the review of income and wealth

Review of Income and Wealth
Series 67, Number 3, September 2021
DOI: 10.1111/roiw.12485

WHEN MONEY MATTERS MORE: LONG-TERM ILLNESS AND THE INCOME/LIFE SATISFACTION SLOPE

by Leonardo Becchetti and Fabio Pisani*

University of Rome Tor Vergata

We compare the life satisfaction of individuals aged above 50 years reporting or not reporting long-term illnesses. Our econometric findings show that the positive income/life satisfaction gradient is steeper for individuals with at least one long-term illness, especially those lacking private insurance or reporting above mean unmet medical needs. We also use the compensating variation approach and show that the marginal utility of income (net of the absolute and relative income effects) for the long-term ill is significantly larger than the average marginal utility of income in the sample.

JEL Codes: I10, I18, I31

Keywords: health and life satisfaction, income/life satisfaction slope, value of health

1. Introduction

The literature on subjective wellbeing has grown considerably in recent decades because of several concurring factors. First, policymakers are becoming increasingly interested in these indicators since they capture information on the public appraisal of their action that is unobservable using traditional objective indicators. They have, therefore, started looking at life satisfaction and life sense surveys, as corporations do with customer satisfaction surveys and employers with job satisfaction surveys to monitor consumers' appraisal and the work climate in their companies, respectively. Second, economists have started employing econometric findings on the determinants of subjective wellbeing in multivariate analysis as a basis for calculating the value of non-market goods using the compensating variation approach. Such information is hugely relevant for cost/benefit analysis and policymaking more generally. For example, this approach has been used in health economics to calculate the value of non-market goods such as cardiovascular diseases (Groot and Van den Brink, 2006), a wide range of illnesses for East and West Germans (Ferrer-i-Carbonell and Van Praag, 2002), the cost of child disability in the United Kingdom (Melnychuk *et al*., 2018), and the cost of caring for informal caregivers (Mentzakis *et al*., 2010). Third, subjective wellbeing indicators matter because they influence people's choices during their lives and, consequently, are objective indicators. Along this line, poor job satisfaction has been shown to be a good predictor of employment status, productivity, and the likelihood of changing

*Correspondence to: Fabio Pisani, Department of Economics and Finance, University of Rome Tor Vergata, Rome, Italy (fabio.pisani@uniroma2.it).

or quitting one's job (Judge, 1992; Staw and Barsade, 1993; Judge *et al*., 2001). Fourth, a poor sense of life (low eudaimonic wellbeing) has been shown to be a significant mortality risk factor (Becchetti et al., 2018), whereas low self-assessed health is a good predictor of mortality (Idler and Angel, 1990; McCallum *et al*., 1994; Idler and Kasl, 1995; Appels *et al*., 1996; Benjamins *et al*., 2004) and chronic illness (Bachelet et al., 2017).

Our study contributes to the literature by investigating the relationship between income and life satisfaction conditional on long-term illness status. Our descriptive findings show, as expected, that reporting at least one long-term illness is associated with a significantly worse distribution of life satisfaction in the population. Based on this descriptive evidence, we econometrically test the income–life satisfaction nexus and find that the interaction between long-term illness status and being in the top 30 percent income group is significantly correlated with life satisfaction, net of the standalone impact of the two interacting variables. To inspect more in depth the relationship between income and life satisfaction along the income distribution without imposing a functional form, we use income deciles. We find that the income/life satisfaction slope is significantly steeper for individuals with at least one long-term illness and, within this group, for those reporting unmet needs of medical examination due to travel costs, the costs of medical treatment, or waiting times. In addition, within the long-term ill subsample, the relationship is steeper for respondents not having complementary private insurance.

Our results add to this strand of the literature by explaining the heterogeneity in the aggregate data used so far in this debate, since we show that the relationship between income and life satisfaction is significantly steeper when individuals record at least one long-term illness. We argue that the observed heterogeneity in the income/life satisfaction gradient has relevant effects on the overall population gradient usually investigated in the literature, given that the long-term illness group accounts for almost half of the respondents in our representative sample of 20 EU countries as well as progressive population ageing in high-income countries.

From a different perspective, our study contributes to the literature by investigating the marginal utility of income and consumption, where the standard assumption is generally that of state independence (i.e. independence from health conditions) (e.g. Feldstein, 1973; Feldman and Dowd, 1991; Mitchell *et al*., 1999; Davidoff *et al*., 2005; Golosov and Tsyvinski, 2006; Brown and Finkelstein, 2008). Empirical analysis on this point is relevant given that the impact of poor health on the marginal utility of consumption is theoretically ambiguous (Finkelstein *et al*., 2009). On the one hand, individuals with poor health have reduced time horizons and possibilities of access to certain consumption goods (e.g. traveling); therefore, their utility of income may fall. On the other hand, they require expensive care, and, therefore, the utility of consumption (and of income) may grow. Previous empirical contributions have used approaches such as survey measures of self-reported compensating income differentials to hypothetical health risks (Sloan *et al*., 1988; Evans and Viscusi, 1990; Viscusi and Evans, 1990). The problem with these approaches is that they require respondents to forecast the shape of their utility function in an unbiased manner (Finkelstein *et al*., 2009), while they may presumably underestimate their income needs when ill. To avoid this problem,

Finkelstein *et al*. (2008) use subjective wellbeing measures, as we do in our study, and focus on UK individuals with health insurance aged above 50 years.

Our original approach complements the above-described valuable findings in several respects. We focus on a cross-country panel including respondents from 20 European countries and examine the health-dependent income/life satisfaction gradients for individuals with or without long-term illness as well as with or without health insurance. By discriminating within the subsample of individuals reporting long-term illness between those with or without private insurance (or unmet needs of medical treatment), we also discriminate between the two possible effects envisaged in the theoretical literature since the arguments supporting the prevalence of the positive effect (due to higher income needs because of expensive care) are related to the variable we use to divide our subgroups.

Our findings have relevant policy implications. We use the compensating variation approach and calculate the magnitude of the significant coefficients of the interaction between chronic disease status and being in the top 30 percent income group to calculate the monetary value of being a higher-income earner, conditional on chronic illness status. These findings provide evidence in favor of the importance of having private health insurance or receiving full healthcare coverage from national healthcare services (NHSs) if we assume that the calculated compensating variation proxies for the value of having extra income when suffering from long-term illnesses.

2. Research Hypothesis

Our research hypothesis can be formulated as follows: *The value of being in the top income centiles for individuals reporting at least one long-term illness is higher than for those not reporting it*. The rationale for our hypothesis is that the progress in medical treatment and healthcare services for individuals with long-term illnesses that may more or less impair their functionality now offers a rich range of opportunities. Treated individuals can, therefore, significantly improve the quality and length of their lives if they have access to these treatments and services. More advanced treatments, however, come with high costs because pharmaceutical companies willing to take part in the innovation race need to know that they can recover their research costs through patent protection. This is the case, for instance, for new cancer therapies based on immuno-molecules and therapies against hepatitis C.[1] NHSs can cover only a proportion of these costs and in most of the countries included in the SHARE survey (Survey of Health, Ageing and Retirement in Europe), full coverage is almost impossible and out-of-pocket private health

[1]The new generation of drugs against multiple myeloma (blood cancer), such as Revlimid and Pomalyst, have almost tripled the average survival time in less than a decade. The cost of these drugs, however, is extremely high, not fully covered by NHSs, and subject to abrupt market changes. For example, US patients on Medicare pay $11,538 out-of-pocket expenses each year for such drugs. In the United Kingdom, the National Institute for Health and Care Excellence delayed for several years the approval of these new drugs because of their costs for the NHS. In 2014, Medicare declared that it could not ensure to all 3.3 million patients with hepatitis C the cure of Harvoni, a new powerful drug capable of leading to a full recovery.

expenditure is high.[2] In addition, even when full coverage exists, NHSs have incentives to use drugs parsimoniously given their cost, and long waiting lists for treatments can significantly reduce the effectiveness for patients. In these cases, patients know that, with extra money or private health insurance, they can often obtain the anticipated treatment privately. Healthcare services not directly related to medical treatment (i.e. invalidity assistance and caregiving) are expensive and far from fully covered by NHSs. Their quality can, therefore, be significantly improved if individuals have higher purchasing power.

For these reasons, we reasonably expect that the marginal utility of being in the top income centiles for individuals above 50 years reporting at least one chronic illness is significantly higher than that for those not reporting such illnesses. The empirical analysis that follows tests whether our hypothesis holds taking into account the opposite argument discussed in the Introduction (Finkelstein *et al*., 2009), where health problems reduce time horizons and consequently the utility of consumption and income.

3. Data and Descriptive Findings

We test our hypothesis using the last three waves of the SHARE cross-national panel database recording data on the health and socioeconomic status of representative samples of individuals aged above 50 years in 20 countries (Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, Israel, Hungary, Czech Republic, Poland, Luxembourg, Portugal, Slovenia, Estonia, and Croatia). Survey participants are asked whether they have received a diagnosis from a doctor on a list of chronic diseases. In addition to this baseline information, the survey measures self-assessed health and a wide range of functionalities using the standard activities of daily living (ADL) and other indexes. The ADL ranks a patients limitations with six activities of daily living: dressing, walking across a room, bathing or showering, eating, getting in and out of bed, and using the toilet.

