Not feeling well… (true or exhaggerated ?) Health (un)satisfaction as a leading health indicator

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Abstract

A desirable property of subjective wellbeing indicators is their capacity to predict future objective outcomes. In our paper we provide novel cross-country original evidence documenting that lagged health (un)satisfaction is a leading health indicator, that is, a significant predictor of future changes in health conditions on a large sample of Europeans aged above 50. We find that, after controlling for attrition bias, lagged (un)satisfaction with health is significantly and positively correlated with changes in the number of chronic diseases, net of the concurring impact of levels and changes in socio-demographic factors and health styles, country and regional health system effects and declared symptoms. Our findings are robust in age, gender, education and income class splits and are significant when separately estimated in the 13 countries of our sample. We further test the ordinal predictive properties of the health (un)satisfaction indicator in magnitude and statistical significance. Illness specific estimates document that the impact of lagged health (un)satisfaction is significant on ulcer, hypertension, arthritis and cholesterol (and weakly so on cataracts, hip or femoral fracture and lung diseases), while having a robust and significant effect on the probability of contracting cancer.

Keywords: health outcomes, health satisfaction.

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1. Introduction

The growing use of subjective indicators in reported statistics and empirical research in the last decades has been accompanied by a harsh debate on their relevance and validity. The best way to test whether subjective indicators matter and are not just noise is to check whether they affect future changes in objective indicators. The goal of our paper is to contribute in this direction by testing

whether health (un)satisfaction[1] significantly correlates with future changes in the number of chronic diseases in a large sample of Europeans aged above 50.

Results described in this paper document that the nexus is strong and robust.

In this sense our findings are consistent with evidence from the already observed link between health (un)satisfaction and mortality rates observed in the US. Related to this point we document that US findings are not country or culture specific and we extend to 13 European countries the analysis of the impact of subjective health indicators on objective health outcomes. We further test the ordinal properties of the health (un)satisfaction indicator, shed lights on how health (un)satisfaction affects transition patterns (from illness to recovery and viceversa) of several specific illnesses and try to discriminate among five potential explanations of our findings. Policy implications of our results are that health (un)satisfaction is a parsimonious leading indicator which can help to predict future changes in health outcomes and expenditure.

The debate on the importance of subjective indicators has a longstanding tradition (see among others Alesina et al., 2001; Bertrand and Mullainathan, 2001; Clark and Oswald, 2002; Kahneman and Krueger, 2006; Oswal and Wu, 2010; Helliwell and Barrington-Leigh, 2010; De Neve et al., 2013). Most of this literature focuses on the effects of objective measures on subjective wellbeing within specific life domains (see among others Judge et al., 2001; Clark, Georgellis and Sanfey, 1998 and Helliwell, 2011 for the labor market; Silva, De Keulenaer and Johnstone, 2012; for environment; Binder and Coad, 2012; Johnston, Propper and Shields, 2007 for health; Becchetti, Corrado and Conzo, 2013; Bartolini, Bilancini and Sarracino, 2009 and Becchetti, Pelloni, and Rossetti, 2008 for social relations). Empirical results seem in general to confirm the expectation that the two types of indicators are significantly correlated and that information on subjective wellbeing can usefully complete objective information (Diener and Seligman, 2004). Similar works in the health domain

[1] The variable is measured as self-perceived health status (1=excellent, 2=very good; 3=good;4=fair; 5=poor) we prefer not to invert the original ordering and call it health (un)satisfaction.

focus on the relationship between health and other socio-economic factors - primarily income and education - at the individual and aggregate level (see among others Cutler and Lleras-Muney, 2006; Case, Lubotsky and Paxson, 2002; Hildebrand and van Kerm, 2009; Edward and Kremer, 2004; Sherry and Lleras-Muney, 2003). In some of these studies self-rated health (SRH) is used as a convenient way of synthetizing physical conditions into a single-item measure. Well-being research also extensively exploited the same indicator to analyse the relationship between health and subjective well-being, becoming increasingly aware of the complex mutual interdependencies involved (see Deaton, 2007; Gwozdz and Sousa-Poza, 2009; Binder and Coad, 2012).

Criticism on the use of subjective indicators relates to their intrinsic characteristics and to the various measurement biases which may affect them. As ordinal measures without a common cardinal reference cross-sectional comparisons among self-reported values may be affected by cultural factors and other types of measurement error.[2] Advocates supporting the validity of subjective indicators respond by arguing that the latter parsimoniously and synthetically capture unmeasured objective factors and are therefore important to reveal unexplored objective dimensions of individual wellbeing.[3] Note as well that, exactly in the medical profession, when doctors ask patients subjective evaluations about their health status and give more attention to those who complain more they demonstrate to interpret them in the sense of cardinality, even though they try at the same time to

[2] Empirical research has shown that subjective wellbeing answers may be affected by more recent life events (Kahneman et al., 1993; Redelmeier and Kahneman, 1996) and even atmospheric conditions (Schwarz and Clore, 1983). Most of the literature however believes that these effects cancel out in aggregate terms.

[3] Beyond the predictive power on objective outcomes tested in this paper, the traditional arguments in favour of the relevance of subjective wellbeing indicators in the literature are: i) the longstanding tradition of subjective wellbeing studies in psychology and sociology (Alesina, Di Tella and MacCulloch, 2004); ii) the documented positive nexus among self-declared happiness, health outcomes such as heart rate and blood pressure responses to stress (Shedler, Mayman and Manis, 1993) and attitudes such as smiling (Pavot et al., 1991 and Eckman et al., 1990); iii) the consistence between subjective wellbeing declared by the respondents and the evaluation provided on the same individuals by friends and family members (see Sandvik et al., 1993 and Diener and Lucas, 1999); iv) the positive link identified in neuroscience studies between positive feelings and physical measures of brain activity (higher alpha power in the left parefrontal cortex), on the one side, and self-declared life satisfaction and the same brain activity, on the other side (Clark et al., 2006).

understand whether subjective health reported by patients is biased by personality traits (ie. the patient may be hypochondriac and therefore overstate her/his health problems or, on the contrary, particularly strong in resisting to pain thereby minimising her/his true physical conditions).

One of the best ways to verify whether subjective indicators matter and worth being recorded is to test whether lagged subjective wellbeing significantly anticipates and predicts changes in related objective indicators. Empirical work in this direction has been carried out in labour economics (see Diener and Seligman, 2004). In this field different scholars have estimated the predictive power of "job satisfaction" on objective outcomes such as employment status, productivity, likelihood of job change and job quit (see among others Judge, 1991; Staw and Barsade, 1993; Miner, 2001; Judge et al., 2001). The existing evidence seems in general to suggest that the cross-sectional distribution of job satisfaction responses indeed contains information predicting workers' future job status. Judge (1991) finds that job satisfaction predicts lower rates of absenteeism, shirking, and tardiness, while Clark, Georgellis and Sanfey (1998) document that "workers who report dissatisfaction with their jobs are statistically more likely to quit than those with higher levels of satisfaction" and Bertrand and Mullainathan (2001) that job satisfaction is a strong predictor of the probability of changing jobs in the future.

The idea of a nexus between health satisfaction and objective physical conditions is indeed widely acknowledged in medicine where a series of empirical studies have consistently shown that subjective health is a good predictor of mortality from various diseases in single countries (Idler and Kasl, 1995; McCallum et al., 1994; Benjamins et al, 2004; Idler and Angel, 1990; Appels et al., 1996), but not explored so far on large scale across countries. The original contribution of our paper in this literature is the focus on a large sample of European countries and the investigation of the effects of health satisfaction on the insurgence of chronic diseases instead of mortality rates. On the first point (cross-country evidence) we document that the predictive power of subjective health is not a country specific phenomenon but is a well-established empirical fact significant in 13 different European

countries with very heterogeneous cultural backgrounds and NHSs (in terms of health expenditure, quality and private/public provision of services and insurance). On the second point (insurgence of diseases) we shed light on an intermediate (between (un)satisfaction and mortality) missing link in the above mentioned medical literature and broaden the set of approaches used to investigate the nexus between subjective and objective health indicators. Specifically on this last point we argue that working on morbidity and not on mortality presents several original aspects. First, by focusing on an intermediate step of the nexus between health (un)satisfaction and mortality we provide evidence on the extra burden in terms of health expenditure that an increase in health (un)satisfaction may generate (a more specific interest in economics). Second, we may evaluate whether health (un)satisfaction affects recovery from, as well as contraction of, illnesses.[4] The characteristics of our approach which also looks at the separate impact of each of the self-reported health satisfaction items allows as well to test whether the predictive power of health (un)satisfaction possesses ordinal characteristics both in terms of magnitude and statistical significance (ie. the impact of each rung of the health (un)satisfaction ladder is ranked in the expected order and is significantly different from the adjoining rungs). On this point our findings confirm those of Benjamin et al. (2004) documenting that ordinality is almost always met with very few exceptions.

We remark as well that, while results in most empirical researches are often weakened by the difficulty of identifying the correct causality nexus in the observed correlation, (a problem which limits the possibility of inferring policy conclusions from the research), results on our specific research question yield straightforward policy suggestions even without finding a decisive answer to the causality problem. This is because, even though also in our case it may be interesting to know whether is health (un)satisfaction *per se* which produces negative effects on health (that is, whether

[4] The point is relevant also because, as argued by Joumard et al. (2008), deaths may be for a significant part unrelated to the quality of health care and health status. As well, a disease-based approach provides the additional advantage of more directly capturing health gains and transitions from recovery to illness due to specific treatments with respect to mortality measures which cannot capture such gains.

hypochondriac personality types are more likely to get depressed with negative effects on their future health outcomes) or the nexus is reverted, the simple correlation we observe is already conducive of a policy suggestion: if health (un)satisfaction significantly correlates with future health conditions this implies that the subjective indicator under scrutiny has additional predictive power beyond objective indicators and therefore worth being recorded and taken into account to have information on future health outcomes and its consequences on human capital and health spending.

The rest of the paper proceeds as follows. In sections 2 and 3, we respectively describe the data and present descriptive statistics of the variables used in our analysis and descriptive evidence on the nexus between health (un)satisfaction and future changes in the number of chronic diseases. In section 4, we provide econometric findings, robustness checks and interpretation of our main results. Section 5 concludes.

2. The database

We use data from the "Survey of Health, Ageing and Retirement in Europe (SHARE)", which is a cross-national panel dataset on health, socio-economic status, and the social and family networks of more than 45,000 Europeans aged 50 and over. The database is structured in 4 waves (spanning from 2004 to 2012) and contains information about a wide range of objective and subjective variables related to physical health status and subjective wellbeing of the respondents and their family members. Hence, the characteristics of the SHARE database create optimal conditions to investigate the effect of perceived health on health outcomes. We can rely on 126,035 observations coming from 19 countries: Austria, Germany, Sweden, Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, Israel, Czech Republic, Poland, Ireland, Hungary, Portugal, Slovenia and Estonia.

Our main variable of interest is self-reported health satisfaction for which the SHARE database allows respondents to select one of the five following modalities: "excellent", "very good", "good", "fair",

"poor". As main health outcome variable we consider the synthetic aggregate measure of the number of chronic diseases. Chronic diseases are measured by asking respondents whether they received a doctor's diagnosis for one or more major chronic diseases in a list presented on a show-card in which the following 17 chronic conditions are considered: 1) Heart attack (heart attack including myocardial infarction or coronary thrombosis or any other heart problems including congestive heart failure); 2) High blood pressure or hypertension; 3) High blood cholesterol; 4) Stroke or cerebral vascular disease; 5) Diabetes; 6) Chronic lung diseases; 7) Asthma; 8) Arthritis or rheumatism; 9) Osteoporosis; 10) Cancer or malignant tumor; 11) Ulcer (stomach or duodenal ulcer, peptic ulcer); 12) Parkinson disease; 13) Cataracts; 14) Hip fracture or femoral fracture; 15) Other fractures; 16) Alzheimer's; 17) Benign tumor. An important characteristics of the chronic disease question is its "objective" nature. Respondents are not asked to evaluate by themselves whether they have or not an illness but are asked to report whether they received a diagnosis of disease from a health professional (a doctor).

Descriptive evidence on our main variables of interest documents that the modal health satisfaction item is "fair" with almost 40 percent responses, followed by "poor" with 22.6 percent responses. Only 10.7 percent of respondents declare that their health is "excellent", while 7.46 percent report quite to the contrary that it is "very poor" (Figure 1, panel A).

With regard to our dependent variable more than 59 percent of respondents in the sample have been diagnosed at least one chronic disease and slightly more than 17 percent of them at least three of them (Figure 1, panel B). The distribution of the first differenced variable (changes in the number of chronic diseases) is right skewed as expected (health conditions are more likely to get worse than better with ageing) with modal value around zero (no changes in chronic diseases for almost half of the sample (47.6 percent)), around 20 percent of respondents who register one additional disease and around 15.8 percent of them who report an improvement (one disease less) (Figure 1, panel C).

3. Descriptive statistics on the nexus between subjective health (un)satisfaction and objective health outcomes

When considering the nexus between lagged health (un)satisfaction and the number of chronic diseases we need to condition our analysis on the lagged level of the number of chronic diseases in order to avoid omitted variable bias. This is because those with higher number of ex ante chronic diseases are more likely to report lower health satisfaction and, at the same time, lower positive changes in the number of chronic diseases. Omission of such variable would therefore produce a downward bias in the relationship between subjective health satisfaction and changes in the number of chronic diseases.

We start doing so also in our descriptive evidence by focusing our attention on those who do not declare any chronic disease in the previous period. Within this subsample we find that those who evaluate their health satisfaction as "excellent" (that is, the lowest self-reported level of health (un)satisfaction) register in the following wave an average change in the number of chronic diseases of 0.367. We may grossly interpret this evidence as documenting that the lowest self-reported level of health (un)satisfaction is correlated with a probability of registering a new chronic disease of 36.7 percent in the following period (or that, about one of out of three among those declaring no chronic diseases and the lowest health (un)satisfaction level report a chronic disease in the period which follows). The situation gets worse for those reporting lower levels of health satisfaction. Those who consider their health as "very good" register a change in the number of chronic diseases in the following period of 0.438, those who consider it as "good" of 0.594, those who consider it "fair" of 0.892, up to those considering their health as "poor" who register an average change of 1.11 (that is, on average, each of those declaring the highest level of health (un)satisfaction will report at least one chronic disease in the period which follows). Figure 2a documents that these averages are significantly different from each other (95 percent confidence intervals do not overlap) even when we consider two close and consecutive rungs of the health (un)satisfaction ladder. The above

mentioned descriptive findings imply as well that the probability of registering a chronic disease in the following period is three times larger for those reporting the lowest than for those reporting the highest health (un)satisfaction level. We find similar results if we look at the subsample of respondents starting from nonzero ex ante numbers of chronic diseases. By considering those with one ex ante chronic disease we find that those reporting "excellent" health satisfaction register on average a following period change in the number of chronic diseases of -0.006, those reporting "very good" health a change of 0.078, those reporting "good" health a change of 0.19, those reporting "fair" health a change of 0.46, while those reporting "poor" health a change of 0.67 (Figure 2b).

