UMR 8184
Thema
THéorie Économique, Modélisation et Applications

THEMA Working Paper n°2017-01
Université de Cergy-Pontoise, France

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Janvier 2017

UNIVERSITÉ de Cergy-Pontoise
CNRS CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

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January 17, 2017

Abstract

Income-related health inequalities have gained much attention. Using the Survey of Health, Ageing and Retirement in Europe (SHARE), this paper tests three hypotheses concerning the link between health, income and income inequalities. The Absolute Income Hypothesis states that income has a positive and concave effect on health. The second hypothesis, the strong version of Income Inequality Hypothesis, states that income inequalities affect all members in a society equivalently. The last one is the weak version of Income Inequality Hypothesis which assumes that income inequalities may hurt the health of only the least well off in a society. Results show strong evidence for the three hypotheses on the self-perceived health status, a subjective measure, using a set of income inequalities indexes and robust methods to consider the subjective nature of this health measure.

Keywords: Health inequalities, income inequalities, self-reported health, Europe.
JEL Classification: IOO, I14, D31.

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‡We thank participants of the 5th SHARE User's Conference (November 12th, 2015 in Luxembourg), the EuHEA conference (July 15th, 2016 in Hamburg) and the third EuHEA PhD student and supervisor conference (September 8th, 2016 in Barcelona), as well as Fabian Gouret and Toni Mora for their helpful comments.

SHARE Project acknowledgement - Research Data Center and Data Access

"This paper uses data from SHARE Waves 1, 2, 4 and 5 (DOIs: 10.6103/SHARE.w1.260, 10.6103/SHARE.w2.260, 10.6103/SHARE.w4.111, 10.6103/SHARE.w5.100), see Börsch-Supan et al. [2013] for methodological details.

The SHARE data collection has been primarily funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812) and FP7 (SHARE-PREP: N 211909, SHARE-LEAP: N 227822, SHARE M4: N 261982). Additional funding from the German Ministry of Education and Research, the U.S. National Institute on Ageing (U01 AG09740-13S2, P01 AG005842, P01 AG08291, P30 AG12815, R21 AG025169, Y1-AG-4553-01, IAG BSR06-11, OGHA 04-064) and from various national funding sources is gratefully acknowledged (see www.share-project.org)."

1 Introduction

The last few years have seen unprecedented attention to an attempt by policy makers, policy advisers and international institutions to reduce health inequalities. To do so, they usually focus on the access to healthcare, given that such policies allow to improve the health of lower income groups (see, e.g., World Health Organization [2009], pp.94-108; Potvin et al. [2010]). Improving equality of access to healthcare is however not the sole public policy which can favor health equality. In particular, it has been widely said that income and income inequalities can influence the health status; thus, any public policy which influences income and/or income inequalities might influences health. In this way, studying the relationship between income, income inequalities and health is interesting per se. With these elements in mind, this paper confronts on an empirical basis three hypotheses. The first one, called the Absolute Income Hypothesis, was initially introduced by Preston [1975] and states that there is a positive and concave relationship between income and health[1]. Higher incomes can provide means for purchasing a better health status. The second one is the strong version of the Income Inequality Hypothesis and it asserts that the health status is determined by income inequalities within a society. Thus, the health of all individuals is affected by an increase or a decrease in income inequalities. The last one, a weak version of the Income Inequality Hypothesis, says that income inequalities are a threat to individuals placed at the lower end of the income distribution. This last hypothesis implies that income inequalities do not impact low income people and high income people in the same magnitude.

Various authors have studied the Absolute Income Hypothesis mainly in the United States, using different health measures, like self-perceived measures (Mackenbach et al. [2005]), life expectantcy (Cutler et al. [2006]; Theodossiou and Zangelidis [2009]) and other health outcomes (Ettner [1996], Carrieri and Jones [2016]). Kennedy et al. [1998], Fiscella and Franks [2000], Wagstaff et al. [2003], Van Doorslaer et al. [2004] and other authors focus on the strong version of the Income Inequality Hypothesis and show that income inequalities in a society also matter in order to explain the average health status measured by self-perceived measures (mostly in the United States). Concerning the weak version of the Income Inequality Hypothesis, there are few empirical studies which investigate it, with the exception of Mellor and Milyo [2002] in the United States, Li and Zhu [2006] in China or Hildebrand and Van Kerm [2009] in Europe. Importantly, the strong version of Income Inequality Hypothesis and the weak version of Income Inequality Hypothesis are non-nested given that the weak version considers the rank of individuals and an interaction term between the rank and the income inequalities index whereas the strong version does not. Thus, both versions can be valid when income inequalities in a society negatively impact the health of all individuals, and more particularly the health of people ranked

[1] In this way, redistributing income from rich people to poor people will have an important and positive impact on the health of the poorer people, whereas the richer ones will experience a small decrease in their health.

at the lower end of the income distribution. However, the authors previously mentioned focus mainly one of the versions in the best case.

In this paper, we test the three above hypotheses at the same time using the Survey of Health, Ageing, and Retirement in Europe (SHARE), using mainly the fifth wave of this survey (2015), as well as the pooled version of the survey in robustness. We use the self-perceived health measure as our health outcome. This type of subjective measure is sometimes criticized but it is similar to the ones used by Mackenbach et al. [2005], Fiscella and Franks [2000] and Hildebrand and Van Kerm [2009]. Furthermore, some authors show that these subjective measures are not biased (e.g., Benitez-Silva et al. [2004]). Lastly, even if this type of measure can be criticized because of some interpersonal comparison issues, authors prove that some econometric models tackle these problems (e.g., Lindeboom and Van Doorslaer [2004]; see subsection 4.3 for some robustness checks in which we explicitly consider this issue).

The paper is organized as follows. Section 2 presents formally the three hypotheses that we will test empirically. Section 3 describes the SHARE dataset. In section 4 we present the baseline econometric specification as well as the results and some robustness checks.

2 The relationship between income inequalities and health

Inequalities in health refer to the close relationship between health and membership in a group characterized by incomes, which is an individual social determinant. This section formally presents the three hypotheses mentioned in the introduction, as well as some related literature.

2.1 The Absolute Income Hypothesis

From an early stage in the debate, the Absolute Income Hypothesis states that the relationship between health and income is positive and concave (Preston [1975]), meaning that people with higher incomes have better health outcomes, but income inequalities have no direct effect on health. As a result, the concavity of the relationship between individual income and health status is a necessary condition to assess the efficiency of redistributive policies. In this case, as we can see in figure 1, each additional dollar of income raises individual health by a decreasing amount. This implies that transferring a given amount of money from rich people to poor people will result in an improvement of the average health (from y_1 to y_2), which shows the impact of the redistribution of incomes as a public policy to reduce health inequalities.
The individual-level relation between income and health is specified as follows:

