Subjective Health Status of the Older Population: Is it related to Country-Specific Economic Development Measures?

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Abstract:
It is now common to use the individual's self-assessed-health-status (SAHS), which expresses her/his holistic 'internal' view, as a measure of health. The use of SAHS is supported by numerous studies that show that SAHS is a better predictor of mortality and morbidity than medical records. The 2011 wave of the rich Survey of Health Aging and Retirement Europe (SHARE) is used for the exploration of the full spectrum of factors behind the health-status in 16 European countries, using about 33 thousand observations. Special emphasis is given to the *examination of development country measures and their correlation with aggregate country-levels of subjective-health.* The empirical analysis includes 2 layers: (i) estimation of SAHS equations, using a large set of personal socio-economic characteristics as explanatory variables (controlling for country fixed-effects); and (ii) study of the correlations between average country SAHSs – controlled for differences in populations' socio-economic characteristics – and objective country-specific aggregate macroeconomic development variables (logarithm of per-capita GDP; the Human Development Index; life expectancy at birth; per-capita expenditures on health; percentage of GDP spent on education; income inequality). The second part of the empirical examination (that borrows the technique used by Oswald and Wu, 2010) is novel and will lead to an answer to our core question: *Is subjective-health affected by the country's economic development level?*
The main findings are: (i) the estimation of self-assessed-health-status regressions provides clear evidence of the *effects of a large set of socio-economic variables on the individual's subjective rating of her/his health status, beyond and above the obvious effects of health conditions;* (ii) the second, more innovative, finding is related to the effects of country-specific economic development variables on the subjective-health of the residents, beyond and above those of the personal characteristics. Country dummy variables are added to the SAHS regression, to derive the country-specific aggregate SAHSs. These country dummies are then examined for correlations with a set of objective country economic development measures. It appears that *the first five development measures (logarithm of per-capita GDP; the Human Development Index; life expectancy at birth; per-capita expenditures on health; percentage of GDP spent on education) are positively and significantly correlates with aggregate SAHSs, while Income Inequality does not correlate significantly with SAHS.*
It is therefore not only 'who you are' that affects the subjective rating of health, but also 'in which country you live'. *Those who live in more developed countries report higher levels of subjective-health (everything else being equal).* Overall, our findings indicate that what is true for the individual is also true for the country as a whole: both *individual* and *country-level development* factors affect subjective-health and the two levels accumulate and reinforce the subjective-health assessment. This seems to be at odds with the 'Easterlin Paradox' that emphasizes within country individual effects and denies cross-country effects.

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1. Introduction and motivation

Education and health are important factors behind economic development of states. There is a dual relationship between education/health and economic development. The educational attainments and the health status of the population affect its level of economic development (e.g., on education and development, see, Benhabib and Spiegel, 1994; Krueger and Lindahl, 2001; Kim and Terada-Hagiwara, 2010. On health and development, see, Commission on Macroeconomics and Health, 2001; Case, 2002; Bloom et al., 2004; Acemoglu and Johnson, 2007; Deaton, 2007). Causality can however also run in the opposite direction: from the country's economic status to education/health of the population (e.g., Ruhm, 2000, 2006, 2008; Bezruchka, 2009). In this study we focus on this path of causality and explore if individuals who live in more developed countries report higher levels of subjective-health (Self-Assessed-Health-Status – SAHS), everything else being equal. Specifically, we look at country effects on SAHS (controlling for individual socio-economic/demographic/health-related variables) and explore whether these country dummies (that represent country average levels of SAHSs) are significantly correlated with a battery of country development measures (logarithm of per-capita GDP; the Human Development Index – HDI; life expectancy at birth; per-capita expenditures on health; percentage of GDP spent on education; income inequality). In other words: are, otherwise similar residents, who live in more advanced/developed countries, reporting higher SAHSs? To explore the correlation between country-specific average *net* SAHSs and country development parameters, we borrow the technique employed by Oswald and Wu (2010), who looked at subjective-well-being (SWB) correlates within a sample of US citizens. They estimated a subjective well-being equation that included the explanatory variables of incomes and demographic characteristics of the sampled individuals, as well as dummy variables for the states of residence of the individuals. The standardized state dummy variables were then confronted with objective measures of US states, suggested in Gabriel and colleagues