We repeat our descriptive analysis for the subsample of those reporting no chronic diseases in the first period in subsamples according to gender, age class, income class and education degree. In all subsamples we find a pattern similar to what found in the overall sample with average changes in the number of reported chronic diseases which are in general significantly different in mean from one rung to the following of the health (un)satisfaction ladder (Figures 2c-2d). Relevant exceptions are the overlaps of the effects of "very good" and "excellent" health status for males, the high educated and those with income above sample average. We find that ordinality in the effects of the different health satisfaction items is respected with confidence intervals which never overlap when considering the highest and the lowest items, but with much lower distance between the two lowest of them.

We also verify whether our first descriptive evidence remains significant when separately considering countries in the North, East, South and Center of Europe and find that it is generally the case, although in East and South countries there is some overlap between the two lowest items ("fair" and "poor"), while in North countries between the two highest "very good" and "excellent".[5]

Overall, descriptive evidence provided in the above section is strongly in favour of the predictive power of subjective wellbeing but may be driven by spurious concurring effects. In the econometric

[5] Evidence on subsamples for those reporting ex ante one chronic disease is similar, omitted for reasons of space and available upon request.

specification which follows we therefore control whether the nexus remains robust when controlling for a large set of concurring factors.

4. Econometric findings

In a first benchmark econometric specification used for evaluating the impact of lagged health (un)satisfaction on changes in the number of chronic diseases we include as controls socio-demographic characteristics at individual level in t_0 and their first differences. We add to these controls variables capturing country level characteristics of the health systems such as health/GDP expenditure, the number of avoidable congestion heart failures (which is a standard measure of NHSs' quality (Joumard et al. 2010)) and a NUTS2 level health indicator represented by the number of beds in hospital per 100,000 inhabitants in the region.[6] We further introduce country dummies to control for the remaining country specific effects which may impact upon our dependent variable. In our second specification we add health styles such as drinking, smoking and sport habits, (over)weight or obesity and changes in health styles. In a third specification we introduce NUTS2 level fixed effects while in the fourth and last specification we add declared symptoms.

The fully augmented (fourth) benchmark specification considered when testing our hypothesis is

[6] Eurostat collects at NUTS2 level data on infrastructure (e.g. available beds in hospitals per 100,000 inhabitants) and on staffing in the health sector (e.g. number of physicians or doctors per 100,000 inhabitants and dentists). Eurostat NUTS2 level indicator are available at http://ec.europa.eu/health/indicators/other_indicators/sub_national/index_en.htm.

$$\Delta N_chronicdiseases_{i,t}$$

$$= \alpha + \beta\, Health_unsat_{i,t-1} + \gamma\, N_chronicdiseases_{i,t-1} \sum_{k=1}^{K} \delta_k\, Socio_Dem_{k,i,t-1}$$

$$+ \sum_{l=1}^{L} \lambda_l\, Healthbehaviour_{l,i,t-1} + \sum_{c=1}^{C} \chi_c\, \Delta Socio_Dem_{c,i,t} + \sum_{d=1}^{D} \psi_d\, \Delta LifeStyles_{d,i,t}$$

$$+ \sum_{h=1}^{H} \rho_h\, Symptoms_{h,i,t} + \xi\, Healthexpgdp_{\,t} + \vartheta\, Availablebeds_t$$

$$+ \pi\, AvoidalbeCHF_t + \sum_{v=1}^{V-1} \mu_v\, DInt_Year_{v,i}$$

$$+ + \sum_{g=1}^{G-1} \kappa_g\, DCountry_{g,i} + \sum_{r=1}^{R-1} \phi_r\, DNUTS2_{r,i} + \varepsilon_{i,t}$$

where $\Delta N_chronicdiseases_{i,t} = N_chronicdiseases_{i,t} - N_chronicdiseases_{i,t-1}$ is the first difference in the number of chronic diseases, $Health_unsat_{i,t-1}$ is the lagged health (un)satisfaction variable, *SocioDem* includes previous-wave socio-demographic characteristics (i.e. gender, age, schooling years, employment and marital status, number of children and grandchildren, the natural logarithm of the respondent's per capita total household income[7]), $LifeStyles$ include variables measuring body mass index, vigorous physical activity, alcohol and smoking habits. Δ*SocioDem and* $\Delta LifeStyles$ are first differences of socio-demographic variables and life styles, that is, dummy variables equal to one if between the previous and the current wave the respondent witnesses a change in marital status (variable *gets_divsep*), employment status (variables *gets_retired* and *gets_unemployed*), improves (ie. moves from one categorical response to another) in the frequency of physical activities (*improvesport*), reduces alcohol consumption (*reducedrinking*), becomes

[7] As is well known the SHARE dataset suffers from missing value problems for some variables like, for instance, income. We address this problem with a solution commonly adopted in the literature, i.e. using imputed values for the variables of interest for our analysis which are available as supplementary datasets at the SHARE website. More specifically, as suggested by Christelis (2011), we use the dataset where the missing information is imputed with Fully Conditional Specification method (FCS) (Van Buuren et al., 2006). In brief, this method generates a distribution for the missing value of a given variable conditional on the non-missing values of other variables in the dataset. This procedure generates five imputed datasets (one for each iteration) which are downloadable from the SHARE website. The imputed variables used in our study are *number of children, logincome, number of grandchildren, limited activities*. For these variables, each respondent displays five different values but for simplicity we consider an average of them across the five datasets.

grandmother/grandfather (*getsgrandchildren*). We also control for asynchronous survey administration in each wave by introducing interview-year dummies (*DInt_year*) as well as country (*DCountry*) and NUTS2 (*DNUTS2*) fixed effects[8]. Standard errors are clustered at NUTS2-year level to consider that within NUTS2 variance is lower than across variance.

Results from the first specification (Table 1, column 1) document that lagged levels of health (un)satisfaction are significantly and positively correlated with the change in the number of chronic diseases. Note as well that, since the dependent variable registers health worsening but also improvement, self-related health (un)satisfaction is likely to capture unobservable severity of objective diseases (as documented in section 3 by descriptive evidence of those with one ex ante chronic disease and "excellent" health satisfaction who on average improve in the following period). In terms of magnitude an increase of one step in the health (un)satisfaction ladder from its mean value (2.96) produces a 0.143 increase in the number of chronic diseases in the period which follows. In the second specification augmented for life styles and changes in life styles (Table 1, column 2) lagged health (un)satisfaction remains significant with a slightly lower magnitude (0.129 impact). Our main coefficient of interest remains significant and stable in the third specification where we introduce dummies for NUTS2 regions. In the fourth specification we find that the impact of lagged health (un)satisfaction is now partially absorbed by declared symptoms with magnitude falling to 0.097. In columns 5-8 of Table 1 we repeat the previous four specifications correcting for attrition bias. The problem of attrition is particularly relevant in the SHARE sample with aged respondents who may exit from the survey for various reasons (death or nonresponse due to health worsening or other reasons unrelated to health). In order to control for attrition we regress the probability of survival in two consecutive waves on the set of controls used in our specifications and use the inverse of the

[8] Out of the initial 19 countries those remaining (not dropped by missing variables in one of two consecutive waves) are 13 and, more specifically, Austria, Germany, Sweden, Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, Poland and Czechia.

predicted probability as a weight in our benchmark estimates from Table 1, columns 1-4.[9] Results provided in columns 5-8 are substantially unchanged with reference to our main findings documenting that their robustness even when we account for attrition bias.

Among other factors affecting the dependent variable in regressions presented in Table 1 we find age, education and relational variables such as getting a new partner. The number of chronic diseases is obviously higher for the older and as well for the less educated respondents.[10]

4.1 Ordinality test on the predictive property of health (un)satisfaction

In Table 2 we repeat our four specifications by taking into account the qualitative characteristics of our interest variable and replacing the health (un)satisfaction indicator with dummies for each of its levels (except for the lowest which is our omitted benchmark). We find that those reporting the highest level of health (un)satisfaction ("poor" health) have an effect on the number of chronic diseases in the period which follows ranging from 0.57 in the first specification to 0.33 in the last in which we control for declared symptoms. This implies that they will register from 0.33 to 0.57 more chronic diseases than those reporting the lowest level of health (un)satisfaction ("excellent" health).

[9] More specifically, to control for attrition we estimate the following specification $A_{i,t} = \alpha + \sum_{k=1}^{K} \beta_k \; Sociodem_{i,t} + \gamma \; noconditions_{i,t} + \delta \; nosymptoms_{i,t} + \sum_{v=1}^{V-1} \chi_v \; DInt_Year_{i,v} + \sum_{g=1}^{G-1} \kappa_g \; DCountry_{i,g} + \epsilon_{i,t}$,
where the dependent variable is the probability of survival in two consecutive waves, *Sociodem* is a set socio-demographic and economic controls which include gender, age, education years, income, employment and marital status, number of children and grandchildren, smoking, drinking and doing vigorous physical activity and a dummy for the overweight or obese condition, while *nocondition* and *nosymptoms* are two dummy variables which are equal to one if the respondent reports no specific illnesses or symptoms respectively. Findings from this estimate document that attrition is negatively affected by female gender, the number of grandchildren and the *nocondition* dummy, while positively affected by being divorced/separated and doing sport activities infrequently. This evidence leads us to presume that mortality and worsening health conditions are highly likely to be the main cause of nonresponses. For similar attrition weighting procedures see, among others, Raab et al. (2005), Nicoletti and Peracchi (2005) and Vandecasteele and Debels (2007).

[10] As is well known the existing literature documents that education has a positive impact on health for at least two reasons: the more educated have better health styles and use better and more efficiently medical information (see among others Grossman 2006).

More in general the last two items (“fair” and “poor” self-reported health) are those registering the strongest quantitative impact. Ordinality of the impact of the health (un)satisfaction indicator in terms of magnitude is always met in results presented in Table 2 since higher (un)satisfaction items have higher coefficients.

Note as well that we may use our estimate with dummies for each rung of the health (un)satisfaction ladder to test whether the ordinality assumption is met also in terms of statistical significance, that is, if each rung of the scale yields a significantly different effect on health satisfaction than the two adjoining ones. What we observe from this point of view when ”excellent” is the omitted benchmark is that the statistical significance begins from the next to adjoining rung (“good” is significantly different from “excellent” while “very good” is not) (Table 2a). We repeat the estimate by using each time one of the other rungs of the ladder as omitted benchmark (ie. “very good”, “good”, “fair” and “poor”) checking whether the adjoining rungs and the other rungs are significant in the estimate. Our findings document that most of times the ordinality property is met also in terms of statistical significance with very few exceptions indicating a weaker capacity of discriminating between two consecutive rungs at the two extremes of the scale (between “poor” and “fair” and between “very good” and “excellent”) (Tables 2b-2e).

4.2 Robustness checks

We check whether our main findings are robust in gender, age class, education, income and number of visits splits. The reference specifications are, respectively, the fully augmented estimate in which we also account for declared symptoms (Table 1, column 8) and the less than fully augmented estimate where symptoms are not considered (Table 1, column 7). The rationale for focusing on these two specifications is that they are the more complete and controlled for attrition bias, and that significance when not controlling for symptoms is as well important since it documents that health

(un)satisfaction, if significant, may absorb parsimoniously part of the impact which can be detected by asking many different questions on specific symptoms. Results described in Tables 3a-3d document that our main finding remains significant in all the considered sample splits with a remarkably stable coefficient (between 0.144 and 0.096 in the estimates with the unique health (un)satisfaction variable, Tables 3a-3b).

An additional problem of our cross-country empirical evidence is exposure to country specific cultural bias in self-reported subjective health status. As is well known specific characteristics related to the cultural or national context are indeed very likely to influence the ways in which people may understand, interpret, benchmark or respond to the same survey question (see Vittersø, Biswas-Diener and Diener, 2005; Suh, Diener and Updegraff, 2008). A well-known approach to address the problem in the literature is the use of "vignettes" (King et al., 2004). A "vignette" is a picture or a short narrative description of a hypothetical scenario (in our case health conditions) that respondents are asked to rate, and which may be used to identify differences in how respondents react to the same information. The vignette method works under the assumptions of vignette equivalence and response consistency[11]) (see among others Bago d'Uva et al., 2009; Ferrer-I-Carbonell et al., 2010). If these two assumptions are assumed to hold, heterogeneity in evaluating the common vignette situation may be used to build a correction factor eliminating "cultural bias" from their subjective evaluation of their health. The vignette approach has been widely used in recent cross-country studies to identify cultural effects in subjective data (see for example Angelini et al., 2014; Kapteyn, Smith and van Soest, 2009; Kristensen and Johansson, 2008).

We however propose a more drastic approach which does not require the validity of vignette assumptions by repeating our fully augmented specification (and that without declared symptoms)

[11] The equivalence property requires that the scenarios in the vignettes are perceived with no systematic differences across respondents. The property of response consistency requires that individuals use the response category in the self-assessment question in the same way they evaluate hypothetical scenarios in the vignettes.

separately for each country. Our main findings are always confirmed and prove to be robust to potential cultural and country biases. An interesting result in country specific estimates with dummies for each health (un)satisfaction item is that ordinality is always met with the exception of the ranking between "poor" and "fair" in France, Germany and Greece (Tables 3f-3g). This finding may depend on a cultural bias according to which respondents from the three countries do not like to communicate that their health is at the lowest level of the satisfaction scale or on the poorer lexical distinction between the two levels when the term is translated into country specific languages (to let the reader check this specific point the health (un)satisfaction terms in the 13 original languages are reported in the legend of Tables 3e-3h).

4.3 Five possible rationales beyond the nexsus between health (un)satisfaction and objective health outcomes

We consider that at least five factors may be beyond the phenomenon under our investigation.