$$h_i = \beta_0 + x_i\beta_1 + x_i^2\beta_2 + Z_i\gamma + \epsilon_i \tag{1}$$

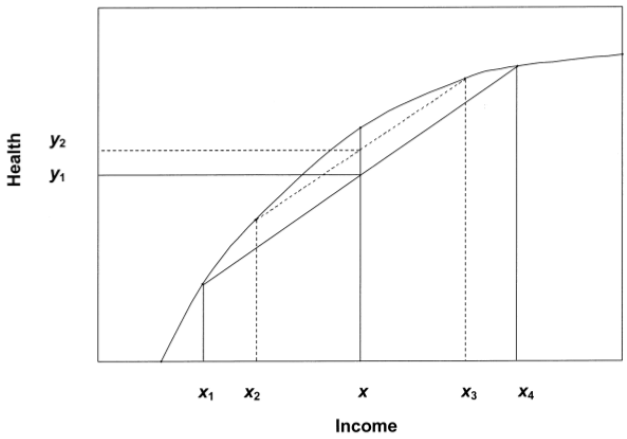


Figure 1: The individual-level relation between income and health

where h_i represents the health status of individual i (objective or subjective measures); x_i is the income of individual i; Z_i is a set of individual specific control variables[2]; and ϵ_i is the error term coming from differences in individual health.
The concavity effect is legitimized if β_1 is positive, β_2 is negative, and $\frac{\partial h_i}{\partial x_i} > 0$.
A strong link between health and income has been demonstrated in a large number of empirical studies, and a concave relationship between the two is largely found. Preston [1975] explain that the impact of additional income on mortality is greater among the poor than the rich people. Ettner [1996], using three US surveys, finds that increases in income improve mental and physical health but increase the alcohol consumption. Then, Mackenbach et al. [2005] shows that a higher income is associated with better self-assessed health in Europe. Using mortality rates, Cutler et al. [2006] conclude the same thing in the United States. Theodossiou and Zangelidis [2009], using data on individuals aged between 50 and 65 from six European countries, find a positive but small effect of income on health. More recently, Carrieri and Jones [2016] analyze the effect of income on blood-based biomarkers and find a positive and concave effect of income on health.

2.2 The strong version of Income Inequality Hypothesis

Some researchers affirm that income inequalities in a society are equally important in determining individual health status. The key difference between the Absolute Income Hypothesis and the strong version of Income Inequality Hypothesis stems from the fact that the latter explicitly considers the effect of income distribution on health while the former only takes into account the concavity assumption between health and income. Mellor and Milyo [2002] specifically define two versions of this hypothesis: the strong version and the weak version.

The strong version of the Income Inequality Hypothesis implies that, whatever the level

[2]Such as the age, the gender, the number of years of education, the marital status and the job situation. It can also contains countries dummies variables.

of income, the health of all individuals in a society is equivalently affected by income inequalities in this society. In this way, both the well off and poor people are impacted by income inequalities. These may be a public bad for all members of a society since income inequalities are a threat to the health of all individuals. We can thus identified an individual effect (a micro part) which is assimilated to the Absolute Income Hypothesis and an aggregate effect (a macro part) which corresponds to the relationship between individual health and income inequalities in a society.
Theoretically, the strong version of the Income Inequality Hypothesis is specified as follows:

$$h_{ij} = \beta_0 + x_i\beta_1 + x_i^2\beta_2 + \delta II_j + Z_i\gamma + \epsilon_{ij} \tag{2}$$

which is an expansion of equation (1) with the introduction of II_j as a measure of income inequalities in a society j (corresponding to the macro part explained above); where h_{ij} represents the health status of individual i in a society j.
This hypothesis has been empirically tested mainly on data from developed countries (mainly in the United States). Tests have been conducted at both the individual level and the aggregate level. At the aggregate level, a number of studies try to demonstrate an association between income inequalities and public health and the results are contrasted (Kaplan et al. [1996]; Lynch et al. [1998]; Subramanian and Kawachi [2004]). At the individual level, Kawachi et al. [1997], Kennedy et al. [1998], and Fiscella and Franks [2000] all find a negative impact of income inequalities on self-perceived health. However, Van Doorslaer et al. [2004] find no effect of income inequalities on an objective health measure, the McMaster health utility index, derived from the self-perceived health status. Finally, other authors test the impact of income inequalities on alcohol consumption (Marmot [1997]), malnutrition (Wagstaff et al. [2003]) or health service use (Lindelow [2006]) and find contrasted results.

The strong version focuses on the direct ties between health and income inequalities. There are several potential pathways through which income inequalities might harm an individual's health. Kawachi and Kennedy [1999] summarize three plausible mechanisms linking income inequalities to health. The first one is that disinvestment in human capital is linked to income inequalities. In states with high income inequalities, educational outcomes are negatively impacted when a smaller proportion of the state budget is spent on education which creates differences in education and thus in income. High income disparities may translate into lower social spending because interests of richer persons begin to diverge from other people in societies where inequalities rise. Thus, reducing social spending turns into a decrease in life opportunities for poorer people and thus an increase in inequalities (see also Grossman [2015]). The second mechanism is that income inequalities lead to the erosion of the "features of social organization that facilitate cooperation for mutual benefit". In other words, Kawachi and Kennedy [1999] interpret this mechanism as the erosion of the "social capital", corresponding to the set of collective resources an individual

can put together. This may be the access to public services, the feeling of security, the characteristics of the relatives or the community solidarity (Grignon et al. [2004]). Here we focus on the solidarity argument. This one is important for the maintenance of population health. Kawachi and Kennedy [1999] made a study using the General Social Survey where each indicator of social capital (like the degree of mistrust or levels of perceived reciprocity) was correlated with lower mortality rates. An increasing level of mistrust between the members of a society was due to the development of the distance between the well off's expectation and the ones of poorer people. Unfortunately this result implies a growth of a latent social conflict. As a result, health being affected by the erosion of social capital seems to be towards the transition of social policies which are detrimental to poor people, implying unequal political participation. A lower turnout at elections is perceived among states with low levels of interpersonal trust. These states are less likely to invest in policies that ensure the security of poorer people in a society. Finally less generous states are likely to provide less hospitable environments for these individuals. The last mechanism is that income inequalities contribute to unhealthiness through stressful social comparisons. In this case, a technique in anthropology called "cultural consensus analysis" is used to take into account the psychosocial effects of social comparisons. Indeed, many communities have a common cultural model of the standard of living. This technique involves interviewing people and observing if individuals succeed in achieving the cultural model of lifestyle. This aspect can be seen as the satisfaction individuals have with their life. However, it should be noticed and not forgiven that a possible endogeneity issue can appear with this mechanism connected to the life satisfaction of individuals.

2.3 The weak version of Income Inequality Hypothesis

The second version of the Income Inequality Hypothesis is the weak one. According to this hypothesis, people who are more likely to have poorer health are the ones who feel more economically disadvantaged than their peers in a reference group. As a result, it specifically suggests that only the least well off are hurt by income inequalities in a society. The damaging effect of these inequalities on health decreases with a person's income rank. Indeed, for an individual, stress and depression leading to illness may be caused by the fact of having a low relative income when compared to another person (Cohen et al. [1997]). The main concern is thus on the difficulties that an individual may face when he is situated at the bottom of the social ladder.
Theoretically, the weak version of the Income Inequality Hypothesis is specified as follows:

$$h_{ij} = \beta_0 + x_i\beta_1 + x_i^2\beta_2 + \delta II_j + \theta R_{ij} + \eta R_{ij} * II_j + Z_i\gamma + \epsilon_{ij} \tag{3}$$

which is an expansion of equation (2) where we introduce R_{ij} as a person's rank, and the interaction between inequalities and a person's rank ($R_{ij} * II_j$) to allow the effects of income inequalities to vary by the relative income level in a society.

The interaction term allows us to know how income inequalities affect people with lower levels of income, compared to other people. Therefore, this hypothesis suggests that the breadth of the difference between rich people and poor ones accounts for the health. When testing this equation, δ underlines the strong version of the Income Inequality Hypothesis whereas θ and η specifically refer to the weak version. Thus, if the three previous coefficients are significant, then both the strong and the weak version are correct, meaning that everybody is affected by income inequalities, and in particular people who are at the lower end of the income distribution. On the other hand, whether only δ (or θ and η respectively) is significant implies that only the strong version (*resp.* the weak version) is satisfied.