(2003).[1] It appears that "there is a state-by-state match ($r=0.6$, $p<0.001$) between subjective and objective well-being" (page 576). In other words: SWB is significantly affected not only by personal traits but also by state characteristics. Our study looks at European countries (analogous to US states), using country objective macro measures (in parallel to the state measures), with the goal of exploring correlations between country average SAHSs and economic development measures.

Questions on subjective health were recently introduced in questionnaires used within the social sciences and the medical professions. The core variable – self-assessed-health-status (SAHS) - is evaluated by the respondents. Respondents are asked to assess their health-status by rating their overall health on a scale with 4-10 categories, ranging from 'excellent' to 'very poor', or some variant.[2] In the SHARE questionnaire (see below the description of the SHARE survey) the question is: "On a scale from 1 to 5, where 1 describes the worst imaginable condition and 5 the best imaginable condition, how do you rate your health in general?"[3] A person's own understanding of her/ his health is the 'internal' view of health, as opposed to 'external' views that are based on observations of doctors or pathologists (Sen, 2002). The external view of health has come under considerable criticism, particularly from anthropological perspectives, for taking a distanced and less sensitive view of illness and health (Kleinman, 1988, 1995).

The 'internal', view expressed by the 'self-assessed-health-status', has increasingly become a common measure of health in empirical research (e.g., Deaton and Paxson, 1998; Kennedy et al., 1998; Smith, 1999). The belief that the individual is the best evaluator of her/his health status was supported by the findings of numerous studies, which indicated that self-ratings of health are good predictors of mortality and morbidity even more than medical records. The first clear demonstration came with Mossey and

[1] The measures are based on objective state conditions, such as: temperature, wind speed, sunshine, coastal land, precipitation, inland water, public land, national parks, hazardous waste sites, environmental 'greenness', commuting time, violent crime, air-quality, student-teacher ratio, local taxes, local spending on highways and education, and cost of living (see Oswald and Wu, 2010, pp. 577-578).

[2] The subjective view of the respondent's health-status follows many studies on subjective well-being (SWB). For instance: In the World Value Survey the question is "Taking all things together, would you say you are: very happy; quite happy; not happy; not at all happy" (The economics literature tends to relate to 'well-being', 'happiness' and 'life satisfaction' largely interchangeably, whereas the psychology literature distinguishes between these 3 concepts). The holistic view of well-being replaced the old use of income as a sole indicator of the individual's well-being.

[3] In some waves of the SHARE survey (i.e., the 2006 wave) the categories range from 0 to 10 (11categories). In the most recent 2011 wave, which is used for this study, the range is 1-5.