The problem with the diagnosis of chronic disease variables is that they do not measure the intensity, severity, or persistence of the illness. Therefore, we use an additional variable that measures respondents' evaluation of whether they have a long-term illness. This variable is more relevant to our analysis because it is the only one that includes information on the time persistence of the illness, which is crucial to evaluate the impact on respondents' health expenditure. The variable answers the following survey question: *Some people suffer from chronic or long-term health problems. By chronic or long-term, we mean it has troubled you over a period of time or is likely to affect you over a period of time. Do you have any health problems, illness, disability, or infirmity?*

Based on the answer to this question, we build our *LongtermIll* variable, a dummy taking a value of one if the individual answers the above question affirmatively. The share of individuals with at least one long-term illness is high, 51.2 percent of the overall sample.

[2]According to Eurostat data, the share of private out-of-pocket expenditure in total health expenditure ranges from relatively low levels in Northern European countries (12.53 percent in Germany, 12.25 percent in the Netherlands, 15.79 percent in Sweden) to higher levels in Southern and Eastern European countries (27.65 percent in Portugal, 22.83 percent in Italy, 24.23 percent in Spain, 29.04 percent in Hungary).

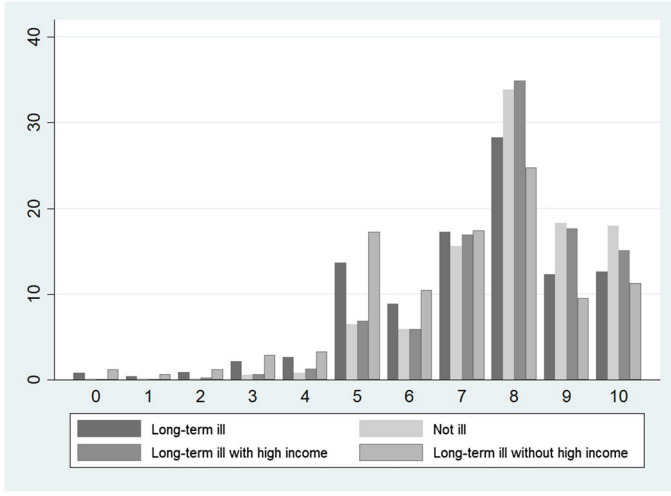

Figure 1. High-Income, Long-Term Illness and Life Satisfaction

Note: On the vertical axis we measure the percentage of answers in the relative group (i.e. Long-term ill, Not ill, Long-term ill with high income, long-term ill without high income). High-income: income above the 30th centile of the income distribution. [Colour figure can be viewed at wileyonlinelibrary.com]

We start by inspecting whether our hypothesis holds with descriptive findings and, specifically, by comparing life satisfaction distributions between the two groups of those reporting/not reporting at least one long-term illness. Within the group of those reporting chronic illnesses, we use as a threshold for a reasonably high-income level the 70th centile household income value of the living country. Specifically, the selected income variable is household income,[3] equivalized using the standard modified OECD scale. The histogram in Figure 1 clearly shows that the diagnosis of at least one long-term illness reduces the share of individuals reporting life satisfaction levels of 8 and above. Specifically, among those not reporting chronic illnesses, 18.09 percent declare the highest level of life satisfaction (10), 18.29 percent a level of 9, and 33.77 percent a level of 8. The three shares fall to 12.64 percent, 12.30 percent, and 28.23 percent among those reporting at least one long-term illness. However, in the subsample of those with at least one long-term illness that is above the 30th domestic household income centile, we return to 15.17 percent, 17.69 percent, and 35.02 percent. The above-mentioned descriptive evidence indicates that the availability of higher income is correlated with the higher wellbeing of respondents reporting long-term illness. One interpretation of these descriptive findings could be that the utility of high income is higher

[3]The SHARE survey moved from a measure of yearly (household) income (obtained by aggregating all individual income components in the household) before taxes and social insurance contributions in wave 1 to a measure of yearly (household) income after taxes and social contributions in all subsequent waves to capture the notion of take-home pay. In addition, we consider that wave 3 is a substantial break since the survey (SHARELIFE) is completely different and more intended as a so-called life history calendar. For this reason, we only use wave 4 onward and therefore only income after taxes. When calculating the household income variable introduced in our estimates, we use PPPs.

when being ill. This theoretical hypothesis is directly tested in the econometric analysis that follows.

4. Econometric Findings

To check whether enjoying high income levels has a positive and significant effect when reporting a long-term illness, we estimate different (more or less simplified) versions of the following fully augmented specification:[4]

$$
\begin{aligned}
LifeSat_{ij} = {} & \alpha_0 + \alpha_1 Female_{ij} + \sum_k \beta_k AgeClass_{kij} + \sum_l \gamma_l EducationClass_{lij} + \alpha_2 Unemployed_{ij} \\
& + \alpha_3 Retired_{ij} + \alpha_4 Employed_{ij} + \alpha_5 LongtermIll_{ij} + \alpha_6 Ln\_Income_{ij} + \alpha_7 HighIncome_{ij} \\
& + \alpha_8 HighIncome * LongtermIll_{ij} + \alpha_9 PartnerInHouse_{ij} + \alpha_{10} Sibling_{ij} + \alpha_{11} ADL_{ij} \\
& + \alpha_{12} HighIncome * ADL_{ij} + \sum_m \delta_m Country_{mij} + \sum_n \vartheta_n Waves_{nij} + \varepsilon_{ij}
\end{aligned} \tag{1}
$$

where the dependent variable, the self-assessed level of life satisfaction of the *i-th* individual in wave *j* (*LifeSat*), is the usual cognitive subjective wellbeing variable measured with the standard life satisfaction question.[5] Our main variable of interest is the product between long-term ill status and the dummy capturing household income above the top 30 percent income threshold (*LongtermIll*HighIncome*).[6] To test the effect of the interaction variable, we introduce as controls the two dummies separately considered (*LongtermIll* and *HighIncome*). Their meaning is obvious, with the second variable measuring relative income effects[7] when used together with a standard income regressor. The right-hand side variables include standard controls such as eight 5-year age classes (*AgeClass*);[8] a female dummy; separate dummies for each International Standard Classification of Education level (*EducationClass*), with a lack of education being the omitted benchmark;[9] the log of household equivalent income (*Ln_Income*); retired, unemployed, and employed

[4]We use cross-sectional calibrated individual weights (to overcome the problem of nonresponse and attrition) provided by SHARE.

[5]For this purpose, we use the standard question on cognitive subjective wellbeing included in the SHARE survey: "On a scale from 0 to 10, where 0 means completely dissatisfied and 10 means completely satisfied, how satisfied are you with your life?"

[6]The threshold is calculated on the income distribution of the overall SHARE sample in the Table 1 column (1), but on the relevant domestic income in the Table 1 column (9).

[7]The relative income literature tests the impact on life satisfaction of the average income level of variously conceived reference groups combining geographical location, gender, age cohort, and professional characteristics (Ferrer-i-Carbonell, 2005; Dorn *et al.*, ; Clark and Senik, 2010; Brodeur and Flèche, 2019). In our estimate, we consider for simplicity the overall sample country population as the reference group.

[8]Specifically, we introduce age as regressors by including dummies for the following 5-year age intervals 60–64, 65–69, 70–74, 75–79, 80–84, 85–89, and above 90 years; we use the 50–59 age class as the omitted benchmark.

[9]The International Standard Classification of Education 1997 has six levels. The first level is primary education or first stage of basic education; the second includes lower secondary or the second stage of basic education; the third represents (upper) secondary education, the fourth is post-secondary non tertiary education; and the fifth and sixth are the first and second stages of tertiary education, respectively.

dummies (*Retired*, *Unemployed, and Employed*); and two dummies measuring whether the respondent lives with a partner and has at least one sibling (*PartnerInHouse* and *Sibling*). Country and wave dummies are added as controls.