As explained in the introduction, only few researches focus on this hypothesis. Mellor and Milyo [2002] use data from the Current Population Survey and find no consistent association between income inequalities and individual health. On the other hand, Li and Zhu [2006], using data from China, find that income inequalities are detrimental for people who are at the lower end of the hierarchy. Finally, Hildebrand and Van Kerm [2009] also test the hypothesis that income inequalities may affect only the least well off in society using the European Community Household Panel but find no evidence supporting it.

3 The data

3.1 The survey

The Survey of Health, Ageing and Retirement in Europe (SHARE) is a multidisciplinary and cross-national panel database of micro data on health, socio-economic status and social and family networks of more than 123 000 individuals aged 50 and over from many European countries and Israel (Börsch-Supan et al. [2013]). SHARE is part of a context of an ageing population. It is the European Commission which has identified the need for scientific knowledge about ageing people in Europe[3]. In fact, people of the European Innovation Partnership on Active and Health Ageing project estimate that in 2050, one in three Europeans will be over 60 years old and one in ten will be over 85 years old. The SHARE survey was then constructed in the different European countries under the leadership of Professor Axel Börsch-Supan. In addition, SHARE is harmonized with the Health and Retirement Study (in the United States - HRS) and the English Longitudinal Study of Ageing (UK - ELSA). Since 2004, SHARE asks questions throughout Europe to a sample of households with at least one member who is 50 and older. These households are re-interviewed every two years in the panel.

The first wave (2004-2005, 27 014 individuals) and the second one (2006-2007, 34 393 individuals) were used to collect data on health status, medical consumption, socio-economic

[3]See http://ec.europa.eu/ for an explanation of the European Innovation Partnership on Active and Healthy Ageing - A Europe 2020 initiative.

status and living conditions. The 2008-2009 survey (Wave 3 - "SHARELIFE") was extended to life stories by collecting information on the history of the respondents. The number of participants increased from 12 countries in wave 1, to 15 (+ Ireland, Israel, Poland and Czech Republic) in wave 2, and the third wave contains information about 14 countries. The fourth wave (2010-2011), is a return to the initial questionnaire of the first two waves. It collects data from 56 675 individuals aged 50 and over in 16 European countries. Finally, the fieldwork of the fifth wave of this survey was completed in 2013. The following countries are included in the scientific release of 2015: Austria, Belgium, Switzerland, Czech Republic, Germany, Denmark, Estonia, Spain, France, Israel, Italy, Luxembourg, Netherlands, Sweden, and Slovenia. This wave contains the responses of 63 626 individuals. We are going to focus on the fifth wave (Börsch-Supan [2016a]) in order to have a great number of individuals who come from different countries. Moreover, we will also focus on the pooled database from waves 1, 2, 4 (Börsch-Supan [2016b]; Börsch-Supan [2016c] and Börsch-Supan [2016d]) and 5 in order to make our results more robust (the third wave is not considered in the panel since it does not contain the same information as the other ones).

The advantage of the SHARE database is that it has many individual variables on health, socioeconomic status and income to perform this research. However, researchers should be also aware of the potential disadvantage of this database. Indeed, Börsch-Supan et al. [2013] explain that in some waves there are a relative low response rates and moderate levels of attrition (even though the overall response rate is high compared to other European and US surveys: the average retention rate over the year is 81 %) which are due to the economic crisis faced by some countries implying a decrease in the participation rates. Due to this attrition, we thus focus on the fifth wave of this survey instead of the pooled database. Nonetheless, we present the results using the pooled database as a robustness test.

3.2 Indexes for the measurement of income inequalities

In this study, we want to underline the effects of income inequalities on health and this is why we need a measurement of income inequalities. The Gini coefficient, as well as the Theil index are two well-known indexes which can be used.

Algebraically, the Gini coefficient is defined as half of the arithmetic average of the absolute differences between all pairs of incomes in a population, and then the total is normalized on mean income. If incomes in a population are distributed completely equally, the Gini value is zero, and if one person has all the incomes in a society, the Gini is one. The Gini coefficient can be illustrated through the Lorenz curve. However, the Gini coefficient does not take into account the income distribution since different Lorenz curves may correspond

to the same Gini index[4]. In other words it does not distinguish between inequalities in low income group and high income ones. Formally, the Gini coefficient is:

$$Gini = \frac{2\sum_i iy_i}{N\sum y_i} - (\frac{N+1}{N}) \tag{4}$$

with y_i representing the income of the population sorted and ranked, from the lowest decile group to the top decile group, and N representing the total population.

As a result, one of the solution is to use the Theil index which measures income inequalities. The Theil index is:

$$Theil = \frac{1}{N}\sum_i \frac{y_i}{\bar{y}} \ln(\frac{y_i}{\bar{y}}) \tag{5}$$

where $\bar{y}$ is the mean income per person (or expenditure per capita). In order to normalize the Theil index to vary between zero and one, we divide it by $ln(N)$[5]. It measures a "distance" of the real population and the "ideal" egalitarian state where everyone have the same income.

Since the Gini coefficient does not take into account the income distribution, most of the following tables of results will be displayed using the Theil index. If the latter is not available, then the Gini coefficient is used[6].

3.3 Descriptive statistics - An overview

In this paper, the data used are from the fifth wave of the SHARE survey. This wave includes responses from 63 626 respondents aged 50 and over, living in 15 different countries. Thus, this survey aims to provide information on health, income, activities and other features of the elderly.

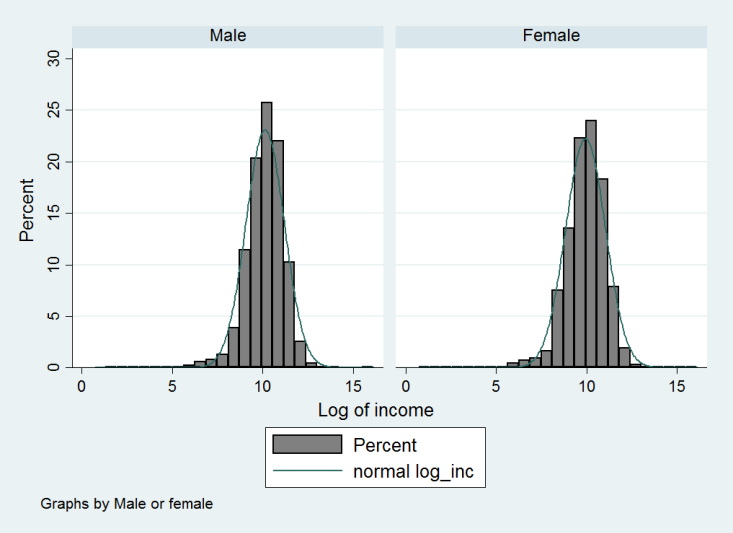
In one hand, the variable of interest is the health which is defined in the database as the self-perceived health status. Individuals are asked to classify their health using ordered qualitative labels from "poor" to "excellent. The figure 2a characterizes the distribution of the health variable among individuals aged 50 and older by gender for all countries. As we can see the majority of inhabitants reports being in a good health. In the other hand, one of our main determinant of health is the income. This variable can be seen as a proxy for well-being, that is to say a factor which allows individuals to improve the living standards. In the database, it corresponds to the sum of individual imputed income for all

[4]For instance, if 50 percent of the population has no income and the other half has the same income, the Gini index is 0.5. The same result can be found with the following analysis which is less unequal. On one hand, 25 percent of total income is shared in the same way by 75 percent of the population, and on he other hand, the remaining 25 percent of the total income is divided by the remaining 25 percent of the population.