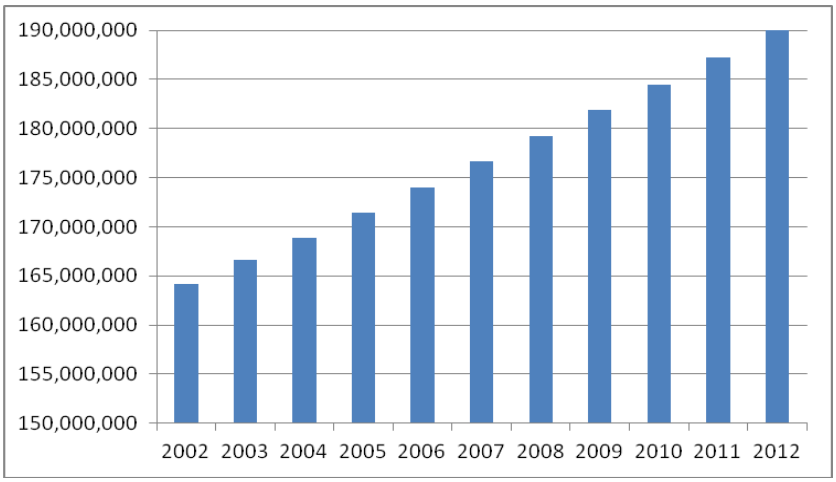
Shapiro's (1982) analysis of the Manitoba Longitudinal Study, which showed that elderly Canadians' self-ratings of health were better predictors of seven-year survival than their medical records or their self-reports of medical conditions. Idler and Benyamini (1997) quote evidence from no less than 27 studies documenting that a respondent's global health rating is an independent powerful predictor of subsequent individual mortality. Benyamini and Idler (1999) identified 19 additional studies that were published during the period 1995 to 1998. Some of the more recent studies in the same line are: Ferraro and Kelley-Moore (2001); Wang at al. (2001); van Doorslaer and Gerdtham (2003); Nagarajan and Pushpanjali (2008); Parissis et al. (2009) and Cesari et al. (2009). Up-to-date over 200 studies have reported robust relationships between self-assessments-of-heath with mortality and morbidity (Mora et al., 2008). The respondents in the above cited sample surveys are heterogeneous in terms of: country of residence, socio-economic status, race, ethnicity, education, preventive practices, and health conditions – indicating the universality of the phenomenon.

Health starts to deteriorate around the age of 50. It is therefore natural to examine the determinants of SAHS using samples from the population aged 50 or above.[4] Moreover, the share of this sub-population is constantly growing in virtually all countries (see Figure 1) and catering to its health needs, is of great socio-political importance.[5]

[4] A sub-set of papers in the blooming field of subjective well-being (SWB) also focuses on the older population when there is a growing concern about well-being (for instance: Diener and Suh, 1997; Clarke et al., 2000; Smith, 2001; Schilling, 2005; Uppal, 2006; Blanchflower and Oswald, 2008; Gwozdz and Sousa-Poza, 2009).

[5] It has been argued that public health decisions are quite often poorly responsive to the patient's own understanding of suffering and healing. The reason is that public policy reacts to medical components of health and illness, while individuals have adopted an expanded more complex and holistic definition of health that encompasses more than simple medical considerations. A better understanding of the determinants of the 'self-assessed-health-status', including macro-level determinants, will therefore facilitate improvements in public health policies that will better cater to individuals' needs and could even lead to the extension of life expectancy.

Figure 1: Size of population aged 50 and over, Europe



Source: Eurostat (2013)

The very rich Survey of Health Aging and Retirement Europe (SHARE) data base is an ideal data set for the exploration of the full spectrum of factors behind the SAHS. It is a multidisciplinary and cross-national panel data set of micro data on health, socio-economic status and social and family networks of more than 45,000 individuals aged 50 or over. They are a balanced representation of the various regions in Europe, ranging from Scandinavian countries (Denmark and Sweden), through Central Europe (Austria, France, Germany, Switzerland, Belgium, the Czech Republic and the Netherlands) and Eastern Europe (Poland, Hungary, the Slovak Republic and Estonia), to the South (Spain, Italy and Portugal).

The empirical analysis includes 2 layers: (i) estimation of SAHS equations, using a set of personal socio-economic characteristics as explanatory variables (controlling for country fixed-effects). The SHARE data base facilitates the examination of variables that have not been explored before, such as: having a living mother/father; and (ii) study of the correlations between average country SAHSs – controlled for differences in populations' socio-economic characteristics – and objective country-specific aggregate macroeconomic development variables (logarithm of per-capita GDP; the Human Development Index; life expectancy at birth; per-capita expenditures on health; percentage of GDP spent on education; income inequality). The second part of the empirical examination will lead to an answer to our core question: Is subjective-health affected by the country's economic development level?