Tables A1 and A2a–e in the Online Appendix present the descriptive statistics of the variables used in our empirical analysis. The share of sample respondents with a tertiary degree is above 21 percent, more than half of respondents (57 percent) are retired, while around 11 percent report limitations in daily activities. Average public health expenditure in the sample countries is around 7 percent of GDP, while 2.7 percent of respondents declare some kind of unmet need. Column (1) of Table 1 shows the econometric findings for the first (not fully augmented) specification estimated with pooled ordinary least squares and heteroskedasticity robust standard errors. The effect of our main variable of interest (*LongtermIll*HighIncome*) is positive and strongly significant. In terms of magnitude, it allows the respondent to recover almost half of the negative effect of chronic illness status. Income (*Ln_Income*) is positive as expected.[10] We further add the dummy capturing individuals with household income above the top 30th domestic income threshold (*HighIncome*) to see whether our main variable of interest remains significant after controlling for the presence of a relative income effect related to the same income threshold. *HighIncome*LongtermIll* remains strongly positive and significant, while the relative income dummy and chronic illness interaction with the presence of a partner are also positive and significant. As is well known, our findings do not imply causality. The issue of endogeneity and reverse causality has long been discussed in the income/life satisfaction literature, where findings are broadly consistent with a two-way causal nexus. While it is reasonable to assume that better economic conditions may contribute to life satisfaction, assertive and extroverted psychological traits contribute to life satisfaction and make it easier for individuals to access good jobs and higher incomes.[11]

The other controls have the expected effects. Education positively affects life satisfaction. Women are significantly more satisfied than men, while rising age remains significant and increasingly positive compared with the omitted benchmark of the 50–59 years cohort, thereby showing that age contributes positively to life satisfaction when controlling for health.[12] Relationships matter since living with a partner and having at least one son/daughter are both positive and significant. Unemployment status is negative as expected, whereas retired status is positive, likely capturing the positive impact of retirement on leisure satisfaction and, in turn, on life satisfaction. Employed status is also positive and significant.

In the second specification, we investigate whether the effects of illnesses on ADL are more important than illness status (Table 1, column 2). We, therefore, add two variables, *ADL* and *HighIncome*ADL*. Our main findings are unchanged. We

[10]We calculate the variance inflation factor to check whether there is multicollinearity in our estimates. We do not find any variable with a variance inflation factor above 5.4 (see Table 1).

[11]Contributions explicitly addressing the problem search for an exogenous income shock and measure its effects on life satisfaction. Examples are Gardner and Oswald's (2007) work on lottery winners and Becchetti and Castriota's (2011) research on individuals hit by a tsunami in Sri Lanka.

[12]This finding is in line with empirical evidence on the U-shaped effect of age on life satisfaction, where the lowest age effect is generally concentrated in the fifties (see Frijters and Beatton, 2012). Our sample size including only individuals aged 50 and above measures just one side of this U-shape.

TABLE 1
THE EFFECT OF HIGH INCOME ON LIFE SATISFACTION WHEN HAVING A LONG TERM ILLNESS

Variables	(1)	(2) Augmented With ADL Variable	(3) With Long-Term Illness	(4) Without Long-Term Illness	(6) Medical Unmet Needs & Long Term Ill	(5) Without Medical Unmet Needs & With Long Term Ill	(7) Not Long Term Ill in $t(0)$ & Long Term Ill in $t(1)$	(8) Disability Adjusted Equivalence Scale	(9) High-Income Threshold From Domestic Income Distributions	(10) Low Public Health Expenditure	(11) High Public Health Expenditure
Female	−0.050***	−0.049***	−0.072**	−0.011	−0.115***	0.050	−0.143*	−0.053***	−0.052***	0.041	−0.117***
	(0.019)	(0.019)	(0.028)	(0.023)	(0.034)	(0.051)	(0.082)	(0.019)	(0.019)	(0.030)	(0.024)
AgeClass 60–64	0.223***	0.218***	0.307***	0.127***	0.353***	0.163**	0.327***	0.232***	0.223***	0.180***	0.266***
	(0.028)	(0.028)	(0.046)	(0.032)	(0.055)	(0.082)	(0.125)	(0.028)	(0.028)	(0.041)	(0.038)
AgeClass 65–69	0.257***	0.254***	0.406***	0.089**	0.534***	0.113	0.430***	0.267***	0.257***	0.194***	0.339***
	(0.034)	(0.034)	(0.054)	(0.039)	(0.065)	(0.092)	(0.122)	(0.034)	(0.034)	(0.049)	(0.047)
AgeClass 70–74	0.306***	0.317***	0.475***	0.103**	0.601***	0.193**	0.443***	0.319***	0.305***	0.240***	0.393***
	(0.037)	(0.036)	(0.058)	(0.042)	(0.071)	(0.095)	(0.135)	(0.037)	(0.037)	(0.052)	(0.051)
AgeClass 75–79	0.282***	0.317***	0.427***	0.114**	0.595***	0.043	0.392***	0.296***	0.281***	0.185***	0.396***
	(0.040)	(0.040)	(0.060)	(0.048)	(0.074)	(0.100)	(0.144)	(0.040)	(0.040)	(0.056)	(0.055)
AgeClass 80–84	0.389***	0.491***	0.565***	0.168***	0.699***	0.251**	0.531***	0.404***	0.386***	0.283***	0.514***
	(0.045)	(0.044)	(0.066)	(0.054)	(0.080)	(0.114)	(0.158)	(0.045)	(0.045)	(0.064)	(0.061)
AgeClass 85–89	0.378***	0.539***	0.508***	0.246***	0.673***	0.121	0.796***	0.394***	0.377***	0.227***	0.516***
	(0.059)	(0.058)	(0.083)	(0.076)	(0.101)	(0.137)	(0.183)	(0.059)	(0.059)	(0.083)	(0.080)
AgeClass 90+	0.398***	0.688***	0.541***	0.247**	0.692***	0.196	0.538*	0.408***	0.387***	0.197	0.575***
	(0.085)	(0.086)	(0.114)	(0.121)	(0.130)	(0.216)	(0.282)	(0.085)	(0.085)	(0.141)	(0.104)
Primary	0.061	0.037	0.175***	−0.069	0.161**	0.251**	0.043	0.064	0.063	0.140***	−0.028
	(0.040)	(0.039)	(0.063)	(0.045)	(0.080)	(0.098)	(0.121)	(0.040)	(0.040)	(0.049)	(0.063)
LowerSecondary	0.170***	0.141***	0.322***	0.011	0.253***	0.376***	0.130	0.178***	0.171***	0.206***	0.068
	(0.044)	(0.043)	(0.072)	(0.047)	(0.091)	(0.116)	(0.139)	(0.044)	(0.044)	(0.054)	(0.070)
UpperSecondary	0.207***	0.175***	0.414***	−0.015	0.340***	0.485***	0.305**	0.220***	0.212***	0.279***	0.106*
	(0.042)	(0.041)	(0.069)	(0.044)	(0.090)	(0.101)	(0.135)	(0.042)	(0.042)	(0.054)	(0.064)
PostSecondary	0.341***	0.295***	0.581***	0.093	0.359***	0.937***	0.479**	0.353***	0.347***	0.461***	0.186**
	(0.058)	(0.056)	(0.096)	(0.065)	(0.119)	(0.155)	(0.225)	(0.058)	(0.059)	(0.078)	(0.086)
LowerTertiary	0.334***	0.286***	0.519***	0.133***	0.422***	0.740***	0.357***	0.348***	0.345***	0.490***	0.209***
	(0.044)	(0.043)	(0.071)	(0.047)	(0.091)	(0.117)	(0.135)	(0.044)	(0.044)	(0.065)	(0.065)
UpperTertiary	0.329***	0.279***	0.509***	0.114**	0.353***	0.761***	0.354***	0.326***	0.336***	0.492***	0.169**
	(0.042)	(0.041)	(0.069)	(0.048)	(0.114)	(0.138)	(0.146)	(0.045)	(0.042)	(0.068)	(0.069)
Unemployed	−0.378***	−0.434***	−0.236**	−0.595***	−0.124	−0.549***	−0.946***	−0.373***	−0.375***	−0.441***	−0.372***
	(0.071)	(0.071)	(0.102)	(0.096)	(0.124)	(0.171)	(0.351)	(0.072)	(0.072)	(0.102)	(0.099)

TABLE 1
(CONTINUED)