[5]It is this normalized index that we use hereafter and that we name the Theil index.

[6]This is the case for a robustness test with the use of a lagged measurement of income inequalities (see Table 7).

(a) Self-perceived health in Europe.



(b) Income quintiles in Europe.

Figure 2: Health and Income in Europe

household components. Figure 2b shows the distribution of income of people aged 50 and over in the fifth wave where the mean is about 36 000€. Moreover, the income inequality hypothesis includes an indicator for the measurement of income inequalities (see figure 3). In this paper, we use either the Gini index or the Theil index. The mean of the Gini index in Europe is 0.39 which corresponds to a rather egalitarian society. The mean of the Theil index in Europe is 0.33 which is also rather egalitarian. In our analysis we include others variables such as the age, the marital status, the education of individuals, the job situation, dummies for the countries and the gender, and the GDP of the countries (see tables 4, 5 and 6 in the appendix for further information). Finally, the pooled data (waves 1, 2, 4 & 5) contains 181 708 observations, where each individual is present on average 2.9 years in the panel.

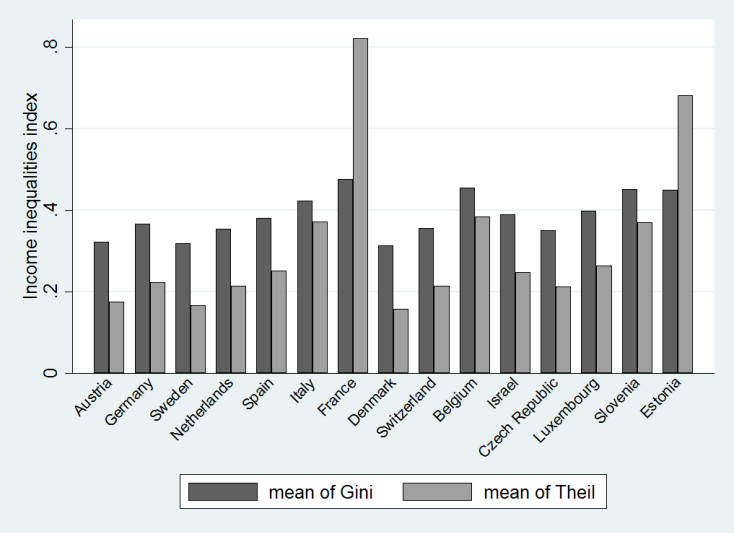


Figure 3: Income inequalities indexes in Europe

4 Model and economic results

4.1 The ordered probit model

To model the association between self-perceived health and other socioeconomic status and test the hypotheses, we use an ordered probit specification. When the self-perceived health status outcome is denoted as h_i, the model can be stated as:

$$h_i = j \qquad iff \quad \mu_{j-1} < h_i^* \leq \mu_j, \qquad for \quad j = 1, 2, 3, 4, 5 \tag{6}$$

The latent variable specification of the model that we estimate can be written as:

$$h_i^* = x_i\beta + \epsilon_i \tag{7}$$

where h_i^* is a latent variable which underlies the self-reported health status[7]; x_i is a set of observed socioeconomic variables; and ϵ_i is an individual-specific error term, which is assumed to be normally distributed.
In this data, the latent outcome h_i^* is not observed. Instead, we observe an indicator of the category in which the latent indicator falls. As a result the observed variable is equal to 1, 2, 3, 4 or 5 for "fair", "poor", "good", "very good" or "excellent" with this probability:

$$P(y = j|x) = F(\mu_j - x_i\beta) - F(\mu_{j-1} - x_i\beta) \tag{8}$$

The interval decision rule is:

[7]Once h_i^* crosses a certain value you report fair, then poor, then good, then very good, then excellent health.

1. $h_i = 1$ if $h_i^* \leq \mu_1$;
2. $h_i = 2$ if $\mu_1 < h_i^* \leq \mu_2$;
3. $h_i = 3$ if $\mu_2 < h_i^* \leq \mu_3$;
4. $h_i = 4$ if $\mu_3 < h_i^* \leq \mu_4$;
5. $h_i = 5$ if $h_i^* > \mu_4$.

In this model, the threshold values $(\mu_1, \mu_2, \mu_3, \mu_4)$ are unknown. We do not know the value of the index necessary to shift from very good to excellent. In theory, the threshold values are different for everyone.

4.2 Results

Tables 1, 2 and 3 report coefficient estimates for all estimated ordered probit models when income inequalities are measured using the Theil index[8]. The fifth wave gives us access to 63 626 observations and we also display the results of the pooled database for the sake of robustness. Results from table 1 report the estimated coefficients for the absolute income hypothesis while results from tables 2 and 3 provide tests of both the strong version and the weak version of the income inequality hypothesis.

Table 1: Results of the ordered probit for the Absolute Income Hypothesis

Variables	**Absolute Income Hypothesis**	
	Wave 5	**Pooled data**
Income	1.84e-06 ***	1.41e-06 ***
	(1.22e-07)	(4.74e-08)
Income squared	-2.06e-13 ***	-1.78e-13 ***
	(1.55e-14)	(1.14e-14)
Age	0.037 ***	-0.014 ***
	(0.006)	(0.003)
Age squared	-0.0004 ***	-0.0001 ***
	(0.00004)	(0.00002)
Years of education	0.034 ***	0.021 ***
	(0.001)	(0.001)
Gender = 1 if women	0.003	-0.055 ***
	(0.009)	(0.005)
Marital Status:		
Married, living with spouse	Reference group	

[8]Results associated to the Gini coefficient are not provided here but they are very similar and available upon request.

Table 1: Results of the ordered probit for the Absolute Income Hypothesis (continued)

Variables	**Absolute Income Hypothesis**	
	Wave 5	**Pooled data**
Registered partnership	-0.04	-0.06 ***
	(0.035)	(0.0169)
Married, not living with spouse	-0.094 **	-0.098 ***
	(0.039)	(0.009)
Never married	-0.07 ***	-0.127 ***
	(0.019)	(0.014)
Divorced	-0.045 ***	-0.079 ***
	(0.015)	(0.011)
Widowed	-0.024 *	-0.046 ***
	(0.014)	(0.009)
Job Situation:		
Retired	Reference group	
Employed	0.253 ***	
	(0.014)	
Unemployed	-0.212 ***	
	(0.028)	
Permanently sick	-1.25 ***	
	(0.026)	
Home-maker	-0.059 ***	
	(0.017)	
Other	-0.236 ***	
	(0.031)	
Dummies for countries and waves are included but not reported, and available upon request.		
***: 1% significant; **: 5% significant; *: 10% significant.		