Deaton (2008) looked at the 'satisfaction with health' versus a set of subjective aggregate country measures of health (in particular, life expectancy and country expenditures on health) and found that they are uncorrelated across 132 countries. Our study relates to a larger set of country-specific measures and their correlation with country SAHSs (controlling for differences in personal characteristics), using data for European countries, and a different statistical analysis. A comparison of the results with those presented by Deaton is obviously of interest. Moreover, evidence (based on the SHARE rich data set) on the relationship between the country's economic/social/welfare performance and the population's average SAHS, is also relevant for the heated debate on the (so-called) Easterlin Paradox that related to SWB and suggested that wealthy people tend to be happier than poor people in the *same country*, but that there is no such relationship *across countries*, or *over time*. In a series of studies Easterlin has examined the relationship between happiness and GDP, both across countries and within individual countries through time, and found little significant evidence of a link between aggregate income and aggregate happiness. He concluded: "*what is true for the individual is not true for society as a whole*" (Easterlin, 1973, page 4, italics in the original). Our core findings can be used to test the Easterlin Paradox, twisting it from the well-being domain to health. See discussion in Section 4.

The structure of the paper is the following: The next section describes the SHARE data set and the variables used for the econometric analysis. The empirical analysis of the determinants of SASH, the normalized country coefficients and their correlations with a set of country-specific development variables are presented in Section 3, and Section 4 summarizes and concludes.

2. The SHARE (**S**urvey of **H**ealth, **A**ging and **R**etirement in **E**urope**) data base**

2.1 *The data base*

SHARE is a unique, innovative, carefully designed, multidisciplinary and cross-national panel data base of micro data on health, socio-economic background, and social and family networks. It includes more than 45,000 individuals aged 50 or over. SHARE is coordinated centrally at the Mannheim Research Institute for the Economics of Aging, with substantial central tasks in Italy and the Netherlands. It is a collaborative effort of

more than 150 researchers world-wide, organized in multidisciplinary national teams and cross-national working groups. A scientific monitoring board and a network of advisors help to maintain and improve the project's scientific standards. The main funding comes from the European Commission (5^{th}, 6^{th} and 7^{th} framework programs).

SHARE will constitute a longitudinal data base. Three waves have been completed already – in 2004, 2007 and 2011. Eleven countries have contributed data to the 2004 SHARE baseline data set. They are a balanced representation of the various regions in Europe, ranging from Scandinavian countries (Denmark and Sweden), through Central Europe (Austria, France, Germany, Switzerland, Belgium and the Netherlands) to the Mediterranean (Spain, Italy and Greece). The Czech Republic, Poland and Ireland joined SHARE in 2006 and participated in the second wave of data collection. The remaining EU countries, Finland, Hungary, Portugal and Slovenia, participated in the project's third wave in the year 2011.

Data collected include health variables (e.g. self-reported health, health conditions, physical and cognitive functioning, health behavior, use of health-care facilities); bio-markers (e.g. grip strength, body-mass index, peak flow); psychological variables (e.g. psychological health, well being, life satisfaction); economic variables (e.g. current work activity, job characteristics, opportunities to work past retirement age, sources and composition of current income, wealth and consumption, health insurance, housing, education); and social support variables (e.g. marital variables, assistance within families, transfers of income and assets, social networks, volunteer activities).

Daniel McFadden concluded that "*SHARE has become a world-class example of research infrastructure*". This incredible data base will facilitate our goal of exploring the various determinants of SAHS, as well as the country-specific effects, leading to policy implications for the improvement of the health status of European elderly.