Variables	(1)	(2) Augmented With ADL Variable	(3) With Long-Term Illness	(4) Without Long-Term Illness	(6) Medical Unmet Needs & Long Term Ill	(5) Without Medical Unmet Needs & With Long Term Ill	(7) Not Long Term Ill in $t(0)$ & Long Term Ill in $t(1)$	(8) Disability Adjusted Equivalence Scale	(9) High-Income Threshold From Domestic Income Distributions	(10) Low Public Health Expenditure	(11) High Public Health Expenditure
Retired	0.275***	0.238***	0.306***	0.185***	0.245***	0.402***	0.124	0.284***	0.276***	0.280***	0.192***
	(0.031)	(0.031)	(0.044)	(0.039)	(0.056)	(0.070)	(0.105)	(0.031)	(0.031)	(0.040)	(0.049)
Employed	0.376***	0.322***	0.580***	0.121***	0.630***	0.446***	0.269**	0.381***	0.380***	0.341***	0.357***
	(0.037)	(0.037)	(0.055)	(0.045)	(0.066)	(0.105)	(0.122)	(0.037)	(0.037)	(0.051)	(0.055)
LongtermIll	−0.684***	−0.563***						−0.623***	−0.666***	−0.711***	−0.615***
	(0.023)	(0.024)						(0.023)	(0.022)	(0.031)	(0.036)
ADL		−0.827***									
		(0.041)									
Ln_Income	0.074***	0.070***	0.097***	0.061***	0.098***	0.091***	0.100***	0.077***	0.073***	0.063***	0.111***
	(0.009)	(0.010)	(0.019)	(0.010)	(0.034)	(0.019)	(0.036)	(0.010)	(0.010)	(0.009)	(0.030)
HighIncome	0.150***	0.158***	0.325***	0.244***	0.361***	0.259***	0.288***	0.140***	0.120***	0.116***	0.193***
	(0.026)	(0.026)	(0.034)	(0.027)	(0.046)	(0.064)	(0.077)	(0.027)	(0.025)	(0.041)	(0.045)
HighIncome*LongtermIll	0.275***	0.215***						0.266***	0.228***	0.278***	0.210***
	(0.033)	(0.033)						(0.033)	(0.034)	(0.058)	(0.045)
HighIncome*ADL		0.113*									
		(0.063)									
PartnerInHouse	0.553***	0.535***	0.595***	0.486***	0.547***	0.680***	0.587***	0.556***	0.558***	0.639***	0.469***
	(0.022)	(0.022)	(0.032)	(0.029)	(0.038)	(0.061)	(0.094)	(0.022)	(0.022)	(0.034)	(0.029)
Sibling	0.113***	0.116***	0.065	0.164***	0.050	0.094	0.104	0.105***	0.114***	0.130**	0.098**
	(0.036)	(0.035)	(0.053)	(0.047)	(0.063)	(0.100)	(0.179)	(0.036)	(0.036)	(0.053)	(0.048)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.603***	6.723***	5.386***	7.131***	5.424***	4.975***	6.087***	6.559***	6.644***	6.258***	6.381***
	(0.106)	(0.106)	(0.204)	(0.109)	(0.337)	(0.214)	(0.375)	(0.106)	(0.110)	(0.107)	(0.294)
Observations	176,351	176,351	90,845	85,506	64,433	26,412	11,082	176,351	176,351	91,108	85,243
R^2	0.129	0.146	0.110	0.101	0.105	0.095	0.120	0.129	0.128	0.121	0.132

Note: Robust standard errors in parentheses. Column (8): Household income calculated with disability specific equivalence scale (see Section 4 for methodological details). Column (9): Threshold for *HighIncome* and *HighIncome*LongtermIll* is calculated for each individual country. Omitted benchmark: male, no education, 50–59 age class, other job status.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

then repeat our base estimate separately for the following two subsamples: (1) long-term ill vs. non-long-term ill[13] and (2) long-term ill with vs. without unmet medical needs because of long waiting lists, expensive medical care, and/or high distance (we assume that the economic problem is more relevant for long-term ill respondents). We find that the value of high income is higher for the respondents in these two groups compared with their complementary samples (Table 1, columns (3)–(6)). We also test our hypothesis for individuals reporting transition into long-term illness (respondents not being long-term ill at t_0 but being so at t_1). We find that our main coefficient (the interaction between high income and long-term illness) is positive and significant, and we also note that the coefficient of the high-income threshold variable is higher than that in the benchmark specification (Table 1, column (7)). This finding seems reasonable and consistent with the idea that long-term illness increases the importance of high income and reduces the overall utility of income.

We further consider that disability requires extra costs and thus reduces well-being for a given level of equivalized income (Davila-Quinta and Malo, 2012). Therefore, in a modified version of the baseline model, we calculate equivalized income by taking into account the weight of disabled members, as suggested by Kuklys (2005). More specifically, we use the following correction factor for households without disabled members:

$$E = 1 + 0.5 * (NA - 1) + 0.3 * NCH$$

and the following correction factor for households with at least one disabled member:

$$E = 1.56 + [1 + 0.5 * (ND - 1)] + 0.5 * (NA - ND) + 0.3 * NCH$$

where *ND* is the number of disabled members, *NA* is the number of adults, and *NCH* is the number of children in the household. The effect of the interaction between long-term illness and high income is also remarkably stable (Table 1, column (8)). In column (9) of Table 1, we check whether our findings are robust when calculating the income distribution parameters based on the domestic distribution of income, which is relevant for each individual in our database, as opposed to the overall SHARE sample. Our main findings are unchanged. Finally, we examine whether the interaction effect is sensitive to differences in NHSs. Therefore, we estimate the model using the mean health expenditure/GDP split and find that the coefficient of *HighIncome*LongtermIll* is slightly higher in countries with below mean values of that variable (Table 1, columns (10) and (11)).

[13]This sample split is important since the descriptive statistics show that average household income for the long-term ill is slightly lower than that for the complementary sample. To assess whether our main findings are affected by the fact that being in the top 30 percent income centile implies a higher income change for long-term ill respondents based on their average income, we test whether the effect remains significant when the benchmark specification is estimated for the sample of long-term ill only.

4.1. *A Deeper Analysis of the Life Satisfaction/Income Gradient*

To avoid imposing a unique (linear/concave) functional form on the income–life satisfaction relationship, in the benchmark specification, we replace the household income variables with dummies capturing membership of one of 10 income deciles (*Inc_dec* variables) in a country and augment the specification by interacting each of these dummies with chronic ill status (*Inc_dec*LongtermIll*). The non-interacted income deciles capture both the absolute and the relative income effects. Therefore, the estimated model becomes

$$
\begin{aligned}
LifeSat_{ij} = {} & \alpha_0 + \alpha_1 Female_{ij} + \sum_k \beta_k AgeClass_{kij} + \sum_l \gamma_l EducationClass_{lij} \\
& + \alpha_2 Unemployed_{ij} + \alpha_3 Retired_{ij} + \alpha_4 Employed_{ij} + \alpha_5 LongtermIll_{ij} + \sum_p \chi_p Inc\_dec_{pij} \\
& + \sum_r \eta_r Inc\_dec * LongtermIll_{rij} + \alpha_6 PartnerInHouse_{ij} + \alpha_7 Sibling_{ij} + \alpha_8 ADL_{ij} \\
& + \sum_s \theta_s Inc\_dec * ADL_{sij} + \sum_m \delta_m Country_{mij} + \sum_n \vartheta_n Waves_{nij} + \varepsilon_{ij}
\end{aligned} \tag{2}
$$

Colum (1) of Table 2 reports the results for the pooled ordinary least squares estimate using the overall sample. We find that all the income deciles are positive and significant and that the magnitude of their coefficients grows as income rises as expected (the coefficient of the second decile is 0.03, whereas that of the 10th decile is approximately 0.43, with the first income decile the omitted benchmark). The same pattern is found for long-term illness interacting with the income deciles (the interaction term of the second income decile is 0.12, whereas that of the last income decile is around 0.46). This implies that the income/life satisfaction slope is significantly steeper, and increasingly so, for individuals reporting at least one long-term illness, or that the marginal utility of income for these individuals is significantly higher than that for the rest of the sample, as shown in Figure 2.

We replicate all the specifications shown in Table 1 with these income deciles (ADL-augmented model, subsamples of long-term ill only and well respondents only, long-term ill with and without unmet medical needs, disability-adjusted income, high income threshold calculated within a country, low/high public health/GDP expenditure). We find that the distance between the second and last income deciles remains large in all these subsamples and slightly more so in the long-term ill only sample (from 0.13 to 0.78) (Table 2, columns (2)–(11)).

5. Robustness Checks and Fixed Effects

The previous two models (high income and income deciles) are estimated by splitting the sample into two subgroups: individuals with and without supplementary health insurance (Table 3). We find that not having private insurance significantly raises the effect of income on life satisfaction. A similar robustness check is performed using information on long-term care insurance (Table 4). Again, we find a significant difference between individuals with or without insurance, with the latter having a significantly steeper income/life satisfaction gradient.