Table 2: Results of the ordered probit for the strong version of Income Inequality Hypothesis

Variables	**Strong IIH**	
	Wave 5	**Pooled data**
Income	1.84e-06 ***	1.94e-06 ***
	(1.20e-07)	(4.34e-08)
Income squared	-2.04e-13 ***	-2.39e-13 ***
	(1.50e-14)	(1.13e-14)
Index of inequalities (Theil):	-0.403 ***	-0.473 ***
	(0.024)	(0.018)
Mechanisms:		
1st: % Health expenditure in the GDP	0.077 ***	
	(0.003)	
2nd: Received help from others	-0.179 ***	
	(0.006)	
2nb bis: Given help to others	0.001 ***	
	(0.0001)	
3rd: Life satisfaction	0.216 ***	
	(0.003)	
GDP	1.99e-06 ***	0.0002 ***
	(4.53e-07)	(3.03e-07)
Age	-0.019 ***	-0.019 ***
	(0.006)	(0.003)
Age squared	-0.0003 ***	-0.0001**
	(0.00004)	(0.00002)
Years of education	0.028 ***	0.019 ***
	(0.001)	(0.0005)
Gender = 1 if women	0.005	-0.057 ***
	(0.009)	(0.005)
Marital Status:		
Married, living with spouse	Reference group	
Registered partnership	-0.006	-0.03 *
	(0.035)	(0.017)
Married, not living with spouse	0.004	-0.087 ***
	(0.039)	(0.009)
Never married	0.023	-0.108 ***
	(0.019)	(0.013)
Divorced	0.068 ***	-0.062 ***
	(0.016)	(0.011)
Widowed	0.055 ***	-0.055 ***

Table 2: Results of the ordered probit for the strong version of Income Inequality Hypothesis (continued)

Variables	**Strong IIH**	
	Wave 5	**Pooled data**
	(0.015)	(0.009)
Job Situation:		
Retired	Reference group	
Employed	0.224 ***	
	(0.014)	
Unemployed	-0.103 ***	
	(0.028)	
Permanently sick	-1.069 ***	
	(0.026)	
Home-maker	-0.064 ***	
	(0.017)	
Other	-1.169 ***	
	(0.031)	
Temporal dummies are included but not reported, and available upon request.		
***: 1% significant; **: 5% significant; *: 10% significant.		

Table 3: Results of the ordered probit for the weak version of Income Inequality Hypothesis

Variables	**Weak IIH**	
	Wave 5	**Pooled data**
Income	1.89e-06 ***	1.16e-06 ***
	(1.44e-07)	(4.76e-08)
Income squared	-2.09e-13 ***	-1.46e-13 ***
	(-2.09e-13)	(1.12e-14)
Index of inequalities (Theil)	-0.838 ***	-0.567 ***
	(0.049)	(0.038)
Quintile 1	-0.26 ***	-0.379 ***
	(0.029)	(0.019)
Quintile 2	-0.201 ***	-0.288 ***
	(0.028)	(0.019)
Quintile 3	-0.115 ***	-0.184 ***
	(0.027)	(0.019)
Quintile 4	-0.053 **	-0.115 ***
	(0.026)	(0.018)
Quintile 5	Reference group	
Interaction quintile 1 & II	0.115 *	0.121 **

Table 3: Results of the ordered probit for the weak version of Income Inequality Hypothesis (continued)

Variables	**Weak IIH**	
	Wave 5	**Pooled data**
	(0.069)	(0.053)
Interaction quintile 2 & II	0.114 *	0.054
	(0.068)	(0.053)
Interaction quintile 3 & II	0.023	-0.012
	(0.068)	(0.052)
Interaction quintile 4 & II	0.062	0.053
	(0.068)	(0.052)
Interaction quintile 5 & II		Reference group
GDP	0.0001 ***	0.0002 ***
	(0.049)	(3.06e-07)
Age	0.037 ***	-0.015 ***
	(0.006)	(0.003)
Age squared	-0.0004 ***	-0.0006 ***
	(0.00004)	(0.00002)
Years of education	0.026 ***	0.017 ***
	(0.001)	(0.001)
Gender = 1 if women	0.007	-0.05 ***
	(0.009)	(0.005)
Marital Status:		
Married, living with spouse		Reference group
Registered partnership	0.058 *	-0.026
	(0.035)	(0.017)
Married, not living with spouse	-0.076 **	-0.09 ***
	(0.039)	(0.009)
Never married	0.023	-0.027 **
	(0.019)	(0.014)
Divorced	0.032 **	0.016
	(0.018)	(0.011)
Widowed	0.015	0.026 ***
	(0.014)	(0.009)
Job Situation:		
Retired		Reference group
Employed	0.246 ***	

Table 3: Results of the ordered probit for the weak version of Income Inequality Hypothesis (continued)

Variables	**Weak IIH**	
	Wave 5	**Pooled data**
	(0.014)	
Unemployed	-0.176 ***	
	(0.028)	
Permanently sick	-1.2072 ***	
	(-1.21)	
Home-maker	-0.056 ***	
	(0.017)	
Other	-0.207 ***	
	(0.031)	
Temporal dummies are included but not reported, and available upon request.		
***: 1% significant; **: 5% significant; *: 10% significant.		

Coefficients of the individual income and income squared in tables 1, 2 and 3 provide support for all the hypotheses that income has a positive and concave effect on the self-perceived health status. Indeed, the coefficients associated to the income variable are all positive and significant and the coefficients associated to the income squared variable are all negative and significant. This implies that higher income leads to better health outcomes and that population health would be higher by redistributing incomes. As a result, the absolute income hypothesis is verified.

Concerning income inequalities, coefficients on the Theil index in tables 2 and 3 are negative and significantly different from zero. This supports evidence of the strong version of income inequality hypothesis stating that an increase in income inequalities is detrimental to all members of society. Indeed concerning this measurement, zero represents an egalitarian state, thus the negative relationship between the self-perceived health and the indicator of income inequalities implies that health will be better if the index is low. Moreover, we also find evidence in table 3 supporting the weak version of income inequality hypothesis which states that inequalities hurt only the least well-off in a society. Indeed, we introduce the rank and an interaction term between the rank and the index of income inequalities to allow a variation between the income level and the effect of income inequalities. In the specification, we choose to follow the framework of Mellor and Milyo [2002] who introduced the interaction term between the measurement of income inequalities and the dummies variables based on quintiles of income (1 for the lowest income group and 5 for the highest, which is a proxy for the rank). All the coefficients associated to the quintiles variables are negative and significant. Coefficient estimates are higher for low-income groups that is to say the effects of income inequalities are more detrimental for people with low incomes. Only the first two interaction terms are significant which reinforces the

previous statement. People with high income compared to their peers are less impacted by the effect of income inequalities on health.
Regarding the mechanisms of Kawachi and Kennedy [1999] (table 2), the disinvestment in human capital (first mechanism) is characterized by the percentage of health expenditure in the GDP[9]. The coefficient associated is positive and significant meaning that when governments increase the health spending, this has a positive effect on individual health. For the second mechanism, we want to illustrate the interaction between individuals to represent the erosion of social capital. As a result, we choose a variable from the SHARE survey: "received help from others". The coefficient associated to this variable is negative and significant. We can explain this negative coefficient by saying that people who are in bad health are the ones who receive help. In order, to legitimize this explanation, we also do the estimation with the "reverse variable": "given help to others". In this case, the coefficient is positive and significant proving that people in good health offer their help. Then, the last mechanism is about social comparisons. The coefficient associated to this variable ("life satisfaction") is positive and significant which implies that when individuals are satisfied with their life, they also report having a good health.

In sum, our baseline specifications provide evidence of a statistically significant association between income, income inequality and health. Results are robust to model specifications as well as across the hypotheses. The impact of income inequalities on health is greater among individuals with low-income ranking.