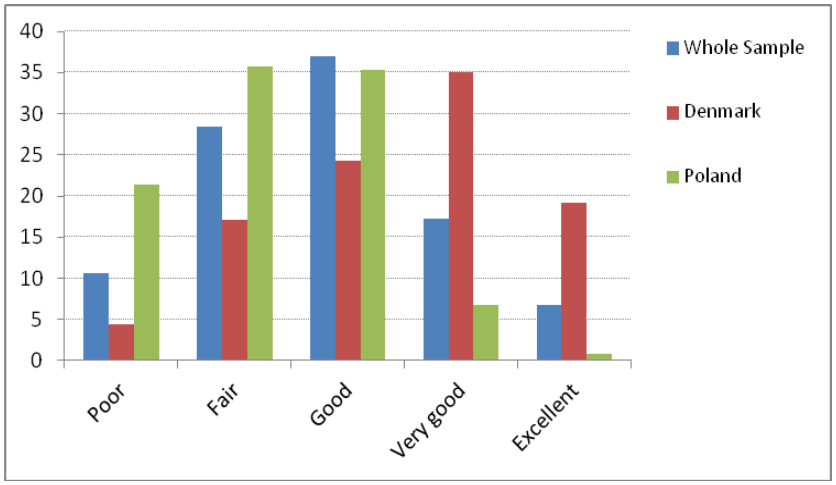
2.2 *Variables used for the econometric analysis: definitions, rational for use, and descriptive statistics*

The *dependent variable* is the individual's subjective self-assessment of her/his health status that has 5 categories and is based on the question: "On a scale from 1 to 5, where '1' describes the worst imaginable condition and '5' describes the best imaginable

condition, how do you rate your health in general?" The average SAHS score for the whole sample is 2.8.

Figure 2 plots the distribution (in percentages) of responses to the SAHS question, for the whole sample, and also for Denmark and Poland (which have very different levels of development. The inclusion of all the 16 countries, that are included in the sample, results in a cluttered graph). As is evident from the graph, there are substantial differences between Denmark and Poland in the subjective-health evaluations. For instance: The modal value is "Good" for the whole sample (37% chose this value). The modal value for Poland is lower: "Fair" (35.7% marked this value as their SAHS) while the modal value in Denmark is "Very Good" (reported by 35%). The country differences might stem from differences in health conditions, from country-specific macro development variables, and also from cultural and language differences.

Figure 2: Distribution (percentages) of responses to SAHS question, Share 2011



The independent variables include: Socio-demographic variables (gender, age, education, marital status, number of children in household, parents alive, pension); medically based health (drug use, diagnoses of medical problems, use of medical services, health symptoms, and quality of eyesight); functional capacity, cognitive functioning,

behavioral risks (alcohol use and obesity), country dummies.[6] Appendix Table A.1 summarizes the descriptive statistics of the research variables.

(i) Socio-demographic variables

Gender: Gender is introduced using a dummy variable that is set to 1 for male respondents. In our sample 45.1 percent are males. Research indicates that at older age women experience more health-related problems and functional limitations than men (e.g., Murtagh and Hubert, 2004). This could lead to lower levels of SAHS (when the health-related differences are not controlled for).

Age dummies: For age we use four dummy variables, relating to the age groups of: 61-to-70; 71-to-80; 81-to-90; 91 and over; with the reference group being age of 50-to-60. In our sample 27.7 percent are at the age of 50-60; 37.3 percent belong to the age group of 61-70; and 25.1, 9.4 and 0.6 percent belong to each of the groups of 71-80, 81-90, and over 90, respectively. Against the rich literature on age effects on well-being[7], the literature on age effects on SAHS is scarce. Deaton (2008) who looked at correlates of well-being and health in 132 countries (using data of the 2006 Gallup World Polls) distinguished between rich countries and poor ones. He found that in rich countries it is people in their 50th, not in their 60s or 70s, who report the least satisfaction with their health. The explanation he offered was that this group experienced health problems for the *first* time, suggesting that it is not poor health that is hard to tolerate, but the first indications of mortality. On the other hand, in the poor countries, and in particular in Africa where morbidity has been a constant companion throughout life, health satisfaction declines rapidly with age. If Deaton's speculation about a minimum point in SAHS at the 50s is correct, and as our data set covers European developed countries and populations at the age of 50 and over, we should expect the lowest level of SAHS (ceteris paribus) at the age group of 50-60 (our reference group).