According to the first, pessimism about health conditions can produce per se effects on future objective health. Under this interpretation the causal link would go from our regressor to the dependent variable with hypochondria having negative health consequences.[12] The second interpretation is that the observed correlation may depend on some kind of "inefficiencies": individuals may not feel well and not having yet received a proper diagnosis. This may be due to demand or supply side reasons. On the demand side respondents may not be so ready, quick or efficient in getting a visit from a doctor or a specialist in order to obtain the right diagnosis while, on the supply side, the problem may be caused by the inefficiencies of the national or regional health systems. More specifically, one dimension of the so called "inefficiency rationale" is that the

[12] For an ample survey of the effect of subjective wellbeing on health see among others Diener and Tay (2012).

synthetic (even though non professional) evaluation of the respondent about her/his health status may be more precise than what specialists focusing only on their specific competences may discover with their diagnosis at a given point in time. Note that, if this would be the only rationale, our cross-sectional findings measured in Tables 3f-3h could provide a comparison of health efficiency in different countries. The third rationale is that those who are more pessimistic about their health conditions may be more likely to misreport objective conditions in the future. A fourth rationale which may explain what we observe is that health (un)satisfaction proxies for the unobserved severity of the illness (thereby positively affecting persistence into illness). This factor applies obviously only to those who already register ex ante at least one chronic diseases (and therefore does not apply to what shown in Figures 2a and 2c-2d). A fifth factor which may be a work in the phenomenon under inquiry is that health (un)satisfaction may make individuals more aware of their health problems and therefore more actively engaged in solving them. This factor should work exactly in the opposite direction of what we observe producing a negative and not a positive nexus between health (un)satisfaction and the number of chronic diseases.

Note that the conclusion that subjective health (un)satisfaction is a leading indicator of future objective health conditions (supported in our paper) does not apply under the third rationale. It is therefore important to document that what we observe does not depend uniquely from this specific explanation

4.4 Interpretation of our findings and further evidence from specific illnesses

An overall reflection on our findings on the number of chronic diseases may help to understand which of the five above mentioned rationales are more likely to explain the observed phenomenon. If the third rationale (misreport bias) applies we would expect it to be less relevant for the more educated

and for those with higher income. Quite to the contrary we find that our result is robust in the sample of the more educated and of those with higher income (Tables 3a-3d). If the third rationale applies we should as well expect misreport in some but not all countries. As well we expect that the third rationale is more likely to affect levels and not changes in number of chronic diseases which is the specific focus of our research (that is, the misreport bias should apply in the same way on levels of health (un)satisfaction both in the lagged and in the current period). Last but not least, results in the literature testing the effects of subjective health declaration on mortality rates (Benjamin et al. 2004) document a robust positive link rejecting the hypothesis that health (un)satisfaction is correlated with misreporting bias.

If the second interpretation (inefficiency) is correct the subsample of those with a higher number of doctor visits in the period for which they report health (un)satisfaction should show a weaker correlation. With reference to doctor visits, we find that less than 45 percent of the sample report more than 4 visits and less than 31 percent more than 6 visits (Tables 3a-3d). In both subsamples our result remains quite robust.[13] Again supply side "inefficiency" (under the third rationale) is unlikely to account entirely for the observed phenomenon since we report separate and significant evidence for countries which are highly heterogeneous in terms of quantity (health expenditure) and quality of health (proxied by the number of avoidable CHF in our sample). Our sample includes countries such as Sweden where the health/GDP ratio is close to 12 percent and countries like Poland where it is slightly higher than 6 percent in 2012. As well in terms of quality of NHSs we range from France with the lowest number of amenable mortality for all causes in 2007 among OECD countries, to Poland which is the fourth next to highest (Gay et al. 2011). We as well include countries with public provision and public insurance such as Italy and Poland and countries which rely mostly on market mechanisms for service provision and private insurance for basic coverage such as Germany, Netherland and Switzerland. Note however that the fact that magnitudes of health (un)satisfaction

[13] Results from the estimate for those with more than 6 visits is omitted for reasons of space and available upon request.

coefficients are larger for subsamples were individuals are expected to have reduced capacity to transform their synthetic perception about their health status into a diagnosis (less educated, low income) seems to provide evidence in favour of the above mentioned inefficiency hypothesis (Tables 3a-3b).

In order to discriminate further between the different rationales we wonder which specific illness lagged health (un)satisfaction predicts beyond our aggregate result on the number of chronic diseases. We repeat Table 1 estimates and find that the impact is significant on arthritis, cataracts, cholesterol, hypertension, lung disease and ulcer if we consider mainly the last two columns where our estimates are corrected for attrition bias (Tables 4 and 5).[14] For some specific illnesses it is possible to decompose our phenomenon in two-by-two patterns of transitions by considering that individuals in two consecutive time periods may enter into, exit from and persist in illness or not reporting it in both periods. We look at transition patterns only for those illnesses which report sufficiently high share of transitions from a state to another (this is why we consider cancer, heart attack, arthritis, osteoporosis and cataracts, while not considering here illnesses such as Parkinson and diabetes). We therefore estimate a multinomial logit model where three out of the four possible transitions (remaining not affected is the omitted benchmark) are regressed on our usual set of controls.

Our results document that, for the considered illnesses, most of the health (un)satisfaction effect is concentrated on the increase in the probability of getting ill, a finding significant in all the considered illnesses (Table 5). This finding is compatible with both the hypochondria and the inefficiency hypotheses (while definitely not with misreporting bias). Beyond it we find that health (un)satisfaction is associated with a higher probability of remaining ill for heart attack, arthritis and

[14] The SHARE database reports data for the following cancer types (brain, oral cavity, larynx, other pharynx, thyroid, lung, breast, oesophagus, stomach, liver, pancreas, kidney, prostate, testicle, ovary, cervix, endometrium, colon or rectum, bladder, skin, non Hodgkin lymphoma, leukaemia, other organs). The paucity of observations related to the specific cancer types prevents us to perform finer analysis on each of them.

osteoporosis (which is compatible with the inefficiency hypothesis and with our fourth rationale arguing that subjective health proxies for the severity of the illness). We further find that health (un)satisfaction raises the probability of recovery in some cases (heart attack and osteoporosis). This last fact documents that in some cases health (un)satisfaction may prompt more active search for cure (the fifth rationale) even though this factor is definitely dominated by the other in our general findings related to the impact on the number of chronic illnesses.

5. Conclusions

The traditional economic discipline has often cast doubts on the relevance of the recent wave of studies using subjective wellbeing indicators. An argument in support of these indicators is that they may capture unobserved or unobservable objective components anticipating future changes in observable objective variables.

We explore this hypothesis by looking at health indicators. We find that the subjective indicator of health (un)satisfaction is a robust and significant predictor of future changes in objective health outcomes (the aggregate number of chronic diseases and several specific illnesses) after controlling for levels and changes in socio-demographic individual controls and characteristics of health systems at national and regional level.

Our findings hence document that the non-professional synthesis of the respondent on her/his overall health status has extra predictive power in terms of changes in the number of chronic diseases after controlling for levels and changes in socio-demographic factors, life styles, for declared specific symptoms and ex ante chronic diseases.

Beyond this general result we find that the impact is significant for several specific illnesses when separately considered and mostly concentrated on the probability of getting ill. Our specific tests illustrated in Tables 2a-2e document that the standard 5-item health satisfaction indicator has sound

ordinal properties thereby confirming the policy suggestion already stemming from studies on mortality rates that such indicator provides richer information than dichotomous health satisfaction measures. Findings provided in this paper are quite robust in age, income and gender splits and separately observed in the 13 European countries for which we have data. They therefore strongly support the hypothesis that health (un)satisfaction is a parsimonious leading health indicator and that the impact of health (un)satisfaction on future objective health outcomes is a stylized fact valid in many different countries.

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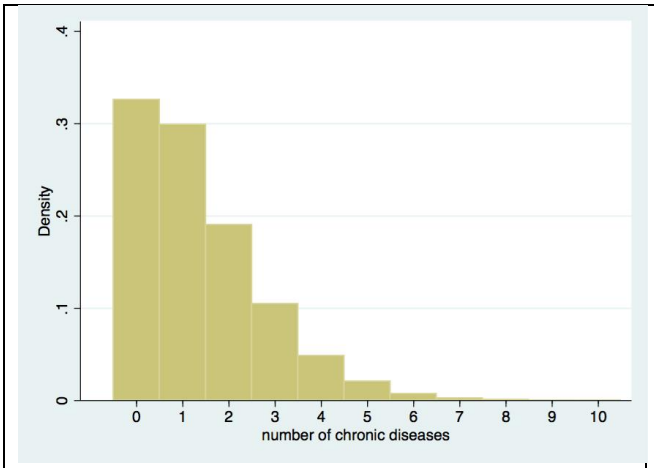
Variable Legend

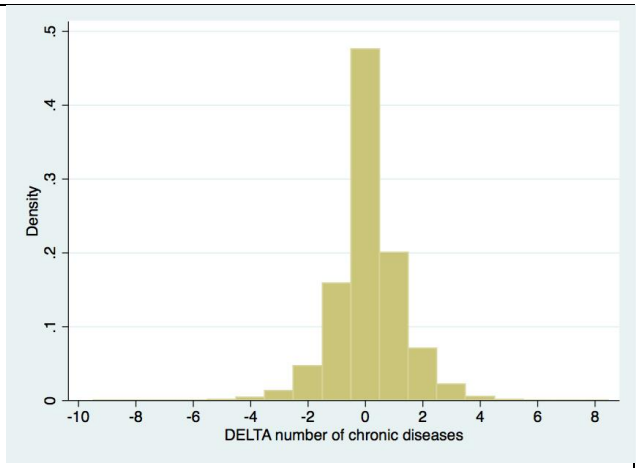
Variable	Description
Ageclass	(0/1dummies for the following age groups) Age 55-59; Age 60-64; Age 65-69; Age 70-74; Age 75-79
Arthritis	Dummy variable=1 if the doctor told you had: arthritis. 0 otherwise
Asthma	Dummy variable=1 if the doctor told you had: asthma. 0 otherwise
Available_Beds_Hospitals	available beds in hospitals per 100 000 inhabitants available at http://ec.europa.eu/health/indicators/other_indicators/sub_national/index_en.htm
Avoidablechf	avoidable congestive heart failure hospital admission rate of people aged 15 and over per 100,000 inhabitants
Bmi_Mod	body mass index (easySHARE version)
Breathlessness	Dummy variable=1 if the respondent has bothered by: breathlessness. 0 otherwise
Cancer	Dummy variable=1 if the doctor told you had: cancer. 0 otherwise
Cataracts	Dummy variable=1 if the doctor told you had: cataracts. 0 otherwise
Chroniclungdisease	Dummy variable=1 if the doctor told you had: chronic lung disease. 0 otherwise
Country	country identifier
Diabetesorhighbloodsugar	Dummy variable=1 if the doctor told you had: diabetes or high blood sugar. 0 otherwise
Divorced	Dummy variable=1 if the respondent is divorced
Dizzinessfaintsorblackouts	Dummy variable=1 if the respondent has bothered by: dizziness, faints or blackouts. 0 otherwise
Drinking Variables	Dummy variables: Drink 5or6days a week; Drink 3or4days a week; Drink 1or2 a week; Drink 1or2 a month; Drink <1 a month; Not Drink for 3 months
Eduyears	years of education
Employed	Dummy variable=1 if the respondent is employed
Fallingdown	Dummy variable=1 if the respondent has bothered by: falling down. 0 otherwise
Fearoffallingdown	Dummy variable=1 if the respondent has bothered by: fear of falling down. 0 otherwise
Female	Dummy variable = 1 if the respondent's gender is female and 0 otherwise. 0 otherwise
Gets_Divorced	Dummy variable=1 if the respondent got divorced
Gets_Grandchildren	Dummy variable=1 if the respondent got grandchildren
Gets_Partnership	Dummy variable=1 if the respondent got a new partner
Gets_Retired	Dummy variable=1 if the respondent got retired
Gets_Separated	Dummy variable=1 if the respondent got separated
Gets_Unemployed	Dummy variable=1 if the respondent got unemployed
Gets_Widowed	Dummy variable=1 if the respondent got widowed
Getshelpfromoutside	Dummy variable=1 if the respondent
Health_Satisfaction	Self-perceived health status: 1=excellent, 2=very good; 3=good;4=fair; 5=poor
Healthexpgdp	Share of health expenditure to GDP
Heartattack	Dummy variable=1 if the doctor told you had: heart attack. 0 otherwise
Hearttrouble	Dummy variable=1 if the respondent has bothered by: heart trouble. 0 otherwise
Highbloodcholesterol	Dummy variable=1 if the doctor told you had: high blood cholesterol. 0 otherwise
Highbloodpressureorhypertension	Dummy variable=1 if the doctor told you had: high blood pressure or hypertension. 0 otherwise
Hipfractureorfemoralfracture	Dummy variable=1 if the doctor told you had: hip fracture or femoral fracture. 0 otherwise
Homemaker	
Improvesport	Dummy variable=1 if the respondent increased physical activity last year
Jointpain	Dummy variable=1 if the respondent has bothered by: pain in back, knees, hips or other joint. 0 otherwise
Ln(income)	Ln of household total gross income. Its value is equal to the sum over all household members of the individual-level values of: annual net income from employment and self-employment (in the previous year); Annual public old age/early or pre-retirement/disability pension (or sickness benefits); Annual public unemployment benefit or insurance, public survivor pension from partner; Annual war pension, private (occupational) old age/early retirement/disability pension, private (occupational) survivor pension from partner's job, public old age supplementary pension/public old age/public disability second pension, secondary public survivor pension from spouse or partner, occupational old age pension from a second and third job; Annual public and private long-term insurance payments; Annual life insurance payment, private annuity or private personal pension, private health insurance payment, alimony, payments from charities received; Income from rent. Values of the following household level variables are added: Annual other hhd members' net income; Annual other hhd members' net income from other sources; Household bank accounts, government and corporate bonds, stocks/shares; mutual funds.
Married	Dummy variable=1 if the respondent is married
N_Children	number of children
N_Chronicdeseases	number of chronic diseases
N_Doctorvisits	how often seen or talked to medical doctor last 12 months
N_Grandchildren	number of grandchildren
None	Dummy variable=1 if the doctor told you had: none. 0 otherwise
Osteoporosis	Dummy variable=1 if the doctor told you had: osteoporosis. 0 otherwise
Other_Job	Dummy variable=1 if the respondent has a second job
Overweight_Obese	Dummy variable=1 if the respondent is overweight (29.9<BMI<34.9) or obese (BMI>34.9). 0 otherwise
Parkinson	Dummy variable=1 if the doctor told you had: parkinson disease. 0 otherwise