4.3 Robustness checks

In order to settle economic policies to reduce inequalities, it is important to investigate the causal relationship between income and health. In most regressions, we make use of cross-sectional data. Thus, the results suggested so far fail to address causality. However, talking about causality can be difficult since this will imply some endogeneity issues. In order to establish a causal link between income, income inequalities and health, we choose another income inequalities measure. Indeed, the idea is to consider that inequalities have a delayed effect on health. In other words, income inequalities in the past have an effect on individual current health. In order to account for this postponed effect we use a lagged measurement for income inequalities[10]. The results, reported in table 7 (see the Appendix part), are very similar to those obtained with another measurement of income inequalities. Hence, the results are consistent with all the hypotheses explained before and with the existence of a permanent impact of income inequalities on health, that one can consider as causal.

[9]Source: OECD website.

[10]We use a computed Gini coefficient from the OECD website from 2004 when the values are available. However, there are many missing values so we took the oldest values available when the 2004 ones were not available. Here are the cited countries for which the 2004 value was not available. Austria: 2007; Spain: 2009; Netherlands and Switzerland: 2010; Denmark, France, Germany, Sweden and Israel: 2011.

Moreover, our baseline specification depends on a dependent variable which is subjective. Self-reported measures give a good amount of information about individual health since people summarize all the health information they have from their practitioners (general practitioners and specialists) and from what they feel (Benitez-Silva et al. [2004]). The use of this measure in our specification raise the problem of interpersonal comparisons between people aged 50 and over ("Is the way I consider "good health" the same as you consider this health commodity?"). Empirical studies on the relationship between health, income and income inequalities commonly use ordered probit models where the thresholds are constant by assumption. However, one limit is that it restricts the marginal probability effects. In fact the distributional effects are restricted by the specific structure. Then, another limit is that additional individual heterogeneity between individual realizations is not allowed by the distributional assumption. Thus, Boes and Winkelmann [2006] and Jones and Schurer [2011] both explain the solution to these issues with the use of the generalized ordered probit model since it is based on a latent threshold where the thresholds themselves are linear function of the explanatory variables. In other words, the previous thresholds of equation 8 are now computed by selecting individual characteristics so that they depend on covariates:

$$\mu_{ij} = \widetilde{\mu}_j + x_i'\gamma_j \tag{9}$$

where γ_j is a vector of response specific parameters. We have:

$$\mu_{ij} = \mu_j \qquad \forall_i \in C_j \tag{10}$$

where C_j is the class. With this model, the probabilities are:

$$P(y = j|x) = F(\widetilde{\mu}_j - x_i\beta_j) - F(\widetilde{\mu}_{j-1} - x_i\beta_{j-1}) \tag{11}$$

Now, the effects of covariates on the log-odds are category-specific and this model allows to have more heterogeneity across individuals.

The results concerning the generalized ordered probit model are similar to those made with the ordered probit model. All the effects are estimated around each four cut-points (from fair to poor, from poor to good, from good to very good, and from very good to excellent). For all the hypotheses (absolute income hypothesis - table 8, income inequality hypothesis, both versions - tables 9 and 10 in the appendix part), the coefficients associated to the variables of interest (income and income squared) do not change significantly in comparison to the results with the ordered probit model. The results are consistent (either with the Theil index or the Gini coefficient for the income inequality hypothesis) as this is proved in previous study (Lindeboom and Van Doorslaer [2004]). In fact, in the four cut-points, the results legitimizes the concavity assumption of the income since the coefficients

are statistically significant and the index for the measurement of income inequalities is negative (or the income inequality hypothesis). Finally, the interpretation of the quintiles and the interaction terms implies the consistency of the weak version of income inequality hypothesis. Indeed, adding some heterogeneity in this model and taking into account the issues of interpersonal comparisons do not modify what is expected with the literature. As an example, we can interpret the coefficient associated to the dummy variable "home-maker" for the absolute income hypothesis (table 8). It has a negative and significant coefficient across cut-points one to three, so being a home-maker decreases standards in these health domains, except regarding the distinction between very good health versus poor health.

5 Conclusion

In this study we underline the hypotheses through which health is affected by income and income inequalities. The aim of this paper was to empirically investigate the evidence for the absolute income hypothesis and the income inequality hypothesis for people aged 50 and over in Europe, using data from the SHARE survey. Indeed, we review the relationship on income-related health inequalities where we mention the literature as well as the theoretical and statistical tools needed to carry out this research. Then we present the data used and some descriptive statistics. Finally we show the model specification, the results of the two hypotheses and some robustness tests. This whole work, both the literature study and the establishment of various models led us to estimate different assumptions on the relationship between health and income. This study is one of the first analyzing this relationship through different hypotheses using the SHARE survey which is a rich database, containing a lot of information on elderly people and countries simultaneously.

We find evidence supporting the absolute income hypothesis which states that people with higher incomes have better health outcomes. We also find evidence supporting the strong version of income inequality hypothesis which argues that inequality affects all members in a society equivalently. In this hypothesis, we find that when there are high income inequalities in a country, people aged 50 and over feel less healthy. Moreover, we also find evidence supporting the weak version of income inequality hypothesis which states that only the least well off are hurt by income inequalities in a society. This hypothesis underlines the fact that income inequalities are more detrimental for the health of people with low incomes. By implementing the generalized ordered probit, we control for potential problems of interpersonal comparisons and the results are very similar to those found with the ordered probit model.

The results concerning the hypotheses are consistent with the concavity assumption of income on health and thus this legitimizes the redistribution of incomes. In fact, what is

important in determining the health status is more how income is distributed in a society and less the overall health of this society. As a result, the more equally income is distributed, the better the overall health in this society. Concerning the political implication, one way to improve health might be to take measures using the redistribution of incomes as a lever. In fact, Lynch et al. [2004] argue that, redistributive fiscal and tax policies will help the governments to achieve better population health. Deaton [2001] explains that if income inequalities affect health, transfer policies that affect the distribution of incomes would have good effects through individual levels of health. There will be like a virtuous circle in which incomes influence the health status (improving the production possibilities of the economy can be achieved by improving the health) which in turn affects the income. Indeed, we also perform the econometric analysis using a lagged income inequalities measure and we show that income inequalities have a delayed impact on health.

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A Descriptive Statistics

Table 4: Descriptive statistics of the variables

Variables	Mean	Standard Deviation	Min	Max
Health				
Self-perceived health status (N=63 626)	2.85	1.09	1	5
Inequalities				
Gini per country	0.39	0.05	0.31	0.48
Theil per country	0.33	0.19	0.16	0.82
Other Variables				
Income	36 621.21	71 863.78	2	1.00e+07
GDP per country (2013 - Dollar US/capita)	39 726.43	11 543.57	26 160.08	92 781.41
Education	11.12	4.28	1	25
Age	67.12	10.06	50	103

Table 5: Detailed descriptive statistics for the health

Health	Percentage of people
Poor (1)	10.81%
Fair (2)	27.01%
Good (3)	36.52 %
Very Good (4)	17.58%
Excellent (5)	8.18%

Table 6: Detailed descriptive statistics for the countries

Country	**Percentage of people***	**GDP - 2013****	**Indexes of inequality*****	
			Theil index	**Gini index**
Austria	6.54%	45 132.54	0.1762	0.3222
Germany	8.71%	43 282.31	0.2234	0.3672
Sweden	7.06%	44 585.87	0.1672	0.3183
Netherlands	6.42%	46 749.31	0.2152	0.3543
Spain	9.75%	33 111.45	0.2521	0.3813
Italy	6.88%	34 836.43	0.373	0.4239
France	6.86%	37 617.06	0.8224	0.4772
Denmark	6.37%	43797.23	0.1578	0.3138
Switzerland	4.62%	56 896.91	0.2144	0.3554
Belgium	8.66%	41 863.94	0.3849	0.4545
Czech Republic	8.7%	28 962.64	0.2123	0.3512
Luxembourg	2.5%	92 781.4	0.2649	0.3979
Israel	3.56%	32 504.72	0.2475	0.3906
Slovenia	4.51%	28 675.43	0.3696	0.451
Estonia	8.88%	26 160.08	0.6816	0.4497

*: From each country in the full sample.

