(1.50)	(1.54)	(3.49)	(3.55)	(1.34)	(1.40)	(2.21)	(2.07)
50/10 perc. ratio times second fifth	0.03	0.03	0.04*	0.04*	-0.04	-0.04	0.02	0.02
	(1.13)	(1.15)	(2.77)	(2.80)	(1.51)	(1.53)	(1.87)	(1.81)
50/10 perc. ratio times third fifth	0.03	0.03	0.04*	0.04*	-0.03	-0.03	0.03†	0.03†
	(1.08)	(1.08)	(2.68)	(2.68)	(1.34)	(1.34)	(2.19)	(2.20)
50/10 perc. ratio times fourth fifth	0.02	0.02	0.03†	0.03†	-0.04	-0.04	0.02	0.02
	(0.94)	(0.92)	(2.43)	(2.39)	(1.51)	(1.47)	(1.85)	(1.94)
50/10 perc. ratio times highest fifth	0.02	0.02	0.03†	0.03†	-0.04	-0.03	0.03	0.03†
	(0.90)	(0.84)	(2.34)	(2.21)	(1.46)	(1.35)	(1.95)	(2.18)
Household income		0.04		0.03		-0.06		-0.07
		(0.99)		(0.83)		(1.50)		(1.71)
Household income squared		-0.01		-0.01		0.01*		0.01*
		(1.70)		(1.59)		(2.92)		(3.05)
Predicted change in ill-health (conditional) rank								
Mean income effect	0.018*	0.017*	0.020*	0.019*	-0.005	-0.004	-0.000	0.001
Inequality effect (lower quintile)	0.007	0.007	0.007*	0.007*	-0.006	-0.006	0.004†	0.004†
Inequality effect (upper quintile)	0.004	0.004	0.005†	0.004†	-0.006	-0.006	0.004	0.004†
Household income effect		0.002		0.001		-0.002		-0.003

Notes: Coefficient on mean regional income and household income multiplied by 100,000. Coefficient on squared household income multiplied by $10e^{10}$. † and * indicate significance at 5% and 1% levels respectively. Absolute z-values in parentheses. See text for an explanation on the construction of change in predicted ill-health rank.

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