Persistentcough	Dummy variable=1 if the respondent has bothered by: persistent cough. 0 otherwise
Reducedrinking	Dummy variable=1 if the respondent reduced drinking habits last year
Reg_Partnership	Dummy variable=1 if the respondent has a registered partnership
Retired	Dummy variable=1 if the respondent is retired
Separated	Dummy variable=1 if the respondent is separated
Sleepingproblems	Dummy variable=1 if the respondent has bothered by: sleeping problems. 0 otherwise
Smoking	Dummy variable=1 if the respondent smokes at the present time
Ulcer	Dummy variable=1 if the doctor told you had: stomach or duodenal ulcer, peptic ulcer. 0 otherwise
Stomachorintestineproblems	Dummy variable=1 if the respondent has bothered by: stomach or intestine problems. 0 otherwise
Stroke	Dummy variable=1 if the doctor told you had: stroke. 0 otherwise
Swollenlegs	Dummy variable=1 if the respondent has bothered by: swollen legs. 0 otherwise
Vig_Activity	Frequency of sports or vigorous activities (0/1 dummies): *Min1week*, *Oneweek, OneorThreemonth, Hardly_ever_never*
Widowed	Dummy variable=1 if the respondent is widowed

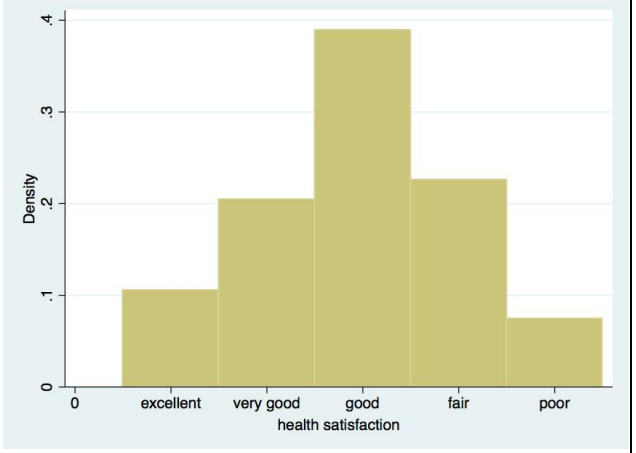
Figure 1 – Number of chronic diseases, changes in the number of chronic diseases, Health satisfaction



Panel A Number of chronic diseases



Panel B Changes in the number of chronic diseases



Panel C distribution of health satisfaction

Figure 2a – Health satisfaction and change in the number of chronic diseases: individuals who reported no chronic diseases in the previous period

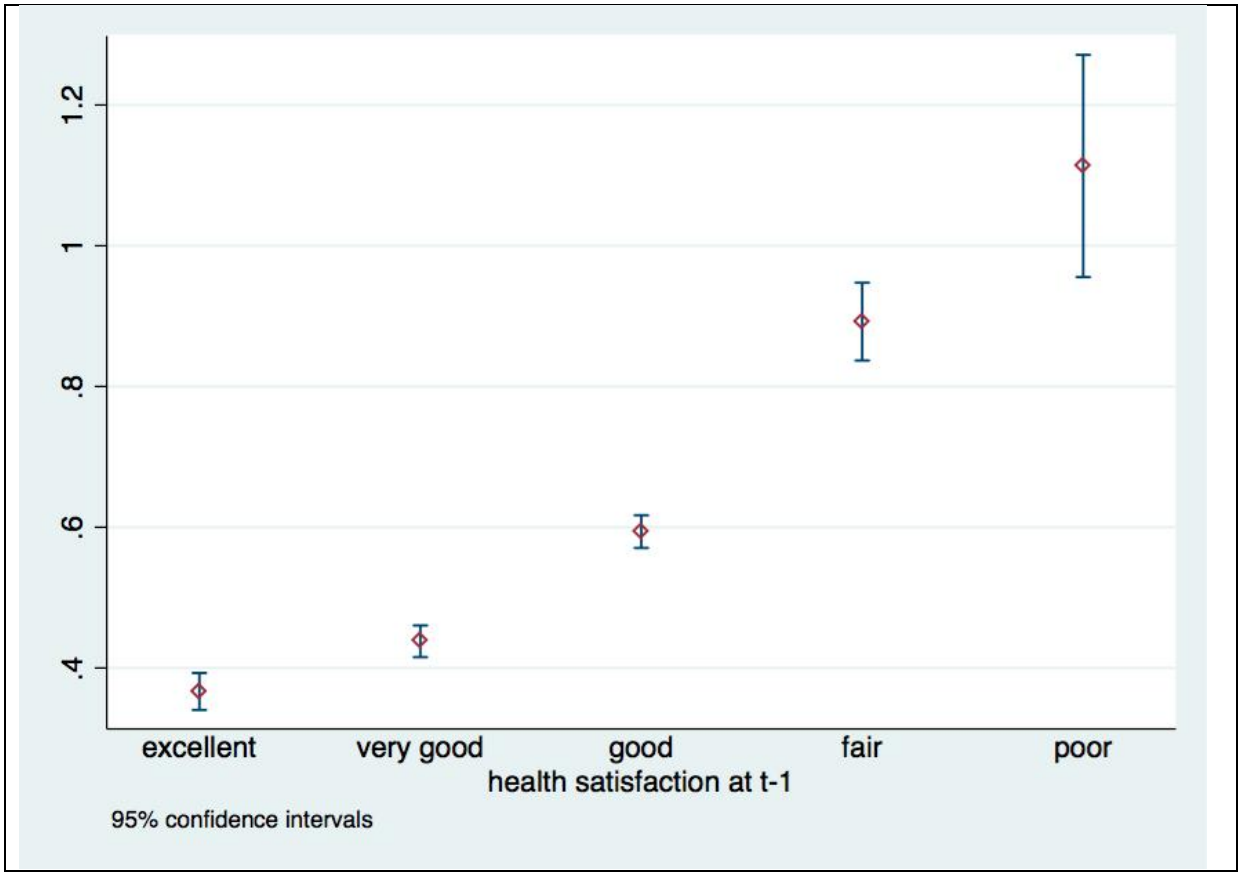


Figure 2b – Health satisfaction and insurgence of chronic diseases: individuals who reported one chronic disease in the previous period

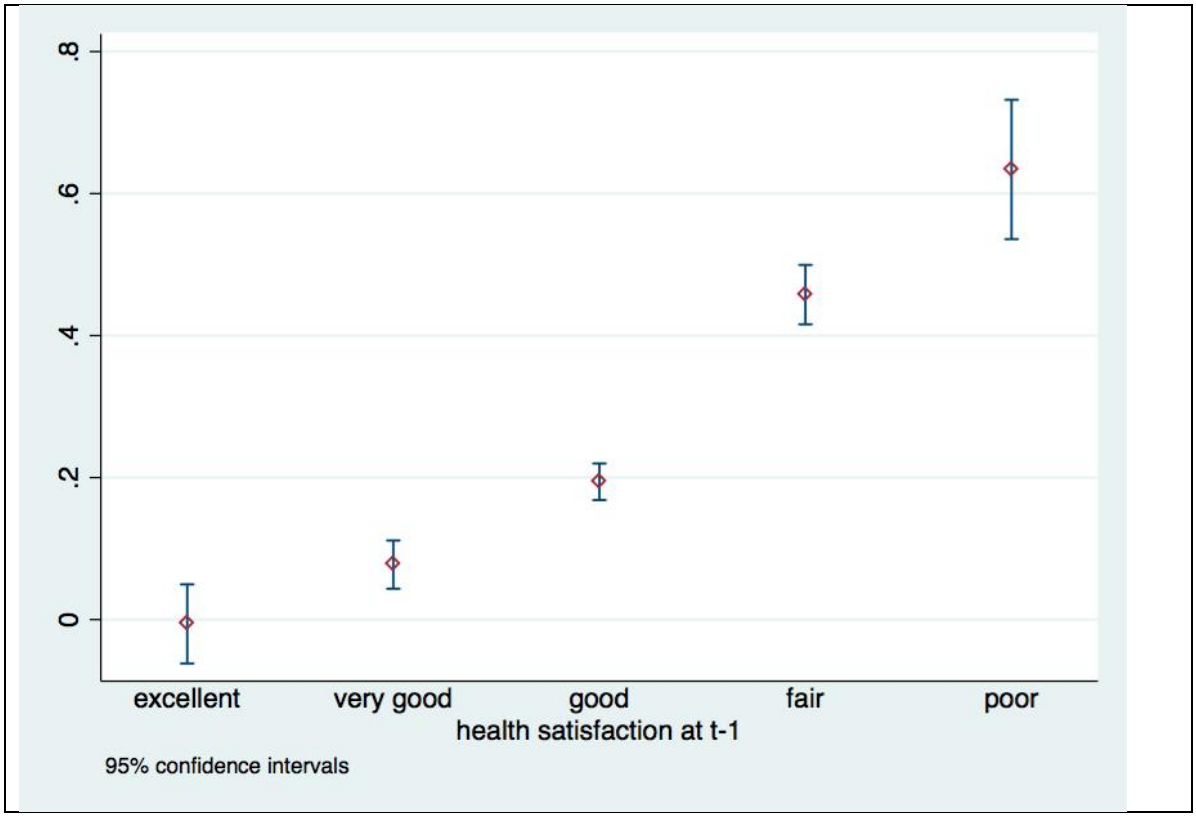
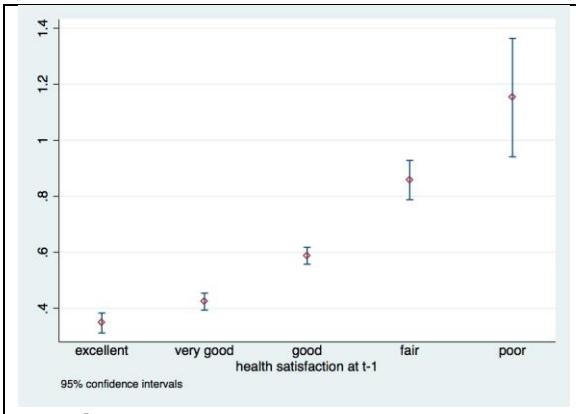
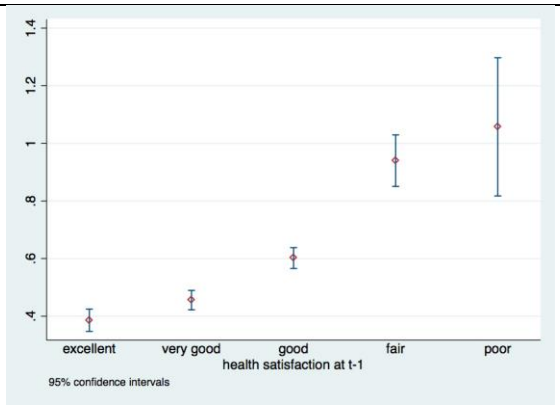


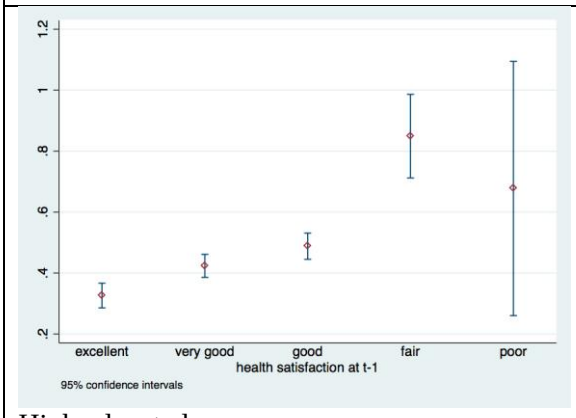
Figure 2c– Health satisfaction and change in the number of chronic diseases by socio-demographic factors