**: Gross Domestic Product, Total dollar US/capita.

***: Values.

B Additional Econometric Results

Table 7: Results with the lagged measurement for the income inequalities index (Wave 5)

Variables	**Strong IIH**	**Weak IIH**
Income	1.83e-06 ***	1.89e-06 ***
	(1.20e-07)	(1.44e-07)
Income squared	-2.05e-13 ***	-2.13e-13 ***
	(1.50e-14)	(1.73e-14)
Index of inequalities (Lagged Gini)	-2.25 ***	-3.513 ***
	(0.148)	(0.287)
Quintile 1		0.057
		(0.122)
Quintile 2		0.293 **
		(0.121)
Quintile 3		0.108
		(0.12)
Quintile 4		0.071
		(0.119)
Quintile 5	Reference group	
Interaction quintile 1 & II		-0.935 **
		(0.404)
Interaction quintile 2 & II		-1.541 ***
		(0.401)
Interaction quintile 3 & II		-0.733 **
		(0.399)
Interaction quintile 4 & II		-0.352
		(0.398)
Interaction quintile 5 & II	Reference group	
Mechanisms:		
1st: % Health expenditure in the GDP	0.07 ***	
	(0.003)	
2nd: Received help from others	-0.179 ***	
	(0.006)	
2nb bis: Given help to others	0.001 ***	
	(0.0001)	
3rd: Life satisfaction	0.22 ***	
	(0.003)	
GDP	2.04e-06 ***	9.91e-06 ***

Table 7: Results with the lagged measurement for the income inequalities index (continued)

Variables	**Strong IIH**	**Weak IIH**
	(4.55e-07)	(4.64e-07)
Age	0.024 ***	0.048 ***
	(0.006)	(0.006)
Age squared	-0.0003 ***	-0.0005 ***
	(0.0001)	(0.0001)
Years of education	0.026 ***	0.023 ***
	(0.001)	(0.001)
Gender = 1 if women	-0.0002	-0.003
	(0.009)	(0.009)
Marital Status:		
Married, living with spouse	Reference group	
Registered partnership	-0.018	0.03
	(0.035)	(0.035)
Married, not living with spouse	0.006	-0.076 *
	(0.039)	(0.039)
Never married	0.019	0.007
	(0.019)	(0.019)
Divorced	0.059 ***	0.006
	(0.016)	(0.016)
Widowed	0.042 ***	-0.013
	(0.014)	(0.014)
Job Situation:		
Retired	Reference group	
Employed	0.254 ***	0.304 ***
	(0.014)	(0.014)
Unemployed	-0.069 ***	-0.118 ***
	(0.028)	(0.028)
Permanently sick	-1.031 ***	-1.154 ***
	(0.026)	(0.026)
Home-maker	-0.019	0.031 *
	(0.017)	(0.017)
Other	-0.152 ***	-0.179 ***
	(0.031)	(0.031)

***: 1% significant; **: 5% significant; *: 10% significant.

Table 8: Absolute Income Hypothesis - Generalized ordered probit (Wave 5)

Variables	**Health commodities**			
	1 to 2	**2 to 3**	**3 to 4**	**4 to 5**
Income	1.99e-06 ***	2.25e-06 ***	3.68e-06 ***	3.81e-06 ***
	(2.76e-07)	(2.00e-07)	(2.44e-07)	(4.44e-07)
Income squared	-2.11e-13 ***	-7.96e-13 ***	-3.26e-13 ***	-5.41e-12 ***
	(2.90e-14)	(1.17e-13)	(4.71e-13)	(1.55e-12)
Age	0.037 ***	0.037 ***	0.026 ***	0.029 ***
	(0.01)	(0.008)	(0.009)	(0.012)
Age squared	-0.0004 ***	-0.0004 ***	-0.0004 ***	-0.0003 ***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Years of education	0.031 ***	0.038 ***	0.036 ***	0.024 ***
	(0.002)	(0.001)	(0.001)	(0.002)
Gender = 1 if women	0.066 ***	-0.014	-0.005	-0.002 **
	(0.016)	(0.012)	(0.012)	(0.016)
Marital Status:				
Married, living with spouse	Reference group			
Registered partnership	-0.063	-0.093 **	0.029	-0.027
	(0.069)	(0.046)	(0.045)	(0.057)
Married, not living with spouse	-0.251 ***	-0.112 **	-0.0001	0.118 *
	(0.062)	(0.049)	(0.053)	(0.069)
Never married	-0.048	-0.068 ***	-0.038	-0.065 *
	(0.032)	(0.024)	(0.026)	(0.035)
Divorced	-0.157 ***	-0.059 ***	0.05 ***	0.06 **
	(0.026)	(0.019)	(0.021)	(0.027)
Widowed	-0.017	-0.026	0.002	-0.015
	(0.021)	(0.017)	(0.02)	(0.029)
Job Situation:				
Retired	Reference group			
Employed	0.398 ***	0.312 ***	0.203 ***	0.174 ***
	(0.029)	(0.019)	(0.019)	(0.025)
Unemployed	-0.222 ***	-0.191 ***	-0.233 ***	-0.126 **
	(0.047)	(0.035)	(0.038)	(0.053)
Permanently sick	-1.196 ***	-1.268 ***	-1.307 ***	-0.963 ***
	(0.033)	(0.038)	(0.054)	(0.076)
Home-maker	-0.088 ***	-0.052 **	-0.047 *	-0.006
	(0.029)	(0.022)	(0.025)	(0.035)
Other	-0.354 ***	-0.173 ***	-0.145 ***	-0.017
	(0.041)	(0.037)	(0.046)	(0.064)

Dummies for countries are included but not reported, and available upon request.

***: 1% significant; **: 5% significant; *: 10% significant

1 to 2: Fair to Poor; 2 to 3: Poor to Good; 3 to 4: Good to VG; 4 to 5: VG to Excellent.