TABLE 2
THE EFFECT OF HIGH INCOME ON LIFE SATISFACTION WHEN HAVING A LONG TERM ILLNESS – INCOME DECILES

Variables	(1)	(2) Augmented With ADL Variable	(3) With Long-Term Illness	(4) Without Long-Term Illness	(5) Medical Unmet Needs & Long Term Ill	(6) Without Medical Unmet Needs & With Long Term Ill	(7) Not Long Term Ill in $t(0)$ & Long Term Ill in $t(1)$	(8) Disability Adjusted Equivalence Scale	(9) High-Income Threshold From Domestic Income Distributions	(10) Low Public Health Expenditure	(11) High Public Health Expenditure
Female	−0.071***	−0.069***	−0.085***	−0.037**	−0.043	−0.069**	−0.043	−0.069***	−0.073***	−0.067**	−0.078***
	(0.017)	(0.017)	(0.021)	(0.015)	(0.031)	(0.025)	(0.023)	(0.009)	(0.020)	(0.022)	(0.019)
Dummy age class	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy education level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy job status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LongtermIll	−0.813***	−0.699***						−0.796***	−0.704***	−0.785***	−0.861***
	(0.018)	(0.016)						(0.034)	(0.005)	(0.017)	(0.018)
ADL		−0.787***									
		(0.004)									
Inc_dec_2	0.030***	0.029***	0.134***	0.039***	0.082***	0.087***	0.026**	−0.010	0.025**	0.044***	−0.012
	(0.005)	(0.005)	(0.012)	(0.005)	(0.011)	(0.011)	(0.009)	(0.037)	(0.008)	(0.007)	(0.019)
Inc_dec_3	0.119***	0.112***	0.239***	0.142***	0.240***	0.121***	0.214***	0.094***	0.042***	0.144***	−0.033
	(0.014)	(0.015)	(0.027)	(0.013)	(0.024)	(0.018)	(0.011)	(0.034)	(0.010)	(0.016)	(0.034)
Inc_dec_4	0.186***	0.179***	0.338***	0.225***	0.286***	0.237***	0.270***	0.148***	0.112***	0.194***	0.059
	(0.024)	(0.024)	(0.038)	(0.022)	(0.033)	(0.026)	(0.015)	(0.033)	(0.012)	(0.024)	(0.042)
Inc_dec_5	0.212***	0.204***	0.390***	0.262***	0.325***	0.310***	0.389***	0.215***	0.144***	0.202***	0.098*
	(0.030)	(0.029)	(0.044)	(0.027)	(0.037)	(0.032)	(0.022)	(0.031)	(0.013)	(0.027)	(0.045)
Inc_dec_6	0.278***	0.267***	0.452***	0.344***	0.478***	0.366***	0.352***	0.242***	0.200***	0.290***	0.146**
	(0.036)	(0.036)	(0.051)	(0.033)	(0.045)	(0.038)	(0.028)	(0.030)	(0.014)	(0.033)	(0.046)
Inc_dec_7	0.361***	0.355***	0.578***	0.441***	0.510***	0.493***	0.523***	0.322***	0.201***	0.352***	0.257***
	(0.043)	(0.042)	(0.059)	(0.039)	(0.054)	(0.045)	(0.033)	(0.029)	(0.014)	(0.036)	(0.048)
Inc_dec_8	0.352***	0.348***	0.645***	0.442***	0.550***	0.548***	0.581***	0.353***	0.232***	0.413***	0.232***
	(0.048)	(0.047)	(0.065)	(0.044)	(0.059)	(0.051)	(0.038)	(0.029)	(0.014)	(0.041)	(0.049)
Inc_dec_9	0.399***	0.396***	0.727***	0.501***	0.657***	0.641***	0.647***	0.395***	0.292***	0.471***	0.292***
	(0.054)	(0.053)	(0.071)	(0.050)	(0.067)	(0.056)	(0.045)	(0.029)	(0.015)	(0.048)	(0.051)
Inc_dec_10	0.428***	0.423***	0.776***	0.534***	0.640***	0.701***	0.578***	0.437***	0.385***	0.438***	0.341***
	(0.059)	(0.057)	(0.078)	(0.053)	(0.073)	(0.063)	(0.047)	(0.029)	(0.015)	(0.059)	(0.054)

TABLE 2
(CONTINUED)

Variables	(1)	(2) Augmented With ADL Variable	(3) With Long-Term Illness	(4) Without Long-Term Illness	(5) Medical Unmet Needs & Long Term Ill	(6) Without Medical Unmet Needs & With Long Term Ill	(7) Not Long Term Ill in $t(0)$ & Long Term Ill in $t(1)$	(8) Disability Adjusted Equivalence Scale	(9) High-Income Threshold From Domestic Income Distributions	(10) Low Public Health Expenditure	(11) High Public Health Expenditure
Inc_dec_2*Longterm_Ill	0.119***	0.150***						0.192***	0.043***	0.114***	0.142***
	(0.005)	(0.005)						(0.047)	(0.003)	(0.006)	(0.009)
Inc_dec_3*Longterm_Ill	0.153***	0.168***						0.243***	0.103***	0.144***	0.161***
	(0.011)	(0.010)						(0.045)	(0.004)	(0.012)	(0.014)
Inc_dec_4*Longterm_Ill	0.199***	0.196***						0.269***	0.109***	0.169***	0.256***
	(0.013)	(0.011)						(0.044)	(0.004)	(0.013)	(0.014)
Inc_dec_5*Longterm_Ill	0.239***	0.231***						0.293***	0.076***	0.200***	0.292***
	(0.014)	(0.013)						(0.042)	(0.005)	(0.013)	(0.015)
Inc_dec_6*Longterm_Ill	0.249***	0.230***						0.370***	0.135***	0.198***	0.311***
	(0.013)	(0.012)						(0.042)	(0.006)	(0.010)	(0.015)
Inc_dec_7*Longterm_Ill	0.305***	0.260***						0.366***	0.184***	0.340***	0.323***
	(0.014)	(0.013)						(0.041)	(0.005)	(0.012)	(0.016)
Inc_dec_8*Longterm_Ill	0.396***	0.346***						0.423***	0.243***	0.317***	0.458***
	(0.014)	(0.013)						(0.040)	(0.004)	(0.012)	(0.016)
Inc_dec_9*Longterm_Ill	0.442***	0.374***						0.449***	0.278***	0.307***	0.519***
	(0.014)	(0.013)						(0.040)	(0.004)	(0.013)	(0.016)
Inc_dec_10*Longterm_Ill	0.463***	0.387***						0.438***	0.334***	0.392***	0.528***
	(0.014)	(0.013)						(0.041)	(0.005)	(0.014)	(0.016)
Inc_dec_2*ADL		−0.101***									
		(0.003)									
Inc_dec_3*ADL		−0.076***									
		(0.003)									
Inc_dec_4*ADL		−0.003									
		(0.002)									
Inc_dec_5*ADL		0.018***									
		(0.003)									
Inc_dec_6*ADL		0.048***									
		(0.003)									

TABLE 2
(CONTINUED)

Variables	(1)	(2) Augmented With ADL Variable	(3) With Long-Term Illness	(4) Without Long-Term Illness	(5) Medical Unmet Needs & Long Term Ill	(6) Without Medical Unmet Needs & With Long Term Ill	(7) Not Long Term Ill in $t(0)$ & Long Term Ill in $t(1)$	(8) Disability Adjusted Equivalence Scale	(9) High-Income Threshold From Domestic Income Distributions	(10) Low Public Health Expenditure	(11) High Public Health Expenditure
Inc_dec_7*ADL		0.120***									
		(0.003)									
Inc_dec_8*ADL		0.112***									
		(0.004)									
Inc_dec_9*ADL		0.180***									
		(0.005)									
Inc_dec_10*ADL		0.253***									
		(0.007)									
PartnerInHouse	0.484***	0.470***	0.536***	0.414***	0.464***	0.540***	0.417***	0.486***	0.484***	0.511***	0.455***
	(0.034)	(0.033)	(0.038)	(0.028)	(0.061)	(0.036)	(0.034)	(0.011)	(0.035)	(0.046)	(0.025)
Sibling	0.140***	0.139***	0.164***	0.112***	0.118***	0.130***	0.046		0.141***	0.157***	0.129***
	(0.022)	(0.021)	(0.031)	(0.020)	(0.036)	(0.025)	(0.061)		(0.012)	(0.032)	(0.013)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	7.197***	7.285***	6.106***	7.570***	6.866***	6.213***	7.253***	7.365***	7.305***	6.702***	7.449***
	(0.072)	(0.068)	(0.071)	(0.066)	(0.125)	(0.085)	(0.136)	(0.041)	(0.072)	(0.074)	(0.057)
Observations	176,351	176,351	90,845	85,506	20,578	64,433	11,082	176,351	176,351	91,108	85,243
R^2	0.173	0.188	0.148	0.134	0.104	0.124	0.142	0.171	0.172	0.144	0.150

Note: Robust standard errors in parentheses. Column (8): Household income calculated with disability specific equivalence scale (see Section 4 for methodological details). Column (9): Threshold for *HighIncome* and *HighIncome*LongtermIll* is calculated for each individual country. Omitted benchmark: male, no education, 50–59 age class, other job status, 1st decile.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

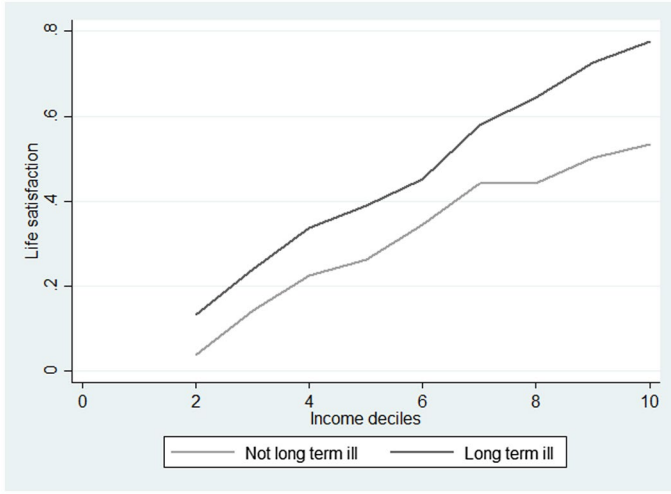

Figure 2. The Income (Decile)-Life Satisfaction Slope for Individuals With/Without Long Term Illness (All Sample)
[Colour figure can be viewed at wileyonlinelibrary.com]

In a further robustness check, we estimate the model in (1) using fixed effects (Table 5). Our main findings remain significant, even though they weaken, with the exception of the estimate where income is calculated using the disability-adjusted scale and the subsample with below mean public health/GDP expenditure (Table 5, columns (8) and (9)). This last result suggests that the positive effect of the interaction between long-term illness status and income above the top 30th centile threshold is a between effect rather than a within effect. Nonetheless, long-term ill status is typically time-invariant in this short panel sample, which could explain why the results are weaker.