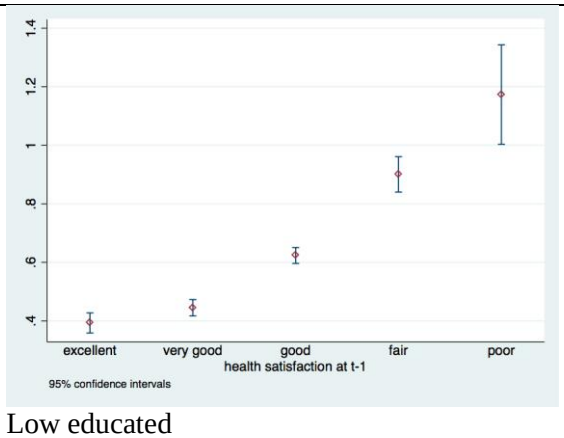
Female



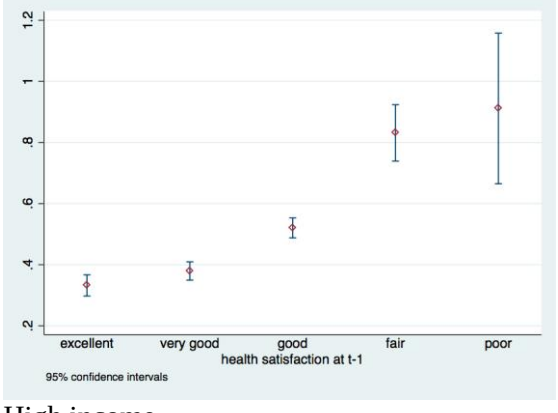
Male



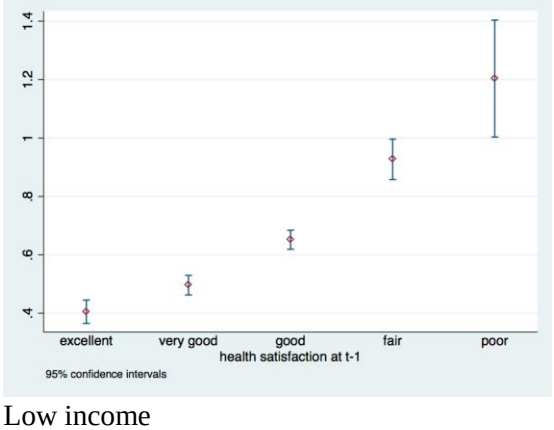
High educated



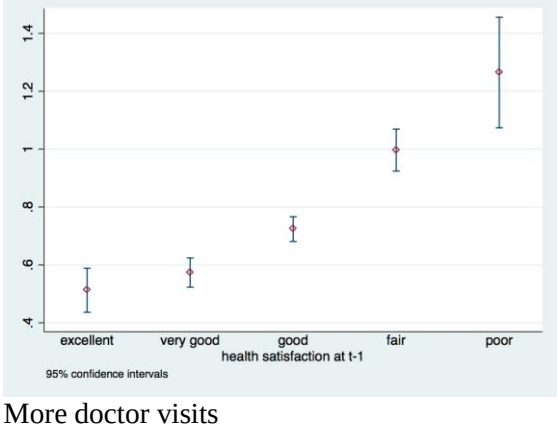
Low educated



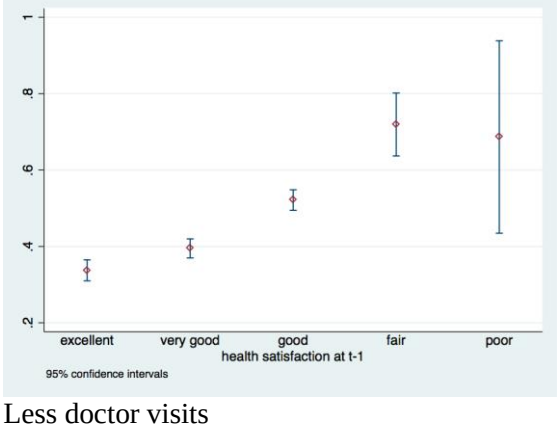
High income



Low income

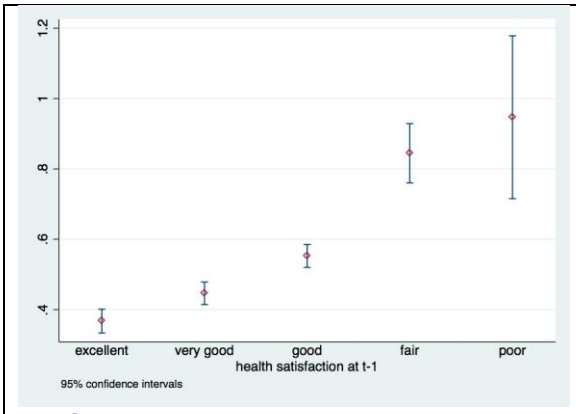


More doctor visits

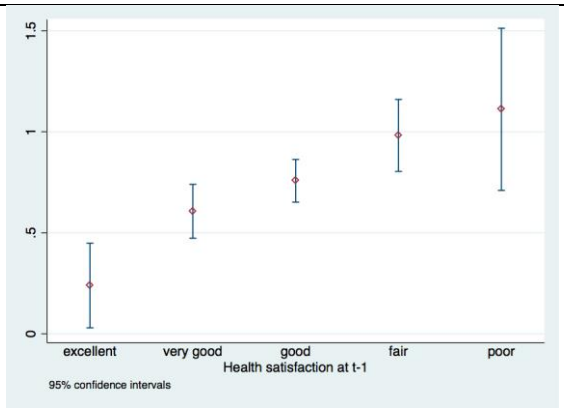


Less doctor visits

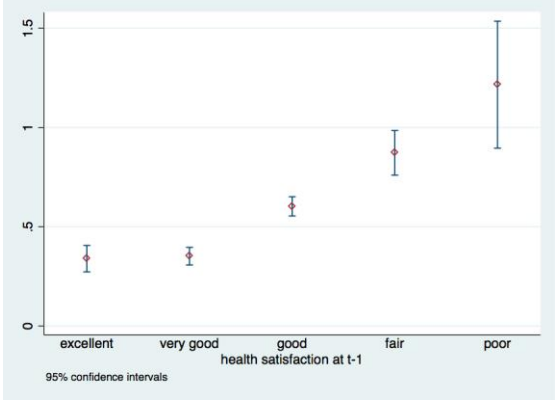
Figure 2d – Health satisfaction and insurgence of chronic diseases by geographic areas



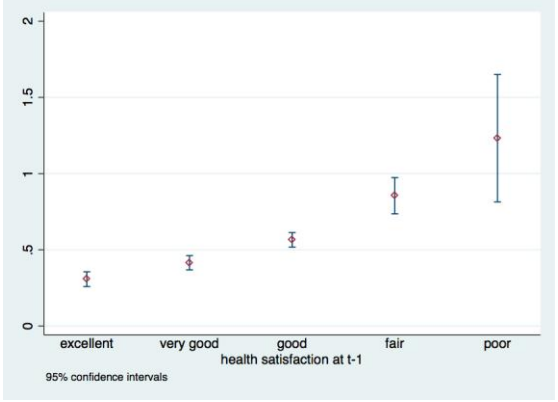
North Europe



Eastern Europe



South Europe



Centre Europe

Legend for Figures 2c-2d: the variable in the vertical axis is the change in the number of chronic diseases between wave t and wave t-1 for individuals who reported no chronic diseases in t-1; *health satisfaction*: self-declared health satisfaction level. More educated: levels 4-6 from 1997 ISCED (International Standard Classification of Education) (4=Post-secondary non-tertiary education, 5=first stage of tertiary education, 6= second stage of tertiary education); Less educated: levels 0-3 from ISCED '97 classification (0=Pre-primary education, 1=primary education or first stage basic education, 2=lower secondary or second stage of basic education, 3=(upper) secondary education). High income: per capita household income above national median. Low income: per capita household income below national median. Older; above 65; Younger: between 50 and 65. North Europe: Netherlands, Belgium, Germany, Sweden, Denmark. Centre Europe: Austria, Switzerland, France. South Europe Spain, Italy, France, Greece. Eastern Europe: Czech Republic and Poland. All figures refer to individuals who reported ex ante no chronic diseases.

Table 1 - The impact of lagged health satisfaction on changes in the number of chronic diseases

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Female	0.00292	0.0264	0.0198	0.00782	0.0390	0.0433	0.0415	0.0323
	(0.0235)	(0.0256)	(0.0271)	(0.0264)	(0.0333)	(0.0352)	(0.0363)	(0.0343)
Age55-59 $_{t-1}$	0.0855**	0.0764**	0.0890**	0.0859**	0.0594**	0.0496	0.0585*	0.0660**
	(0.0337)	(0.0344)	(0.0338)	(0.0329)	(0.0281)	(0.0299)	(0.0299)	(0.0299)
Age60-64 $_{t-1}$	0.154***	0.138***	0.150***	0.148***	0.149***	0.130***	0.137***	0.141***
	(0.0470)	(0.0457)	(0.0444)	(0.0439)	(0.0423)	(0.0407)	(0.0404)	(0.0386)
Age65-69 $_{t-1}$	0.193***	0.177***	0.198***	0.206***	0.155***	0.132**	0.148**	0.164***
	(0.0584)	(0.0614)	(0.0601)	(0.0594)	(0.0564)	(0.0574)	(0.0585)	(0.0565)
Age70-74 $_{t-1}$	0.298***	0.281***	0.312***	0.309***	0.271***	0.256***	0.284***	0.286***
	(0.0530)	(0.0608)	(0.0591)	(0.0601)	(0.0533)	(0.0575)	(0.0560)	(0.0557)
Age75-79 $_{t-1}$	0.265***	0.268***	0.302***	0.314***	0.265***	0.230**	0.259***	0.285***
	(0.0824)	(0.0901)	(0.0869)	(0.0844)	(0.0926)	(0.0950)	(0.0906)	(0.0851)
Age_above 80 $_{t-1}$	0.289***	0.300***	0.318***	0.312***	0.319***	0.303***	0.317***	0.323***
	(0.0780)	(0.0870)	(0.0875)	(0.0863)	(0.0750)	(0.0781)	(0.0789)	(0.0794)
Eduyears $_{t-1}$	-0.00834***	-0.00664**	-0.00575**	-0.00567**	-0.00462	-0.00223	-0.00222	-0.00232
	(0.00283)	(0.00291)	(0.00276)	(0.00281)	(0.00361)	(0.00385)	(0.00363)	(0.00346)
N_children $_{t-1}$	-0.00155	-0.00165	-0.00325	-0.00578	-0.00201	-0.00314	-0.00268	-0.00249
	(0.0115)	(0.0118)	(0.0121)	(0.0120)	(0.0122)	(0.0122)	(0.0125)	(0.0124)
N_grandchildren $_{t-1}$	0.00293	-0.000501	-0.00211	-0.00370	0.00273	0.000992	-5.58e-05	-0.00314
	(0.00573)	(0.00571)	(0.00584)	(0.00554)	(0.00644)	(0.00621)	(0.00664)	(0.00638)
Retired $_{t-1}$	0.0946	0.102	0.0996	0.101	0.199*	0.205**	0.200*	0.196*
	(0.0825)	(0.0795)	(0.0800)	(0.0784)	(0.104)	(0.101)	(0.102)	(0.101)
Employed $_{t-1}$	0.00422	0.00584	0.00127	0.00714	0.0628	0.0701	0.0595	0.0623
	(0.0644)	(0.0615)	(0.0607)	(0.0612)	(0.0843)	(0.0836)	(0.0833)	(0.0831)
Homemaker $_{t-1}$	0.119	0.103	0.108	0.111	0.158*	0.161*	0.164*	0.164*
	(0.0806)	(0.0771)	(0.0755)	(0.0738)	(0.0919)	(0.0916)	(0.0903)	(0.0877)
Other_job $_{t-1}$	-0.448	-0.301	-0.152	-0.106	-0.356	-0.362	-0.234	-0.191
	(0.312)	(0.319)	(0.337)	(0.337)	(0.260)	(0.278)	(0.293)	(0.293)
Divorced $_{t-1}$	0.110	0.109	0.0776	0.0798	0.160	0.175	0.149	0.166
	(0.0882)	(0.0861)	(0.0850)	(0.0856)	(0.131)	(0.126)	(0.129)	(0.129)
Married $_{t-1}$	0.0457	0.0470	0.0300	0.0386	0.0768	0.0755	0.0609	0.0773
	(0.0527)	(0.0524)	(0.0523)	(0.0527)	(0.0609)	(0.0600)	(0.0611)	(0.0609)
Separated $_{t-1}$	0.0676	0.0513	0.0677	0.0695	0.132	0.146	0.182	0.186
	(0.138)	(0.143)	(0.143)	(0.144)	(0.186)	(0.186)	(0.188)	(0.193)
Reg_partnership $_{t-1}$	-0.105	-0.101	-0.118*	-0.116*	-0.113	-0.107*	-0.124*	-0.116*
	(0.0722)	(0.0664)	(0.0689)	(0.0681)	(0.0680)	(0.0629)	(0.0656)	(0.0675)
Widowed $_{t-1}$	0.121*	0.104	0.0920	0.0959	0.149*	0.161*	0.149*	0.152**
	(0.0672)	(0.0669)	(0.0672)	(0.0672)	(0.0793)	(0.0812)	(0.0803)	(0.0760)
Ln(Income)$_{t-1}$	-0.0305	-0.0297	-0.0276	-0.0263	-0.0354*	-0.0351*	-0.0341	-0.0353*
	(0.0187)	(0.0186)	(0.0195)	(0.0191)	(0.0205)	(0.0205)	(0.0210)	(0.0206)
Δ Ln(Income)	0.00633	-0.00143	0.00503	0.00785	0.00758	0.00321	0.00573	0.00569
	(0.0128)	(0.0136)	(0.0134)	(0.0138)	(0.0141)	(0.0137)	(0.0143)	(0.0140)
Drinking5or6days_a_week $_{t-1}$		-0.0683	-0.0665	-0.0643		-0.106*	-0.0958*	-0.1000*
		(0.0492)	(0.0490)	(0.0474)		(0.0560)	(0.0554)	(0.0536)
Drinking3or4days_a_week $_{t-1}$		-0.0262	-0.0332	-0.0290		0.0608	0.0597	0.0616
		(0.0587)	(0.0588)	(0.0581)		(0.0743)	(0.0771)	(0.0793)
Drinking1or2_a_week $_{t-1}$		-0.106**	-0.109**	-0.0984**		-0.0917*	-0.0907*	-0.0753
		(0.0457)	(0.0453)	(0.0440)		(0.0500)	(0.0496)	(0.0459)
Drinking 1or2_a_month $_{t-1}$		-0.00895	-0.0263	-0.0313		0.0406	0.0255	0.0250
		(0.0592)	(0.0587)	(0.0581)		(0.0898)	(0.0873)	(0.0853)
Drinking <1_a_month $_{t-1}$		0.0328	0.00763	0.0204		0.0389	0.0282	0.0383
		(0.0743)	(0.0749)	(0.0746)		(0.113)	(0.114)	(0.114)
NotDrinking_for_3_months $_{t-1}$		-0.0174	-0.0452	-0.0411		0.00417	-0.0228	-0.0176
		(0.0441)	(0.0451)	(0.0440)		(0.0498)	(0.0503)	(0.0489)
VigActivity1_week $_{t-1}$		0.0506	0.0498	0.0469		0.0396	0.0285	0.0322
		(0.0369)	(0.0380)	(0.0385)		(0.0364)	(0.0388)	(0.0395)
VigActivity 1or3_a_month $_{t-1}$		0.101**	0.0925*	0.0852*		0.124**	0.103**	0.0930*
		(0.0490)	(0.0467)	(0.0491)		(0.0485)	(0.0457)	(0.0500)
VigActivity hardlyever_or_never $_{t-1}$		0.119***	0.115***	0.101**		0.128***	0.108***	0.0944**
		(0.0394)	(0.0392)	(0.0382)		(0.0362)	(0.0374)	(0.0371)
Smoking $_{t-1}$		0.0101	0.0198	0.0179		-0.0339	-0.0273	-0.0304
		(0.0345)	(0.0346)	(0.0332)		(0.0362)	(0.0371)	(0.0353)
OverweightOrObese $_{t-1}$		0.173***	0.174***	0.163***		0.181***	0.183***	0.171***
		(0.0312)	(0.0314)	(0.0306)		(0.0316)	(0.0322)	(0.0319)
ReduceDrinking		0.0517	0.0707**	0.0735**		0.0735*	0.0882**	0.0907**
		(0.0337)	(0.0341)	(0.0345)		(0.0392)	(0.0394)	(0.0400)
ImproveSport		-0.145***	-0.142***	-0.132***		-0.160***	-0.148***	-0.140***
		(0.0323)	(0.0313)	(0.0313)		(0.0405)	(0.0398)	(0.0401)
Δ smoking		0.0209	0.0163	0.00749		-0.0271	-0.0390	-0.0537
		(0.0645)	(0.0626)	(0.0643)		(0.0734)	(0.0706)	(0.0723)
ΔBmi_mod		0.0142*	0.0155**	0.0159**		0.0199***	0.0201***	0.0205***
		(0.00744)	(0.00752)	(0.00747)		(0.00742)	(0.00734)	(0.00732)
GetsSeparated	0.315	0.335	0.261	0.238	0.356	0.398	0.316	0.309
	(0.547)	(0.525)	(0.485)	(0.516)	(0.632)	(0.618)	(0.571)	(0.595)
GetsWidowed	0.145	0.172	0.169	0.173	-0.0191	0.0461	0.0411	0.0295
	(0.103)	(0.111)	(0.109)	(0.111)	(0.108)	(0.108)	(0.109)	(0.110)
GetsDivorced	-0.389*	-0.352*	-0.262	-0.274	-0.424***	-0.371***	-0.313*	-0.322*