Table 9: IIH, strong version - Generalized ordered probit (Wave 5)

Variables	**Health commodities**			
	1 to 2	**2 to 3**	**3 to 4**	**4 to 5**
Income	1.75e-06 ***	2.34e-06 ***	3.89e-06 ***	3.20e-06 ***
	(2.69e-07)	(1.97e-07)	(2.38e-07)	(4.42e-07)
Income squared	-1.89e-13 ***	-8.28e-13 ***	-3.75e-12 ***	-5.18e-12 ***
	(2.82e-14)	(1.18e-13)	(4.72e-13)	(1.60e-12)
Index of inequalities (Theil)	-0.095 **	-0.369 ***	-0.7389 ***	-0.4746 ***
	(0.041)	(0.031)	(0.035)	(0.048)
Mechanisms:				
1st: % Health exp. in the GDP	0.059 ***	0.087 ***	0.073 ***	0.082 ***
	(0.005)	(0.004)	(0.004)	(0.006)
2nd: Received help from others	-0.214 ***	-0.193 ***	-0.134 ***	-0.089 ***
	(0.009)	(0.008)	(0.009)	(0.013)
2nb bis: Given help to others	0.001 ***	0.001 ***	0.001 ***	0.001 ***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
3rd: Life satisfaction	0.195 ***	0.215 ***	0.239 ***	0.238 ***
	(0.004)	(0.003)	(0.004)	(0.006)
GDP	2.52e-06 ***	1.41e-06 **	-4.87e-07	5.94e-07
	(8.66e-07)	(6.04e-07)	(6.36e-07)	(8.72e-07)
Age	0.019 *	0.004	0.013	0.019 *
	(0.01)	(0.008)	(0.009)	(0.012)
Age squared	-0.0003 ***	-0.0002 ***	-0.0003 ***	-0.0003 ***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Years of education	0.025 ***	0.029 ***	0.028 ***	0.021 ***
	(0.002)	(0.001)	(0.0014)	(0.0018)
Gender = 1 if women	0.069 ***	-0.018	-0.003	-0.0004
	(0.016)	(0.012)	(0.012)	(0.016)
Marital Status:				
Married, living with spouse	Reference group			
Registered partnership	-0.023	-0.053	0.034	0.014
	(0.071)	(0.047)	(0.045)	(0.058)
Married, not living with spouse	-0.131 **	0.005	0.091 *	0.122 *
	(0.065)	(0.051)	(0.054)	(0.072)
Never married	0.033	0.023	0.064 **	0.001
	(0.034)	(0.025)	(0.027)	(0.036)
Divorced	-0.046 *	0.062 ***	0.166 ***	0.122 ***
	(0.028)	(0.021)	(0.022)	(0.028)
Widowed	0.053 **	0.069 ***	0.076 ***	0.022

Table 9: IIH, strong version - Generalized ordered probit (continued)

Variables	**Health commodities**			
	1 to 2	**2 to 3**	**3 to 4**	**4 to 5**
	(0.023)	(0.018)	(0.022)	(0.031)
Job Situation:				
Retired	Reference group			
Employed	0.344 ***	0.225 ***	0.177 ***	0.176 ***
	(0.03)	(0.019)	(0.019)	(0.025)
Unemployed	-0.141 ***	-0.097 ***	-0.11 ***	0.012
	(0.048)	(0.035)	(0.039)	(0.054)
Permanently sick	-1.016 ***	-1.121 ***	-1.098 ***	-0.744 ***
	(0.034)	(0.034)	(0.056)	(0.084)
Home-maker	-0.074 ***	-0.033	-0.076 ***	-0.044
	(0.029)	(0.022)	(0.025)	(0.035)
Other	-0.299 ***	-0.114 ***	-0.09 *	0.048
	(0.043)	(0.038)	(0.048)	(0.067)

***: 1% significant; **: 5% significant; *: 10% significant

1 to 2: Fair to Poor; 2 to 3: Poor to Good; 3 to 4: Good to VG; 4 to 5: VG to Excellent.

Table 10: IIH, weak version - Generalized ordered probit (Wave 5)

Variables	**Health commodities**			
	1 to 2	**2 to 3**	**3 to 4**	**4 to 5**
Income	1.97e-06 ***	3.03e-06 ***	5.92e-06 ***	7.65e-06 ***
	(3.06e-07)	(2.43e-07)	(3.15e-07)	(6.10e-07)
Income squared	-2.09e-13 ***	-1.14e-12 ***	-6.03e-12 ***	-1.60e-11 ***
	(3.17e-14)	(1.25e-13)	(5.21e-13)	(1.92e-12)
Index of inequalities (Theil)	-0.319 ***	-0.79 ***	-1.077 ***	-0.899 ***
	(0.101)	(0.065)	(0.065)	(0.084)
Quintile 1	-0.145 ***	-0.195 ***	-0.003	0.07
	(0.055)	(0.039)	(0.043)	(0.059)
Quintile 2	-0.099 *	-0.159 ***	-0.014	0.079
	(0.054)	(0.038)	(0.039)	(0.059)
Quintile 3	-0.061	-0.043	0.018	0.025
	(0.054)	(0.037)	(0.037)	(0.047)
Quintile 4	-0.012	-0.02	0.055	0.023
	(0.056)	(0.036)	(0.034)	(0.043)
Quintile 5	Reference group			
Interaction quintile 1 and II	-0.204 *	0.079	-0.039	0.084
	(0.12)	(0.088)	(0.107)	(0.147)
Interaction quintile 2 and II	-0.162	0.097	0.048	0.029
	(0.123)	(0.087)	(0.101)	(0.138)
Interaction quintile 3 and II	-0.163	-0.048	-0.013	0.144
	(0.125)	(0.088)	(0.098)	(0.129)
Interaction quintile 4 and II	-0.058	0.066	0.001	0.098
	(0.132)	(0.088)	(0.093)	(0.124)
Interaction quintile 5 and II	Reference group			
GDP	0.0001 ***	9.96e-06 ***	3.83e-06 ***	2.17e-06 ***
	(8.30e-07)	(6.31e-07)	(6.99e-07)	(9.91e-07)
Age	0.034 ***	0.023 ***	0.029 ***	0.034 **
	(0.01)	(0.008)	(0.008)	(0.011)
Age squared	-0.0004 ***	-0.0003 ***	-0.0004 ***	-0.0004 ***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Years of education	0.025 ***	0.029 ***	0.028 ***	0.022 ***
	(0.002)	(0.001)	(0.001)	(0.002)
Gender = 1 if women	0.066 ***	-0.016	0.0004	0.007
	(0.015)	(0.011)	(0.012)	(0.016)
Marital Status:				

Table 10: IIH, weak version - Generalized ordered probit (Continued)

Variables	**Health commodities**			
	1 to 2	**2 to 3**	**3 to 4**	**4 to 5**
Married, living with spouse	Reference group			
Registered partnership	0.053	0.023	0.075 *	0.049
	(0.067)	(0.045)	(0.044)	(0.056)
Married, not living with spouse	-0.203 ***	-0.091 *	-0.014	0.052
	(0.061)	(0.049)	(0.052)	(0.068)
Never married	0.034	0.014	0.042	-0.008
	(0.033)	(0.024)	(0.026)	(0.035)
Divorced	-0.079 ***	0.009	0.107 ***	0.085 ***
	(0.027)	(0.02)	(0.021)	(0.027)
Widowed	0.024	0.015	0.019	-0.015
	(0.022)	(0.018)	(0.021)	(0.029)
Job Situation:				
Retired	Reference group			
Employed	0.374 ***	0.251 ***	0.206 ***	0.188 ***
	(0.029)	(0.019)	(0.018)	(0.024)
Unemployed	-0.188 ***	-0.169 ***	-0.221 ***	-0.128 **
	(0.046)	(0.034)	(0.038)	(0.053)
Permanently sick	-1.162 ***	-1.262 ***	-1.245 ***	-0.923 ***
	(0.032)	(0.033)	(0.054)	(0.08)
Home-maker	-0.062 **	-0.021	-0.081 ***	-0.069 **
	(0.027)	(0.021)	(0.024)	(0.034)
Other	-0.317 ***	-0.152 ***	-0.148 ***	-0.017
	(0.041)	(0.037)	(0.046)	(0.064)

***: 1% significant; **: 5% significant; *: 10% significant

1 to 2: Fair to Poor; 2 to 3: Poor to Good; 3 to 4: Good to VG; 4 to 5: VG to Excellent.