We estimate the same specifications in Table 1 using an ordered logit model while removing the ad hoc assumption of the continuity of the life satisfaction variable. The results are unchanged in terms of significance and sign. We perform estimates stratified by gender. The coefficients of income are close, with the interaction of income with long-term illness higher for women (the estimates are omitted for reasons of space and available upon request). We finally test in how many countries the results presented in column (1) of Table 1 are significant, finding that the positive effect of the interactions of the long-term illness–income above the top 30 percent income threshold variable is significant in 16 of 20 countries (Table 6).

6. Value of Extra Income: Compensating Variation Approach

Following, among others, Luechinger (2009), we use the following compensating variation approach to calculate the shadow value of being in the top 30 percent of the income distribution when reporting a chronic disease:

TABLE 3
The Effect of High Income on Life Satisfaction When Not Having a Supplementary Health Insurance

	Supplementary Health Insurance (SHI)			
	High Income		Income Deciles	
Variables	No SHI	SHI	No SHI	SHI
Female	−0.135***	0.005	−0.136***	0.003
	(0.034)	(0.034)	(0.029)	(0.040)
Dummy age class	Yes	Yes	Yes	Yes
Dummy education level	Yes	Yes	Yes	Yes
Dummy job status	Yes	Yes	Yes	Yes
LongtermIll	−0.743***	−0.604***	−1.005***	−0.971***
	(0.041)	(0.059)	(0.015)	(0.021)
Ln_Income	0.067***	0.089***		
	(0.021)	(0.026)		
HighIncome	0.280***	0.199***		
	(0.052)	(0.060)		
HighIncome*LongtermIll	0.309***	0.175***		
	(0.061)	(0.068)		
Inc_dec_2			−0.195***	−0.180***
			(0.009)	(0.023)
Inc_dec_3			−0.111***	0.089***
			(0.020)	(0.026)
Inc_dec_4			−0.009	−0.012
			(0.030)	(0.037)
Inc_dec_5			0.020	−0.170***
			(0.029)	(0.035)
Inc_dec_6			0.069**	0.010
			(0.030)	(0.039)
Inc_dec_7			0.298***	0.181***
			(0.037)	(0.042)
Inc_dec_8			0.385***	0.206***
			(0.040)	(0.044)
Inc_dec_9			0.377***	0.337***
			(0.044)	(0.046)
Inc_dec_10			0.508***	0.378***
			(0.059)	(0.048)
Inc_dec_2*Longterm_Ill			0.322***	0.241***
			(0.010)	(0.021)
Inc_dec_3*Longterm_Ill			0.358***	0.127***
			(0.008)	(0.014)
Inc_dec_4*Longterm_Ill			0.221***	0.321***
			(0.010)	(0.015)
Inc_dec_5*Longterm_Ill			0.292***	0.458***
			(0.014)	(0.017)
Inc_dec_6*Longterm_Ill			0.393***	0.552***
			(0.011)	(0.018)
Inc_dec_7*Longterm_Ill			0.407***	0.432***
			(0.012)	(0.019)
Inc_dec_8*Longterm_Ill			0.610***	0.541***
			(0.012)	(0.018)
Inc_dec_9*Longterm_Ill			0.737***	0.595***
			(0.010)	(0.019)
Inc_dec_10*Longterm_Ill			0.702***	0.638***
			(0.019)	(0.018)
PartnerInHouse	0.430***	0.462***	0.417***	0.446***
	(0.040)	(0.038)	(0.065)	(0.045)
Sibling	0.183***	0.003	0.187**	0.010
	(0.069)	(0.054)	(0.059)	(0.058)

TABLE 3
(Continued)

	Supplementary Health Insurance (SHI)			
	High Income		Income Deciles	
Variables	No SHI	SHI	No SHI	SHI
Country fixed effects	Yes	Yes	Yes	Yes
Wave fixed effects	Yes	Yes	Yes	Yes
Constant	6.126***	3.867***	6.750***	4.758***
	(0.211)	(0.293)	(0.146)	(0.203)
Observations	53,326	32,623	53,326	32,623
R^2	0.134	0.135	0.136	0.140

Note: Robust standard errors in parentheses. Omitted benchmark: male, no education, 50–59 age class, other job status, 1st decile for income decile model. Waves 5 and 6 only, no data available for Supplementary health insurance in wave 4.

*** $p < 0.01$; ** $p < 0.05$.

$$CS_i = Income_i \left(1 - \exp\left(\hat{\alpha}_{5,i} * \hat{\alpha}_{6,i}^{-1} \Delta Longtermill_i\right)\right) \tag{3}$$

where $Income_i$ is per capita income (averaged across the three waves) in the i-th country, $\hat{\alpha}_{5,i}$ is the estimated coefficient of the impact of long-term illness on life satisfaction, and $\hat{\alpha}_{6,i}$ is the coefficient of the impact of the log of per capita income on the same dependent variable.

To calculate the compensating variation, we use the coefficients of our country-specific life satisfaction estimates calculated country-by-country using the baseline model in equation (1), together with the average income value from our baseline estimate in column (1) of Table 1 for the overall sample. The fact that income is on both sides of the analysis (although combined with the long-term ill condition in one case) does not make the calculation of the compensating variation trivial because CS_{it} measures the income needed to move from an average income level to the top 30 percent income bracket when ill. Table 6 presents our findings. The estimated ratios present the compensating variation in absolute values (euros in PPP) and as a ratio of average sample household income. Our results show that Luxembourg, Switzerland, Belgium, and the Netherlands have the highest percentages. In general, our findings are thus consistent with the ranking of health expenditure per capita (OECD, 2010).

To interpret our results, high ratios imply that the value of extra income for the long-term ill is high, consistent with the idea that the difference in treatment for the rich and non-rich is extremely relevant. This difference may, in turn, lead from poor basic treatment or high-quality extra treatment that can be received beyond basic NHS coverage. As a caveat to these last calculations, note that country-level findings measured using this approach remain sensitive to measurement errors in the estimated coefficients. An alternative view of the economic significance of our effect remains given by the approach used in Table 1, namely, using the ratios between the income decile coefficients as the denominator and the sum of the same coefficient

TABLE 4
THE EFFECT OF HIGH INCOME ON LIFE SATISFACTION WHEN NOT HAVING A LONG-TERM CARE INSURANCE

	Long-Term Care Insurance (LTCI)			
	High Income		Income Deciles	
Variables	No LTCI	LTCI	No LTCI	LTCI
Female	−0.061***	−0.092***	−0.061**	−0.092**
	(0.021)	(0.016)	(0.020)	(0.030)
Dummy Age Class	0.183***	0.201***	0.174***	0.188***
	(0.032)	(0.024)	(0.037)	(0.031)
Dummy Education Level	0.247***	0.303***	0.233***	0.286***
	(0.040)	(0.030)	(0.026)	(0.047)
Dummy Job Status	0.305***	0.349***	0.294***	0.331***
	(0.044)	(0.032)	(0.035)	(0.051)
LongtermIll	−0.651***	−0.619***	−0.857***	−0.732***
	(0.029)	(0.021)	(0.013)	(0.015)
Ln_Income	0.020**	0.062***		
	(0.010)	(0.007)		
HighIncome	0.148***	0.130***		
	(0.030)	(0.023)		
HighIncome*LongtermIll	0.260***	0.191***		
	(0.039)	(0.029)		
Inc_dec_2			−0.049***	−0.015**
			(0.008)	(0.006)
Inc_dec_3			−0.050***	0.135***
			(0.008)	(0.010)
Inc_dec_4			0.169***	0.162***
			(0.015)	(0.015)
Inc_dec_5			0.008	0.204***
			(0.022)	(0.019)
Inc_dec_6			0.066**	0.257***
			(0.029)	(0.023)
Inc_dec_7			0.241***	0.355***
			(0.034)	(0.029)
Inc_dec_8			0.208***	0.381***
			(0.039)	(0.031)
Inc_dec_9			0.207***	0.413***
			(0.046)	(0.035)
Inc_dec_10			0.316***	0.447***
			(0.055)	(0.037)
Inc_dec_2*Longterm_Ill			0.219***	0.082***
			(0.005)	(0.003)
Inc_dec_3*Longterm_Ill			0.231***	0.107***
			(0.006)	(0.008)
Inc_dec_4*Longterm_Ill			0.073***	0.169***
			(0.007)	(0.011)
Inc_dec_5*Longterm_Ill			0.271***	0.173***
			(0.009)	(0.011)
Inc_dec_6*Longterm_Ill			0.397***	0.139***
			(0.007)	(0.013)
Inc_dec_7*Longterm_Ill			0.331***	0.165***
			(0.010)	(0.013)
Inc_dec_8*Longterm_Ill			0.529***	0.303***
			(0.011)	(0.014)
Inc_dec_9*Longterm_Ill			0.538***	0.359***
			(0.009)	(0.013)
Inc_dec_10*Longterm_Ill			0.492***	0.464***
			(0.011)	(0.012)