	(0.204)	(0.199)	(0.256)	(0.252)	(0.134)	(0.134)	(0.162)	(0.167)
GetsPartnership	-0.551***	-0.524***	-0.504***	-0.507***	-0.555***	-0.577***	-0.565***	-0.569***
	(0.118)	(0.159)	(0.154)	(0.131)	(0.116)	(0.138)	(0.120)	(0.102)
ΔHelpFromOutside	0.0535	0.0440	0.0450	0.0456	0.0315	0.0412	0.0407	0.0446
	(0.0411)	(0.0429)	(0.0430)	(0.0425)	(0.0466)	(0.0478)	(0.0468)	(0.0458)
GetsRetired	0.0438	0.0688	0.0852*	0.0833	0.0977	0.108	0.124*	0.117*
	(0.0502)	(0.0492)	(0.0511)	(0.0507)	(0.0652)	(0.0655)	(0.0661)	(0.0654)
GetsUnemployed	-0.0376	-0.0177	0.0254	0.0293	-0.0880	-0.129	-0.0776	-0.0516
	(0.136)	(0.126)	(0.130)	(0.124)	(0.110)	(0.117)	(0.116)	(0.111)
GetsGrandchildren	-0.0691**	-0.0641**	-0.0669**	-0.0608**	-0.0548*	-0.0493	-0.0541*	-0.0523*
	(0.0266)	(0.0278)	(0.0267)	(0.0266)	(0.0294)	(0.0309)	(0.0295)	(0.0289)
N_ChronicDeseases $_{t-1}$	-0.487***	-0.495***	-0.498***	-0.531***	-0.465***	-0.476***	-0.479***	-0.513***
	(0.0176)	(0.0179)	(0.0174)	(0.0180)	(0.0190)	(0.0195)	(0.0194)	(0.0200)
HealthExp/Gdp $_{t-1}$	-0.246**	-0.209**	-0.759***	-0.0400**	-0.227**	-0.198**	-0.873***	-0.731**
	(0.0963)	(0.0940)	(0.193)	(0.0198)	(0.0997)	(0.0990)	(0.244)	(0.342)
AvoidableCHF $_{t-1}$	0.000768	0.000511	-0.0427***	-0.00946***	0.000581	0.000421	-0.0459***	-0.0352***
	(0.000476)	(0.000505)	(0.00671)	(0.00159)	(0.000536)	(0.000552)	(0.00926)	(0.0132)
Available_beds_hospitals $_{t-1}$	0.000275	0.000275	0.0139***	0.000920***	0.000321	0.000263	0.0154***	0.0116**
	(0.000244)	(0.000238)	(0.00284)	(0.000227)	(0.000259)	(0.000255)	(0.00377)	(0.00539)
HealthUnsat $_{t-1}$	0.143***	0.129***	0.126***	0.0971***	0.140***	0.123***	0.121***	0.0856***
	(0.0175)	(0.0181)	(0.0182)	(0.0182)	(0.0211)	(0.0213)	(0.0213)	(0.0201)
JointPain $_{t-1}$				0.0363				0.0478
				(0.0289)				(0.0314)
HeartTrouble $_{t-1}$				0.355***				0.396***
				(0.0669)				(0.0977)
Breathlessness $_{t-1}$				0.138***				0.119**
				(0.0504)				(0.0574)
PersistentCough $_{t-1}$				0.0709				0.120
				(0.0663)				(0.0886)
SwollenLegs $_{t-1}$				0.131**				0.105**
				(0.0499)				(0.0515)
SleepingProblems $_{t-1}$				0.0175				0.0233
				(0.0374)				(0.0402)
FallingDown $_{t-1}$				-0.0307				-0.0213
				(0.0819)				(0.0833)
FearOfFallingDown $_{t-1}$				0.0471				0.0726
				(0.0806)				(0.0797)
Dizziness $_{t-1}$				0.0888**				0.0944
				(0.0439)				(0.0634)
StomachProblems $_{t-1}$				-0.0220				-0.0662*
				(0.0331)				(0.0348)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NUTS2 dummies	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,654	6,418	6,418	6,400	6,452	6,418	6,418	6,400
R-squared	0.244	0.252	0.277	0.285	0.231	0.245	0.266	0.278

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Legend: Omitted benchmarks: age 50-54, drinking every day, single, no smoking, vigorous activity more than once a week, unemployed.

Table 2a - The impact of lagged health satisfaction on the number of chronic diseases – dummies for each of item of the health satisfaction scale - "excellent" health omitted benchmark

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
"Very good" health	0.0596	0.0688*	0.0526	0.0417	0.0573	0.0576	0.0437	0.0214
	(0.0387)	(0.0392)	(0.0382)	(0.0387)	(0.0462)	(0.0455)	(0.0465)	(0.0464)
"Good" health	0.156***	0.142***	0.134***	0.112***	0.181***	0.155***	0.151***	0.112**
	(0.0282)	(0.0311)	(0.0316)	(0.0315)	(0.0452)	(0.0461)	(0.0462)	(0.0444)
"Fair" health	0.403***	0.364***	0.351***	0.283***	0.402***	0.355***	0.343***	0.251***
	(0.0503)	(0.0524)	(0.0527)	(0.0567)	(0.0663)	(0.0650)	(0.0655)	(0.0660)
"Poor" health	0.566***	0.549***	0.524***	0.388***	0.571***	0.520***	0.504***	0.333***
	(0.0934)	(0.0987)	(0.0946)	(0.0926)	(0.104)	(0.106)	(0.103)	(0.0944)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NUTS2 dummies	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,654	6,418	6,418	6,400	6,452	6,418	6,418	6,400
R-squared	0.246	0.254	0.278	0.286	0.233	0.246	0.267	0.279

Table 2b - The impact of lagged health satisfaction on the number of chronic diseases – dummies for each of item of the health satisfaction scale - "very good" health omitted benchmark

"Excellent" health	-0.0596	-0.0688*	-0.0526	-0.0417	-0.0573	-0.0576	-0.0437	-0.0214
	(0.0387)	(0.0392)	(0.0382)	(0.0387)	(0.0462)	(0.0455)	(0.0465)	(0.0464)
"Good" health	0.0960***	0.0731**	0.0817***	0.0702**	0.123***	0.0975**	0.107***	0.0905**
	(0.0316)	(0.0305)	(0.0291)	(0.0302)	(0.0376)	(0.0371)	(0.0356)	(0.0358)
"Fair" health	0.343***	0.296***	0.298***	0.242***	0.345***	0.297***	0.299***	0.229***
	(0.0427)	(0.0445)	(0.0462)	(0.0492)	(0.0540)	(0.0529)	(0.0541)	(0.0554)
"Poor" health	0.507***	0.480***	0.471***	0.347***	0.514***	0.462***	0.460***	0.311***
	(0.0958)	(0.100)	(0.0983)	(0.0953)	(0.0938)	(0.0963)	(0.0945)	(0.0880)

Table 2c - The impact of lagged health satisfaction on the number of chronic diseases – dummies for each of item of the health satisfaction scale - "good" health omitted benchmark

"Excellent" health	-0.156***	-0.142***	-0.134***	-0.112***	-0.181***	-0.155***	-0.151***	-0.112**
	(0.0282)	(0.0311)	(0.0316)	(0.0315)	(0.0452)	(0.0461)	(0.0462)	(0.0444)
"Very good" health	-0.0960***	-0.0731**	-0.0817***	-0.0702**	-0.123***	-0.0975**	-0.107***	-0.0905**
	(0.0316)	(0.0305)	(0.0291)	(0.0302)	(0.0376)	(0.0371)	(0.0356)	(0.0358)
"Fair" health	0.247***	0.222***	0.217***	0.171***	0.222***	0.200***	0.192***	0.139***
	(0.0412)	(0.0421)	(0.0429)	(0.0448)	(0.0474)	(0.0437)	(0.0434)	(0.0459)
"Poor" health	0.411***	0.407***	0.390***	0.277***	0.391***	0.365***	0.353***	0.221***
	(0.0880)	(0.0920)	(0.0889)	(0.0860)	(0.0886)	(0.0894)	(0.0855)	(0.0808)

Table 2d - The impact of lagged health satisfaction on the number of chronic diseases – dummies for each of item of the health satisfaction scale - "fair" health omitted benchmark

"Excellent" health	-0.403***	-0.364***	-0.351***	-0.283***	-0.402***	-0.355***	-0.343***	-0.251***
	(0.0503)	(0.0524)	(0.0527)	(0.0567)	(0.0663)	(0.0650)	(0.0655)	(0.0660)
"Very good" health	-0.343***	-0.296***	-0.298***	-0.242***	-0.345***	-0.297***	-0.299***	-0.229***
	(0.0427)	(0.0445)	(0.0462)	(0.0492)	(0.0540)	(0.0529)	(0.0541)	(0.0554)
"Good" health	-0.247***	-0.222***	-0.217***	-0.171***	-0.222***	-0.200***	-0.192***	-0.139***
	(0.0412)	(0.0421)	(0.0429)	(0.0448)	(0.0474)	(0.0437)	(0.0434)	(0.0459)
"Poor" health	0.163**	0.184**	0.173**	0.105	0.169*	0.165*	0.161*	0.0821
	(0.0784)	(0.0828)	(0.0784)	(0.0768)	(0.0899)	(0.0889)	(0.0853)	(0.0821)

Table 2e - The impact of lagged health satisfaction on the number of chronic diseases – dummies for each of item of the health satisfaction scale - "poor" health omitted benchmark

"Excellent" health	-0.566***	-0.549***	-0.524***	-0.388***	-0.571***	-0.520***	-0.504***	-0.333***
	(0.0934)	(0.0987)	(0.0946)	(0.0926)	(0.104)	(0.106)	(0.103)	(0.0944)
"Very good" health	-0.507***	-0.480***	-0.471***	-0.347***	-0.514***	-0.462***	-0.460***	-0.311***
	(0.0958)	(0.100)	(0.0983)	(0.0953)	(0.0938)	(0.0963)	(0.0945)	(0.0880)
"Good" health	-0.411***	-0.407***	-0.390***	-0.277***	-0.391***	-0.365***	-0.353***	-0.221***
	(0.0880)	(0.0920)	(0.0889)	(0.0860)	(0.0886)	(0.0894)	(0.0855)	(0.0808)
"Fair" health	-0.163**	-0.184**	-0.173**	-0.105	-0.169*	-0.165*	-0.161*	-0.0821
	(0.0784)	(0.0828)	(0.0784)	(0.0768)	(0.0899)	(0.0889)	(0.0853)	(0.0821)

Table 3a - Sample split results (not controlling for symptoms)

	Health (un)satisfaction$_{t-1}$		Observations	R-squared
All	0.121***	(0.0213)	6,418	0.266
Female	0.123***	(0.0235)	2,888	0.283
Male	0.112***	(0.0285)	3,530	0.282
Older	0.131***	(0.0298)	3,360	0.294
Younger	0.111***	(0.0207)	3,058	0.256
More educated	0.115***	(0.0395)	1,311	0.311
Less educated	0.124***	(0.0213)	5,107	0.274
High income	0.104***	(0.0200)	2,888	0.274
Low income	0.142***	(0.0320)	3,528	0.289
More than 3 doctor visits	0.0964***	(0.0297)	3,465	0.315
Less than 4 doctor visits	0.107***	(0.0232)	2,953	0.234

Table 3b - Sample split results (controlling for symptoms)

	Health (un)satisfaction$_{t-1}$		Observations	R-squared
All	0.0856***	(0.0201)	6,400	0.278
Female	0.0934***	(0.0220)	2,881	0.300
Male	0.0764**	(0.0293)	3,519	0.291
Older	0.0803***	(0.0301)	3,351	0.307
Younger	0.0936***	(0.0207)	3,049	0.269
More educated	0.0729*	(0.0427)	1,306	0.329
Less educated	0.0869***	(0.0210)	5,094	0.286
High income	0.101***	(0.0203)	2,879	0.280
Low income	0.144***	(0.0330)	3,516	0.292
More than 3 doctor visits	0.0603**	(0.0299)	3,455	0.327
Less than 4 doctor visits	0.0712***	(0.0207)	2,945	0.250

For subgroup definitions see Figures 2a-2b legend.