[6] For a literature on the effects of various socio-demographic, medical, and behavioral variables, see (among others): Garrity et. al., 1978; Segovia et al., 1989a, 1989b; Fylkesnes and Ford, 1992; Moum, 1992; Smith et al., 1994; Smith, 1999; Benyamini et al., 2000; Rytt and Singer, 2003; Rozenkranz et. al., 2003.

[7] See for instance, Mroczek and Kolanz (1998), Clark (2003), Easterlin (2006), and Blanchflower and Oswald (2008) who demonstrated signs of a U–shape through the life cycle. Glenn (2009) claimed that there is no evidence for a U-shaped relationship. Traditional psychology suggests that happiness is either flat or slightly increasing in age. Diener and Suh (1997) who summarized, in a review article, findings from a large set of studies, concluded that life satisfaction shows no decline with age, despite the fact that certain resources such as: health, income, and marriage (that correlate with well-being) deteriorate with age.

Education: Education is introduced by a dummy variable that equals 1 if the respondent has at least 13 years of schooling (30.3 percent of respondents belong to this group). Grossman and Kaestner (1997) find support for a positive relation between health and education.[8]

Marital status, number of children in the household, and living parents: For 'marital status' we use 2 dummy variables: married (74.8 percent of the sample) and widowed (12.4 percent), with the reference group including: divorced, separated and single respondents (12.8 percent). There is evidence that married people are healthier (both physically and psychologically) (Ross et al., 1990; Kiecolt-Glaser and Newton, 2001), and report better subjective-health than unmarried people (Ren, 1997; Stack and Eshleman, 1998).[9]

The number of children in the household is included as one of the explanatory variables, since children might serve as a social security net for their older parents, extending help in terms of care-giving and emotional/social support (Zunzunegui et al., 2001). As our sample includes respondents aged 50 and above, the children have most probably left the parents' house. Indeed, the average number of children in the household is 0.014 (modal value is 0).

Parents who are alive (18.3 percent have a living mother and 7 percent have a living father) might request help from their elderly children, but on the other hand, could also extend emotional support and affection that might affect the SAHS. Also, living parents could be a proxy of good genetics. To the best of our knowledge, a living mother/father has not been included in past research on SAHS.

Wealth - public old-age pensions: Wealth is proxied by a dummy variable that relates to public old-age pensions received by the individual. It was coded as 1 if he receives such pension. A percentage of 55.7 of the respondents have this type of pension. In the literature, reduced income is associated with poorer health (Crossley and Kennedy, 2002; Smith et al., 1994). We control for health conditions and still hypothesize that being wealthy leads to higher SAHSs.

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[8] This finding is in line with a positive correlation between education and happiness. For instance: Blanchflower and Oswald (2004) show that education plays a positive role in enhancing happiness, even when income is controlled for.

[9] In the same vein, it is well established that marriage is positively related to happiness (Frey and Stutzer, 2002; Blanchflower and Oswald, 2004).

(ii) Medically based health

Drug use: A continuous variable that is the number of different drugs that the respondent takes at least once a week (e.g., drugs for high-cholesterol, high blood-pressure, joint pain, back pain, sleep problems, anxiety or depression, stomach burns). The average number of drugs is 1.6, ranging from 0 to 11.

Medical diagnosis of health problems: A set of dummy variables that relate to diseases that the individual was diagnosed with. They include: heart diseases (13.3 percent of respondents); hypertension (40.1 percent); vascular diseases (3.9 percent); diabetes (13 percent); lung diseases (6.5 percent); arthritis (24.1 percent); osteoporosis (1.5 percent); and cancer (5.1 percent).

Health symptoms: A continuous variable that is the sum of different symptoms that the individual suffered from during the last 6 months (e.g., sleeping problems, falling down, persistent cough, fatigue, swollen leg, dizziness). The average is 1.7 symptoms ranging between 0 and 11.