TABLE 4
(Continued)

	Long-Term Care Insurance (LTCI)			
	High Income		Income Deciles	
Variables	No LTCI	LTCI	No LTCI	LTCI
PartnerInHouse	0.464***	0.463***	0.446***	0.443***
	(0.027)	(0.019)	(0.048)	(0.032)
Sibling	0.137***	0.125***	0.141**	0.133***
	(0.036)	(0.029)	(0.048)	(0.035)
Country fixed effects	Yes	Yes	Yes	Yes
Wave fixed effects	Yes	Yes	Yes	Yes
Constant	6.919***	6.604***	7.076***	7.015***
	(0.183)	(0.084)	(0.138)	(0.118)
Observations	24,003	49,318	24,003	49,318
R^2	0.171	0.198	0.174	0.199

Note: Robust standard errors in parentheses. Omitted benchmark: Male, no education, 50–59 age class, other job status, 1st decile for income decile model. Waves 5 and 6 only, no data available for Long-term care insurance in wave 4.

***$p < 0.01$; ** $p < 0.05$.

plus the decile interacted coefficient as the nominator. These ratios are more stable and less subject to measurement errors in the coefficient of income on life satisfaction.

7. Findings

Our findings on the positive effect of long-term illness on the income/life satisfaction gradient seem to contradict those of Finkelstein *et al*. (2009). A deeper look at the difference between the two studies may reconcile this apparent contrast. We focus on long-term illness rather than on the number of reported pathologies or on specific pathologies. Therefore, our variable is a sharper measure of the permanent income requirement necessary to tackle a long-term health problem. Furthermore, our sample includes 20 European countries and not only the United Kingdom, and respondents are individuals with or without health insurance as opposed to only those with health insurance. We also observe that the positive effect tends to be significant, especially in countries with higher out-of-pocket health expenditure, for individuals not having private insurance, or for those reporting difficulties accessing care owing to waiting times and high costs. By discriminating within the subsample of individuals reporting long-term illnesses between those with and without private insurance (or difficulties accessing care because of high costs), we directly test the rationale advocated in the literature for the higher utility of income for the elderly. Our findings confirm the validity of this rationale.

8. Conclusions

The new technological advancements leading to the creation of powerful drugs that can extend life expectancy coupled with the reduction in the coverage of health needs in reformed welfare systems open an era in which the provision of

TABLE 5
THE EFFECT OF HIGH-INCOME ON LIFE SATISFACTION WHEN HAVING A LONG TERM ILLNESS - FE PANEL ESTIMATES

Variables	(1)	(2) Full	(3) Female	(4) Male	(5) Without Long-Term Illness	(6) With Long-Term Illness	(7) Disability Specific Equivalence Scale	(8) Low public Health Expenditure	(9) High Public Health Expenditure
Dummy age class	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy education level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy job status	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LongtermIll	−0.158***	−0.148***	−0.163***	−0.152***			−0.157***	−0.200***	−0.091***
	(0.020)	(0.019)	(0.027)	(0.024)			(0.016)	(0.015)	(0.023)
ADL		−0.232***							
		(0.031)							
Ln_Income	0.016***	0.016***	0.015**	0.017**	0.025***	0.003	0.020***	0.014**	0.021*
	(0.005)	(0.005)	(0.006)	(0.009)	(0.008)	(0.011)	(0.006)	(0.005)	(0.011)
HighIncome	0.040***	0.042***	0.034	0.050**	0.060***	0.042*	−0.002	0.042**	0.051**
	(0.013)	(0.013)	(0.022)	(0.024)	(0.020)	(0.025)	(0.016)	(0.018)	(0.021)
HighIncome*LongtermIll	0.037*	0.032*	0.028	0.048*			0.054***	0.064***	−0.014
	(0.018)	(0.016)	(0.021)	(0.029)			(0.020)	(0.017)	(0.025)
HighIncome*ADL		0.014							
		(0.042)							
PartnerInHouse	0.362***	0.357***	0.328***	0.438***	0.284***	0.366***	0.364***	0.413***	0.348***
	(0.054)	(0.054)	(0.053)	(0.057)	(0.055)	(0.059)	(0.036)	(0.055)	(0.049)
Sibling	0.025	0.028	0.090	−0.050	−0.051	0.067	0.026	0.037	0.027
	(0.036)	(0.036)	(0.055)	(0.054)	(0.051)	(0.074)	(0.038)	(0.058)	(0.050)
Wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.984***	6.904***	6.784***	7.214***	7.338***	6.854***	6.984***	6.849***	6.780***
	(0.498)	(0.506)	(0.709)	(0.467)	(0.423)	(0.545)	(0.322)	(0.869)	(0.425)
Observations	176,350	176,350	98,568	77,782	85,505	90,845	176,350	91,108	85,242
R^2	0.016	0.017	0.015	0.018	0.011	0.017	0.015	0.021	0.011
Number of id	93,530	93,530	51,625	41,905	55,053	57,377	93,530	50,158	45,925

Note: Robust standard errors in parentheses. Column (8): Household income calculated with disability specific equivalence scale (see Section 4 for methodological details). Omitted benchmark: male, no education, 50–59 age class, other job status.

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 6
COUNTRY SPECIFIC ESTIMATES AND COMPENSATING VARIATION

Country	Austria	Belgium	Croatia	Czech Republic	Denmark	Estonia	France	Germany	Greece	Hungary
LongtermIll	−0.749***	−0.524***	−0.826***	−0.687***	−0.458***	−0.624***	−0.565***	−0.717***	−0.564***	−0.619***
	(0.044)	(0.038)	(0.087)	(0.033)	(0.044)	(0.037)	(0.047)	(0.050)	(0.057)	(0.084)
Ln_Income	0.069***	0.037***	0.040**	0.067***	0.147***	0.133***	0.187***	0.154***	0.030***	0.137***
	(0.025)	(0.014)	(0.020)	(0.016)	(0.037)	(0.020)	(0.025)	(0.034)	(0.009)	(0.048)
HighIncome	0.100**	0.071**	0.413**	0.298***	−0.037	0.198***	0.166***	0.272***	0.002	0.548***
	(0.044)	(0.034)	(0.181)	(0.055)	(0.048)	(0.073)	(0.046)	(0.057)	(0.092)	(0.184)
HighIncome*LongtermIll	0.114*	0.138***	0.501*	0.137*	0.153***	0.202**	0.182***	0.273***	−0.079	0.451*
	(0.058)	(0.045)	(0.259)	(0.080)	(0.055)	(0.091)	(0.057)	(0.062)	(0.180)	(0.256)
Observations	11,893	15,488	2,353	14,813	9,550	16,748	13,135	11,061	4,630	2,884
Compensating variation	17,055***	26,187***	8,038***	17,384***	12,974***	12,460***	19,789***	18,182***	9,317***	8,744***
	(9.486)	(14.565)	(4.471)	(9.669)	(7.216)	(6.930)	(11.001)	(10.113)	(5.182)	(4.864)
CS in percent of income	95.9%	147.4%	45.2%	97.8%	73.1%	70.1%	113.4%	102.3%	52.4%	49.2%
Country	Israel	Italy	Luxembourg	Netherlands	Poland	Portugal	Slovenia	Spain	Sweden	Switzerland
LongtermIll	−0.894***	−0.627***	−0.661***	−0.325***	−0.800***	−0.767***	−0.574***	−0.616***	−0.521***	−0.594***
	(0.092)	(0.038)	(0.184)	(0.052)	(0.074)	(0.082)	(0.043)	(0.033)	(0.060)	(0.096)
Ln_Income	0.037*	0.053***	0.092	0.098***	0.100**	0.079***	0.039**	0.037***	0.013	0.068***
	(0.022)	(0.008)	(0.060)	(0.033)	(0.039)	(0.021)	(0.015)	(0.010)	(0.036)	(0.016)
HighIncome	0.408***	0.127***	0.105	−0.012	0.048	−0.126	0.237***	0.122***	0.062	0.178***
	(0.088)	(0.041)	(0.158)	(0.049)	(0.269)	(0.125)	(0.056)	(0.041)	(0.058)	(0.060)
HighIncome*LongtermIll	0.396***	0.228***	0.105	0.084	0.045	0.321**	0.132*	0.267***	0.135**	0.170*
	(0.114)	(0.069)	(0.194)	(0.059)	(0.359)	(0.158)	(0.075)	(0.063)	(0.068)	(0.101)
Observations	3,678	12,542	2,962	6,434	3,027	3,265	9,328	13,883	9,680	8,997
Compensating variation	23,429	11,381***	34,173	23,885***	9,971***	18,470***	17,961***	11,946***	20,599	30,730***
	(13.031)	(6.331)	(19.006)	(13.285)	(5.549)	(10.273)	(9.990)	(6.644)	(11.457)	(17.094)
CS in percent of income	131.8%	64.1%	192.3%	134.4%	56.1%	103.9%	101.1%	67.2%	115.9%	172.9%

Note: Robust standard errors in parentheses. Bootstrapped standard errors in parentheses (1,000 replications) for compensating variation.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

health services is both more precious and less universal. Our research hypothesis is that in this modified framework, the importance of income for life satisfaction is much higher for the elderly who experience long-term illnesses, especially those facing access barriers (in terms of money, waiting times, or expensive migration toward regions with higher health quality).