Table 3c - Sample split results – dummies for each of item of the health satisfaction scale with "excellent" health omitted benchmark (not controlling for symptoms)

	"Very good" health		"Good" health		"Fair" health		"Poor" health		Observations	R-squared
All	0.0214	(0.0464)	0.112**	(0.0444)	0.251***	(0.0660)	0.333***	(0.0944)	6,400	0.279
Female	0.0584	(0.0606)	0.119**	(0.0456)	0.322***	(0.0868)	0.362***	(0.120)	2,881	0.301
Male	-0.00310	(0.0583)	0.104	(0.0718)	0.199**	(0.0900)	0.290**	(0.143)	3,519	0.292
Older	-0.0240	(0.0719)	0.0670	(0.0836)	0.174	(0.105)	0.348***	(0.119)	3,351	0.308
Younger	0.0931*	(0.0559)	0.164***	(0.0434)	0.355***	(0.0786)	0.272*	(0.155)	3,049	0.270
More educated	0.140	(0.0856)	0.161*	(0.0944)	0.173	(0.164)	0.515	(0.427)	1,306	0.330
Less educated	-0.0497	(0.0773)	0.0706	(0.0672)	0.230***	(0.0822)	0.272**	(0.103)	5,094	0.287
High income	0.0254	(0.0400)	0.126***	(0.0358)	0.274***	(0.0638)	0.549***	(0.159)	2,888	0.276
Low income	0.0605	(0.0950)	0.167*	(0.0934)	0.401***	(0.110)	0.537***	(0.155)	3,528	0.290
More than 3 doctor visits	0.0710	(0.0792)	0.0289	(0.0886)	0.195*	(0.112)	0.192	(0.117)	3,455	0.328
Less than 4 doctor visits	-0.0332	(0.0424)	0.0899*	(0.0493)	0.130	(0.0873)	0.737***	(0.189)	2,945	0.255

Table 3d - Sample split results – dummies for each of item of the health satisfaction scale with "excellent" health omitted benchmark (controlling for symptoms)

	"Very good" health		"Good" health		"Fair" health		"Poor" health		Observations	R-squared
All	0.0437	(0.0465)	0.151***	(0.0462)	0.343***	(0.0655)	0.504***	(0.103)	6,418	0.267
Female	0.0762	(0.0624)	0.148***	(0.0442)	0.399***	(0.0896)	0.506***	(0.133)	2,888	0.284
Male	0.0237	(0.0564)	0.151**	(0.0671)	0.297***	(0.0805)	0.453***	(0.143)	3,530	0.283
Older	0.0109	(0.0753)	0.134	(0.0890)	0.308***	(0.104)	0.563***	(0.120)	3,360	0.296
Younger	0.103*	(0.0550)	0.173***	(0.0438)	0.399***	(0.0745)	0.397**	(0.158)	3,058	0.258
More educated	0.182**	(0.0818)	0.221**	(0.0839)	0.316**	(0.150)	0.751*	(0.419)	1,311	0.313
Less educated	-0.0312	(0.0785)	0.104	(0.0672)	0.317***	(0.0809)	0.442***	(0.106)	5,107	0.276
High income	0.0201	(0.0367)	0.117***	(0.0382)	0.269***	(0.0641)	0.536***	(0.159)	2,879	0.282
Low income	0.0727	(0.0959)	0.178*	(0.0958)	0.409***	(0.116)	0.554***	(0.157)	3,516	0.2931
More than 3 doctor visits	0.0928	(0.0768)	0.0655	(0.0880)	0.276**	(0.109)	0.335***	(0.120)	3,465	0.317
Less than 4 doctor visits	-0.00723	(0.0483)	0.132**	(0.0508)	0.237***	(0.0883)	0.984***	(0.217)	2,953	0.241

Table 3e Country specific estimates with health satisfaction – not controlling for symptoms

	Health (un)satisfaction$_{t-1}$		Observations	R-squared
Austria	0.185***	(0.0330)	1,439	0.228
Germany	0.147***	(0.0260)	2,723	0.272
Sweden	0.0669***	(0.0193)	3,372	0.214
Netherlands	0.0812***	(0.0196)	3,152	0.266
Spain	0.0822***	(0.0304)	2,189	0.320
Italy	0.0831***	(0.0215)	3,465	0.234
France	0.0840***	(0.0191)	3,428	0.222
Germany	0.121***	(0.0220)	2,756	0.220
Greece	0.0609***	(0.0214)	2,097	0.176
Switzerland	0.0714***	(0.0242)	1,608	0.279
Belgium	0.0995***	(0.0187)	4,615	0.246
Czech Republic	0.143***	(0.0465)	1,190	0.295
Poland	0.106***	(0.0402)	1,407	0.347

Table 3f - Country specific estimates with health satisfaction - controlling for symptoms

	Health (un)satisfaction$_{t-1}$		Observations	R-squared
Austria	0.199***	(0.0316)	1,444	0.214
Germany	0.163***	(0.0243)	2,729	0.261
Sweden	0.0927***	(0.0183)	3,382	0.204
Netherlands	0.0995***	(0.0191)	3,166	0.258
Spain	0.126***	(0.0291)	2,198	0.309
Italy	0.114***	(0.0210)	3,472	0.226
France	0.105***	(0.0184)	3,484	0.213
Denmark	0.150***	(0.0210)	2,765	0.213
Greece	0.0764***	(0.0206)	2,099	0.161
Switzerland	0.106***	(0.0242)	1,614	0.258
Belgium	0.119***	(0.0180)	4,629	0.240
Czech Republic	0.191***	(0.0456)	1,199	0.272
Poland	0.143***	(0.0388)	1,414	0.331

Table 3g - Country specific estimates with health satisfaction -– dummies for each of item of the health (un)satisfaction scale with "excellent" health omitted benchmark - controlling for symptoms

	"Very good" health		Good" health		"Fair" health		"Poor" health		Observations	R-squared
Austria	0.114	(0.0766)	0.282***	(0.0781)	0.473***	(0.102)	0.862***	(0.206)	1,439	0.230
Germany	0.00747	(0.0768)	0.0994	(0.0748)	0.359***	(0.0905)	0.468***	(0.130)	2,724	0.274
Sweden	0.0557	(0.0438)	0.107**	(0.0471)	0.219***	(0.0705)	0.274**	(0.121)	3,372	0.214
Netherlands	0.0474	(0.0502)	0.120***	(0.0462)	0.221***	(0.0664)	0.470***	(0.156)	3,152	0.266
Spain	0.00747	(0.111)	0.0123	(0.106)	0.183	(0.117)	0.248*	(0.147)	2,189	0.321
Italy	-0.000386	(0.0690)	0.0231	(0.0625)	0.207***	(0.0717)	0.286***	(0.108)	3,465	0.236
France	0.0242	(0.0541)	0.0872*	(0.0493)	0.289***	(0.0641)	0.217**	(0.0978)	3,430	0.225
Denmark	0.128***	(0.0433)	0.183***	(0.0526)	0.480***	(0.0788)	0.330**	(0.149)	2,756	0.223
Greece	0.0194	(0.0388)	0.113**	(0.0456)	0.203***	(0.0663)	0.108	(0.112)	2,097	0.178
Switzerland	0.0800	(0.0511)	0.184***	(0.0555)	0.146	(0.0951)	0.333*	(0.186)	1,608	0.280
Belgium	-0.0274	(0.0462)	0.0541	(0.0453)	0.289***	(0.0631)	0.345***	(0.116)	4,615	0.249
Czech Republic	0.207	(0.154)	0.428***	(0.155)	0.438**	(0.170)	0.751***	(0.232)	1,190	0.297
Poland	0.248	(0.242)	0.251	(0.229)	0.294	(0.240)	0.492**	(0.250)	1,408	0.347

Table 3h - Country specific estimates with health satisfaction -– dummies for each of item of the health (un)satisfaction scale with "poor" health omitted benchmark - not controlling for symptoms

	"Very good" health		Good" health		"Fair" health		"Poor" health		Observations	R-squared
Austria	0.104	(0.0763)	0.293***	(0.0778)	0.506***	(0.0982)	0.893***	(0.205)	1,444	0.215
Germany	0.00307	(0.0760)	0.106	(0.0737)	0.385***	(0.0879)	0.517***	(0.125)	2,730	0.263
Sweden	0.0761*	(0.0433)	0.147***	(0.0463)	0.292***	(0.0672)	0.402***	(0.118)	3,382	0.204
Netherlands	0.0502	(0.0497)	0.128***	(0.0455)	0.267***	(0.0636)	0.580***	(0.155)	3,166	0.260
Spain	0.0212	(0.111)	0.0499	(0.105)	0.266**	(0.115)	0.416***	(0.142)	2,198	0.311
Italy	0.00838	(0.0686)	0.0453	(0.0622)	0.266***	(0.0708)	0.418***	(0.106)	3,472	0.229
France	0.0274	(0.0531)	0.0959**	(0.0483)	0.339***	(0.0619)	0.300***	(0.0943)	3,486	0.215
Denmark	0.147***	(0.0427)	0.218***	(0.0518)	0.563***	(0.0747)	0.460***	(0.145)	2,765	0.216
Greece	0.0173	(0.0387)	0.122***	(0.0452)	0.236***	(0.0634)	0.181	(0.111)	2,099	0.162
Switzerland	0.0953*	(0.0509)	0.219***	(0.0550)	0.278***	(0.0943)	0.494**	(0.198)	1,614	0.258
Belgium	-0.0224	(0.0459)	0.0700	(0.0445)	0.338***	(0.0602)	0.411***	(0.114)	4,629	0.244
Czech Republic	0.187	(0.154)	0.435***	(0.154)	0.496***	(0.168)	0.920***	(0.232)	1,199	0.274
Poland	0.205	(0.227)	0.204	(0.214)	0.284	(0.223)	0.557**	(0.234)	1,415	0.332

For the terms used in the health (un)satisfaction question in the original language see Appendix 2

Table 4. - The impact of lagged health (un)satisfaction on specific diseases

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Arthritis								
Health (un)satisfaction$_{t-1}$	0.0336***	0.0316***	0.0306***	0.0301***	0.0268***	0.0263***	0.0251***	0.0245***
	(0.00664)	(0.00713)	(0.00750)	(0.00761)	(0.00834)	(0.00867)	(0.00888)	(0.00901)
Cataracts								
Health (un)satisfaction$_{t-1}$	0.0113***	0.00970**	0.00981**	0.00954**	0.0128***	0.0105**	0.0103**	0.00955*
	(0.00354)	(0.00384)	(0.00386)	(0.00397)	(0.00424)	(0.00467)	(0.00472)	(0.00492)
Cholesterol								
Health (un)satisfaction$_{t-1}$	0.0311***	0.0285***	0.0283***	0.0285***	0.0383***	0.0328***	0.0325***	0.0318***
	(0.00554)	(0.00577)	(0.00598)	(0.00601)	(0.00679)	(0.00630)	(0.00645)	(0.00645)
Diabetes								
Health (un)satisfaction$_{t-1}$	0.00652*	0.00484	0.00545	0.00587*	0.00485	0.00373	0.00362	0.00399
	(0.00347)	(0.00342)	(0.00356)	(0.00350)	(0.00350)	(0.00370)	(0.00384)	(0.00392)
Femoral fracture								
Health (un)satisfaction$_{t-1}$	0.00365*	0.00326	0.00284	0.00301	0.00555**	0.00505**	0.00475*	0.00487*
	(0.00203)	(0.00217)	(0.00226)	(0.00225)	(0.00256)	(0.00250)	(0.00265)	(0.00261)
Heart attack								
Health (un)satisfaction$_{t-1}$	0.00659	0.00471	0.00416	0.00406	0.00465	0.00288	0.00297	0.00315
	(0.00403)	(0.00394)	(0.00394)	(0.00394)	(0.00447)	(0.00369)	(0.00389)	(0.00377)
Hypertension								
Health (un)satisfaction$_{t-1}$	0.0217***	0.0187***	0.0193***	0.0203***	0.0181***	0.0134*	0.0132*	0.0140**
	(0.00586)	(0.00673)	(0.00693)	(0.00674)	(0.00656)	(0.00678)	(0.00697)	(0.00662)
Lung disease								
Health (un)satisfaction$_{t-1}$	0.0104***	0.00883**	0.00824**	0.00834**	0.00908**	0.00760**	0.00727**	0.00738*
	(0.00380)	(0.00379)	(0.00390)	(0.00396)	(0.00359)	(0.00354)	(0.00363)	(0.00376)
Osteoporosis								
Health (un)satisfaction$_{t-1}$	0.00357	0.00514	0.00428	0.00437	0.00589	0.00579	0.00469	0.00466
	(0.00401)	(0.00439)	(0.00447)	(0.00435)	(0.00399)	(0.00423)	(0.00438)	(0.00421)
Parkinson								
Health (un)satisfaction$_{t-1}$	0.00252**	0.00216*	0.00199	0.00202	0.000562	-8.53e-06	-0.000266	-0.000242
	(0.00116)	(0.00124)	(0.00132)	(0.00131)	(0.00145)	(0.00169)	(0.00186)	(0.00187)
Ulcer								
Health (un)satisfaction$_{t-1}$	0.00636	0.00794*	0.00788*	0.00792*	0.0105*	0.0114**	0.0111**	0.0114**
	(0.00407)	(0.00415)	(0.00404)	(0.00413)	(0.00540)	(0.00519)	(0.00534)	(0.00549)
Stroke								
Health (un)satisfaction$_{t-1}$	0.00201	0.00115	0.00105	0.00112	0.00220	0.00142	0.00139	0.00150
	(0.00248)	(0.00265)	(0.00271)	(0.00272)	(0.00275)	(0.00319)	(0.00331)	(0.00332)

Full estimate specification for each column correspond to those in Table 1

Table 5. The effect of health (un)satisfaction on selected illness transitions (1=remaining ill, 2 = getting ill, 3 = recovering from illness)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	1	2	3	1	2	3	1	2	3
Cancer									
Health (un)satisfaction$_{t-1}$	0.289	0.136**	0.00134	0.306	0.137***	0.0327	0.305	0.143***	0.0379
	(0.179)	(0.0597)	(0.0391)	(0.189)	(0.0461)	(0.0302)	(0.193)	(0.0445)	(0.0315)
Heart attack									
Health (un)satisfaction$_{t-1}$	0.444***	0.331***	0.209***	0.392***	0.274***	0.193***	0.366***	0.286***	0.187***
	(0.0445)	(0.0358)	(0.0454)	(0.0519)	(0.0404)	(0.0628)	(0.0468)	(0.0401)	(0.0633)
Arthritis									
Health (un)satisfaction$_{t-1}$	0.474***	0.313***	0.103	0.480***	0.305***	0.135*	0.435***	0.276***	0.112
	(0.0552)	(0.0546)	(0.0810)	(0.0567)	(0.0666)	(0.0784)	(0.0728)	(0.0635)	(0.0876)
Osteoporosis									
Health (un)satisfaction$_{t-1}$	0.622***	0.371***	0.491***	0.626***	0.365***	0.480***	0.607***	0.357***	0.508***
	(0.0617)	(0.0761)	(0.0737)	(0.0634)	(0.0798)	(0.0727)	(0.0568)	(0.0685)	(0.0771)
Cataracts									
Health (un)satisfaction$_{t-1}$	-0.0942	0.142***	-0.196**	-0.0507	0.143***	-0.159**	-0.0574	0.126**	-0.143**
	(0.0813)	(0.0516)	(0.0764)	(0.0863)	(0.0466)	(0.0707)	(0.0871)	(0.0527)	(0.0641)

Table legend. 1: remaining ill in two consecutive periods; 2: getting ill from one to the following period; 3: recovering from illness from one to the following period. Columns 1-3 specification (6) in Table 1. Columns 4-6 specification (7) in Table 1. Columns 7-9 specification (8) in Table 1.

Appendix 1 The Health (un)satisfaction question in the SHARE survey in original language

GREECE
Θα λέγατε ότι η υγεία σας είναι â??.
1. Αριστη
2. Πολύ καλή
3. Καλή
4. Μέτρια
5. Κακή

ISRAEL (Arabic)
...بـ و ضع صحـ تك بـ أن يـ ن/تـ قول كـ نت هل
1. ممـ تاز.
2. جـ يد جداً.
3. جـ يد.
4. بـ أس لا
5. سيء .

ISRAEL (Russian)
Вы бы сказали, что Ваше здоровье...
1. Очень хорошее
2. Хорошее
3. Неплохое
4. Плохое
5. Очень плохое

ENGLISH
PH003_HealthGen2
Would you say your health is...
1. Excellent
2. Very good
3. Good
4. Fair
5. Poor

GERMANY

AUSTRIA
Würden Sie sagen, Ihr Gesundheitszustand ist...
IWER: Vorlesen
1. Ausgezeichnet
2. Sehr gut
3. Gut
4. Mittelmäßig
5. Schlecht

BELGIUM (DUTCH)
Is, naar uw mening, uw gezondheid...
1. uitstekend
2. heel goed
3. goed
4. redelijk
5. slecht

BELGIUM (FRENCH)
Diriez-vous que votre santé est...
1. Excellente
2. Très bonne
3. Bonne
4. Acceptable
5. Médiocre

CZECH REPUBLIC
Řekla byste ľe Vaše zdraví (Váš zdravotní stav) je ...
1. Vynikající
2. Velmi dobrý
3. Dobrý
4. Průměrný
5. špatný

DENMARK
Ville De sige, at Deres helbred er...
1. Fremragende
2. Meget godt
3. Godt
4. Nogenlunde
5. Dårligt

ESTONIA (Estonian)
Kas te ütleksite, et teie tervis on...
1. suurepärane
2. väga hea
3. hea
4. rahuldav
5. halb

ESTONIA (Russian)
Вы бы сказали, что Ваше здоровье...
1. Отличное
2. Очень хорошее
3. Хорошее
4. Удовлетворительное
5. Плохое

FRANCE
Diriez-vous que votre santé est...
1. Excellente
2. Très bonne
3. Bonne
4. Acceptable
5. Médiocre

SLOVENIA
Ali bi rekli, da je vaše zdravje...
1. Odlično

Würden Sie sagen, Ihr Gesundheitszustand ist...
1. Ausgezeichnet
2. Sehr gut
3. Gut
4. Mittelmäßig
5. Schlecht

HUNGARY
Megítélése szerint az Ön egészségi állapota ...
1. kitűnő
2. nagyon jó
3. jó
4. elfogadható
5. gyenge

ITALY
Direbbe che la sua salute è...
1. Ottima
2. Molto buona
3. Buona
4. Discreta
5. Scadente

SWITZERLAND (French)
Diriez-vous que votre santé est...
1. Excellente
2. Très bonne
3. Bonne
4. Acceptable
5. Médiocre

NETHERLANDS
Is, naar uw mening, uw gezondheid...
1. uitstekend
2. heel goed
3. goed
4. redelijk
5. slecht

POLAND
Czy [Pana/Pani] zdaniem, [Pana/Pani] stan zdrowia jest...
1. Doskonały
2. Bardzo dobry
3. Dobry
4. Zadowalający
5. Zły

PORTUGAL
Diria que a sua saúde é...
1. Excelente
2. Muito boa
3. Boa
4. Razoável
5. Má

SWITZERLAND (German)
Würden Sie sagen, Ihr Gesundheitszustand ist...
1. Ausgezeichnet
2. Sehr gut
3. Gut
4. Mittelmäßig
5. Schlecht

2. Zelo dobro
3. Dobro
4. Zadovoljivo
5. Slabo

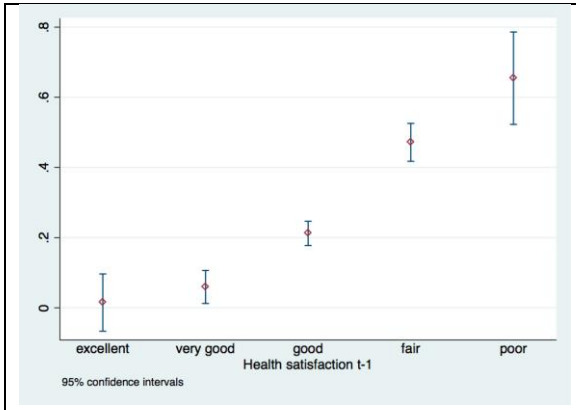
SPAIN
Diría Ud. que su salud es...
1. Excelente
2. Muy buena
3. Buena
4. Pasable
5. Mala

SWEDEN
Tycker du att din hälsa är...
1. Utmärkt
2. Mycket god
3. God
4. Ganska god
5. Dålig

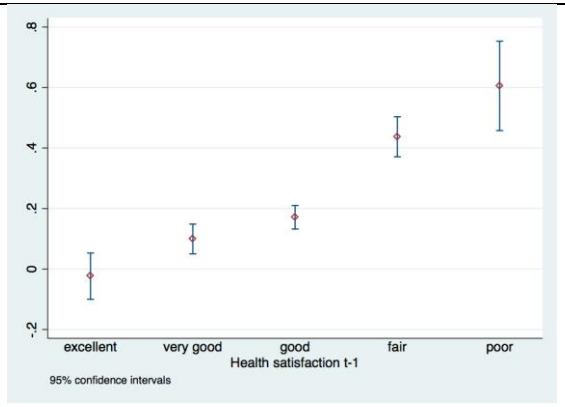
SWITZERLAND (Italian)
Direbbe che la sua salute è...
1. Ottima
2. Molto buona
3. Buona
4. Discreta
5. Scadente

Appendix 2

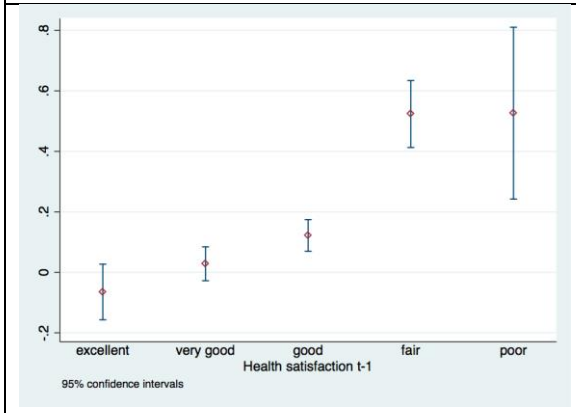
Figure A1– Health satisfaction and insurgence of chronic diseases by socio-demographic factors for individuals reporting one chronic disease in time t-1



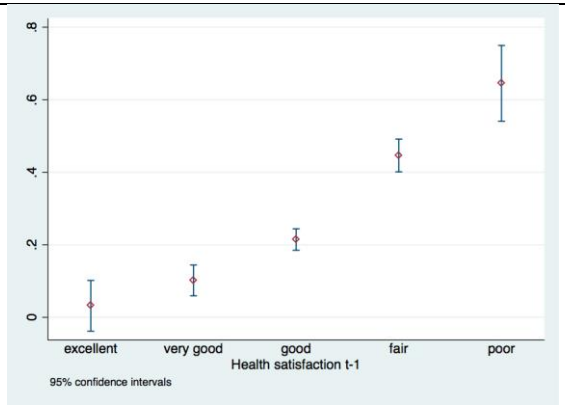
Female



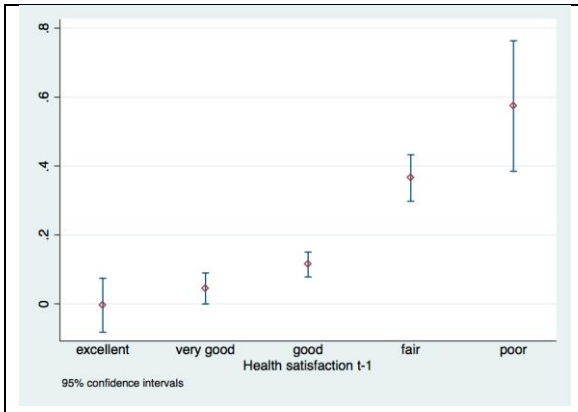
Male



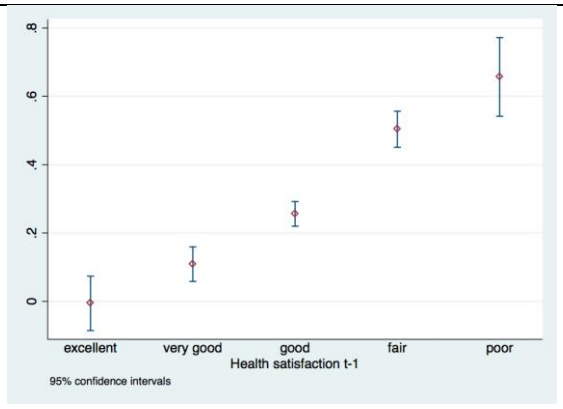
High educated



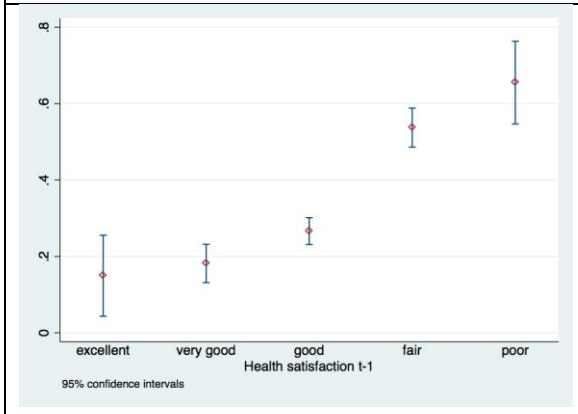
Low educated



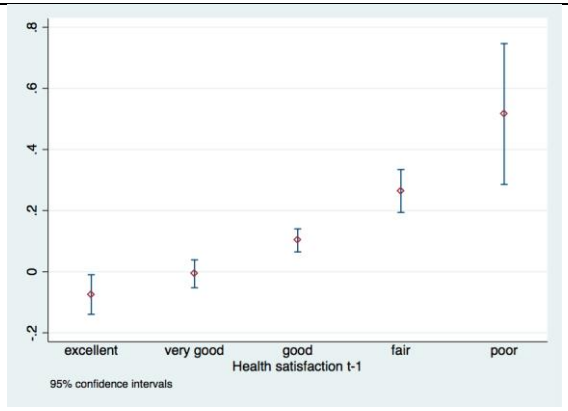
High income



Low income

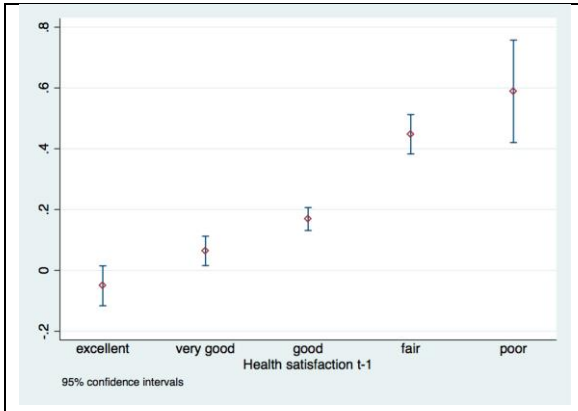


More doctor visits

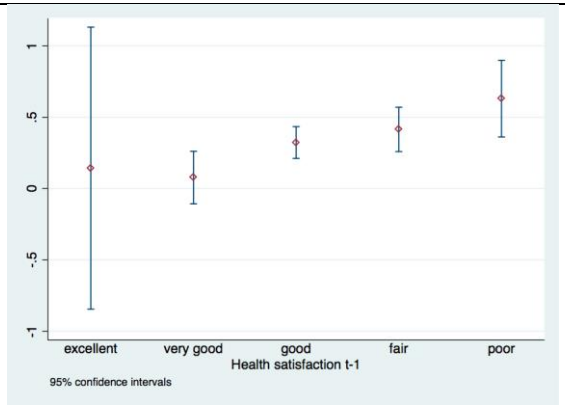


Less doctor visits

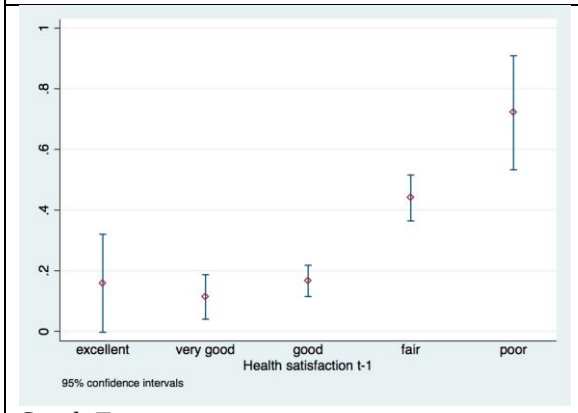
Figure A2— Health satisfaction and insurgence of chronic diseases by geographic areas for individuals reporting one chronic disease in time t-1



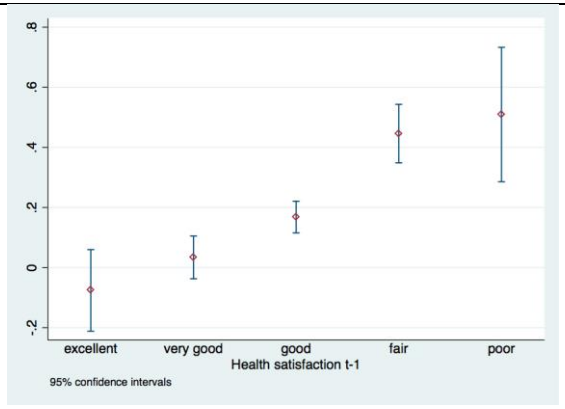
North Europe



Eastern Europe



South Europe



Centre Europe