The evidence presented in this paper does not reject this hypothesis. The econometric results on the determinants of life satisfaction in the SHARE sample, including three waves and 20 countries, show that equivalent household income has a stronger association with subjective wellbeing for individuals reporting at least one long-term illness, with a significantly higher effect for those declaring above mean unmet needs for medical treatment. In this study, we examine the difference in the income–life satisfaction relationship between (long-term) ill and non-ill from different angles, that is, focusing on earning a high income (above the top 30 percent income threshold) or, alternatively, not imposing a functional form on income and examining the impact of dummies for each income decile for those reporting/not reporting long-term illnesses.

The results presented in this paper stimulate reflection on the policy side. If our findings hide a causality nexus, the implication is the growing relevance of healthcare coverage and, therefore, the increasingly higher value of health expenditure for ageing societies. Further research should thus investigate the observed difference in the value of money when the long-term ill could be differently satisfied by full coverage by NHSs or private health insurance models conditional on income distribution and the preferences of individuals in different countries.

References

Appels, A., H. Bosma, V. Grabauskas, A. Gostautas, and F. Sturmans, "Self-Rated Health and Mortality in a Lithuanian and a Dutch Population," *Social Science & Medicine*, 42, 681–9, 1996.

Bachelet, M., L. Becchetti, and F. Riccardini, "Not Feeling Well … True or Exaggerated? Self-Assessed Health as a Leading Health Indicator," *Health Economics*, 27, 153–70, 2017.

Becchetti, L. and S. Castriota, "Does Microfinance Work as a Recovery Tool After Disasters? Evidence from the 2004 Tsunami," *World Development*, 39, 898–912, 2011.

Benjamins, M. R., R. A. Hummer, I. W. Eberstein, and C. B. Nam, "Self-Reported Health and Adult Mortality Risk: An Analysis of Cause-Specific Mortality," *Social Science & Medicine*, 59, 1297–306, 2004.

Brodeur, A. and S. Flèche, "Neighbors Income, Public Goods, and Well-Being," *Review of Income and Wealth*, 65, 217–38, 2019.

Brown, J. R. and A. Finkelstein, "The Interaction of Public and Private Insurance: Medicaid and the Long-Term Care Insurance Market," *American Economic Review*, 98, 1083–102, 2008.

Clark, E. and C. Senik, "Who Compares to Whom? The Anatomy of Income Comparisons in Europe," *Economic Journal*, 120, 573–94, 2010.

Davidoff, T., J. R. Brown, and P. A. Diamond, "Annuities and Individual Welfare," *American Economic Review*, 95, 1573–90, 2005.

Davila-Quintana, C. D. and M. A. Malo, "Poverty Dynamics and Disability: An Empirical Exercise Using the European Community Household Panel," *Journal of Socio Economics*, 41, 350–9, 2012.

Dorn, D., J. Fischer, G. Kirchgässner, and A. Sousa-Poza, "Direct Democracy and Life Satisfaction Revisited: New Evidence for Switzerland," *Journal of Happiness Studies*, 9, 227–55, 2008.

Evans, W. N. and W. K. Viscusi, "Utility Functions that Depend on Health Status: Estimates and Economic Implications," *American Economic Review*, 80, 353–74, 1990.

Feldman, R. and B. Dowd, "A New Estimate of the Welfare Loss of Excess Health Insurance," *American Economic Review*, 81, 297–301, 1991.

Feldstein, M., "The Welfare Loss of Excess Health Insurance," *Journal of Political Economy*, 81, 251–80, 1973.

Ferrer-i-Carbonell, A., "Income and Well-Being: An Empirical Analysis of the Comparison Income Effect," *Journal of Public Economics*, 89, 997–1019, 2005.

Ferrer-i-Carbonell, A. and B. M. S. van Praag, "The Subjective Costs of Health Losses Due to Chronic Diseases. An Alternative Model for Monetary Appraisal," *Health Economics*, 11, 709–22, 2002.
Finkelstein, A., F. P. Erzo, M. Luttmer, and J. Notowidigdo, "What Good Is Wealth Without Health? The Effect of Health on the Marginal Utility of Consumption," NBER Working Paper 14089, Cambridge, MA, 2008.
_____, "Approaches to Estimating the Health State Dependence of the Utility Function," *American Economic Review*, 99, 116–21, 2009.
Frijters, P. and T. Beatton, "The Mystery of the U-Shaped Relationship Between Happiness an Age," *Journal of Economic Behavior & Organization*, 82, 525–42, 2012.
Gardner, J. and A. J. Oswald, "Money and Mental Wellbeing: A Longitudinal Study of Medium-Sized Lottery Wins," *Journal of Health Economics*, 26, 49–60, 2007.
Golosov, M. and A. Tsyvinski, "Designing Optimal Disability Insurance: A Case for Asset Testing," *Journal of Political Economy*, 114, 257–69, 2006.
Groot, W. and H. M. Van den Brink, "The Compensating Income Variation of Cardiovascular Disease," *Health Economics*, 15, 1143–8, 2006.
Idler, E. L. and R. J. Angel, "Self-rated Health and Mortality in the NHANES-I Epidemiologic Follow-up Study," *American Journal of Public Health*, 80, 446–52, 1990.
Idler, E. L. and S. V. Kasl, "Self-Ratings of Health: Do They also Predict Change in Functional Ability?," *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 50B, S344–53, 1995.
Judge, T. A., "Job Satisfaction and Subjective Well-Being as Determinants of Job Adaption," *Academy of Management Proceedings*, 1, 222–6, 1992.
Judge, T. A., C. J. Thoresen, J. E. Bono, and G. K. Patton, "The Job Satisfaction-Job Performance Relationship: A Qualitative and Quantitative Review," *Psychological Bulletin*, 127, 376–407, 2001.
Kuklys, W., *Amartya Sen's Capability Approach: Theoretical Insights and Empirical Applications*, Springer, Berlin, 2005.
Luechinger, S., "Valuing Air Quality Using the Life Satisfaction Approach," *Economic Journal*, 119, 482–51, 2009.
Luechinger, S. and P. A. Raschky, "Valuing Flood Disasters Using the Life Satisfaction Approach," *Journal of Public Economics*, 93, 620–33, 2009.
McCallum, J., B. Shadbolt, and D. Wang, "Self-Rated Health and Survival: A 7-year Follow-up Study of Australian Elderly," *American Journal of Public Health*, 847, 1100–5, 1994.
Melnychuk, M., F. Solmi, and S. Morris, "Using Compensating Variation to Measure the Costs of Child Disability in the UK," *European Journal of Health Economics*, 19, 419–33, 2018.
Mentzakis, E., M. Ryan, and P. McNamee, "Using Discrete Choice Experiments to Value Informal Care Tasks: Exploring Preference Heterogeneity," *Health Economics*, 20, 930–44, 2010.
Mitchell, O. S., J. M. Poterba, M. Warshawsky, and J. R. Brown, "New Evidence on the Money's Worth of Individual Annuities," *American Economic Review*, 89, 1299–318, 1999.
OECD, *Health at a Glance: Europe 2010*, OECD, Paris, 2010.
Sloan, F. A., W. Kip Viscusi, H. W. Chesson, C. J. Conover, and K. Whetten-Goldstein, "Alternative Approaches to Valuing Intangible Health Losses: The Evidence for Multiple Sclerosis," *Journal of Health Economics*, 17, 475–97, 1998.
Staw, B. M. and S. G. Barsade, "Affect and Managerial Performance: A Test of the Sadder-but-Wiser vs. Happier-and-Smarter Hypotheses," *Administrative Science Quarterly*, 38, 304–31, 1993.
Van Praag, B. M. S. and B. E. Baarsma, "Using Happiness Surveys to Value Intangibles: The Case of Airport Noise," *Economic Journal*, 115, 224–46, 2005.

Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's web site:

Table A.1. Variable legend
Table A.2a. Descriptive statistics (Full sample)
Table A.2b. Descriptive statistics (Split sample - without long-term illness)
Table A.2c. Descriptive statistics (Split sample - with long-term illness)
Table A.2d. Descriptive statistics (Split sample - long-term ill without medical unmet needs)