Medical consultation: A continuous variable that is the response to the question: "During the last 12 months, about how many times in total have you seen or talked to a medical doctor about your health. Please exclude dentist visits and hospital stays, but include emergency rooms and outpatient clinic visits". The average is 6.8, ranging from 0 to 98.

Hospitalization: A dummy variable that equals 1 if the respondent answered positively the question: "During the last 12 months, have you been in hospital overnight? Please consider stays in medical, surgical, psychiatric or any other specialized wards." 16 percent of the sample reported that they were hospitalized during the last year.

Eyesight: A continuous variable ranging from 1 (poor) to 5 (excellent). It is the average of 2 variables related to eyesight that are the responses to the question: "Your distance/reading eyesight is: poor (1)…excellent (5)". The Cronbach Alpha between these two variables is 0.72, suggesting that the arithmetic average is a good approximation. The average is 3.3.

(iii) Behavioral risk factors

Alcohol use: The survey includes the following question: "During the last 3 months, how often (during a standard week) have you drunk any alcoholic beverages, like beer, wine, spirits or cocktails?" The seven options range from 'not at all' to 'almost every day'. The following dummy variable is defined: it equals 1 if the respondent uses to drink at least 5 days a week. 23.1 percent of the respondents meet this criterion.

Obesity: A dummy variable that is equal to 1 if the Body Mass Index (BMI, based on weight and height) is greater than 30. 21.1 percent of the respondents are obese.

(iv) Functional Capacity Indices

ADL: This variable relates to limitations with basic activities of daily living (ADL). Six activities are included: dressing (including putting on shoes and socks), walking across the room, bathing or showering, eating (such as cutting up your food), getting in and out of bed, and using the toilet (including getting up or down). We use the individual's answer to these questions for the construction of a linear index, using the principal components analysis.[10]

IADL: This variable describes the number of limitations with instrumental activities of daily living (IADL) reported by each individual. Seven activities are included: using a map to figure out how to get around in a new place, preparing a hot meal, shopping for groceries, making telephone calls, taking medications, doing work around the house or garden and managing money (such as paying bills). We use the respondent's answers to these questions to construct a linear index using the analysis of principal components. [11]

(v) Cognitive capabilities

Identifying animals: A continuous variable that is the number of animals that the individual listed in 60 seconds, in response to the question: "I would like you to name as

[10] The index (first principal components) is constructed as:

$$ADL = 0.39 * dress + 0.42 * walk + 0.42 * bath + 0.36 * eat + 0.41 * get + 0.44 * toilet$$

To calculate index scores for a given observation, one takes the observations' standardized scores on each activity, multiplies the scores by the corresponding first component coefficients, and sums these products.

[11] The index (first principal components) is constructed as:

$$IADL = 0.08 * map + 0.04 * meal + 0.07 * shop + 0.02 * phone + 0.02 * medicat + 0.12 * garden + 0.05 * money$$

The index scores are calculated as explained above.

many different animals as you can think of. You have one minute to do this." The average was 19.9 ranging from 0 to 100.

(vi) Country dummy variables.

The countries included in the sample are: Austria (composes 11.5 percent of the sample), Germany (4 percent), Sweden (4.7 percent), The Netherlands (5.5 percent), Spain (4.8 percent), Italy (6.9 percent), France (12.8 percent), Denmark (5.2 percent), Switzerland (4.9 percent), Belgium (7.9 percent), The Czech Republic (14.2 percent), Poland (4.4 percent), Hungary (2.6 percent), Portugal (3.6 percent), Slovenia (1.7 percent), and Estonia (5.2 percent). Austria is serving as the reference country.

SHARE has also data on employment, attitudes and beliefs (e.g., hope, trust), and social activities (e.g., voluntary work, social networks). These variables are not included in the estimation of SAHS equations due to simultaneity problems.

3. Econometric analysis and findings

The econometric analysis has 2 layers: (i) estimation of a SAHS equation, using the explanatory variables described above with a special focus on the country coefficients; and (ii) based on the regression results: derivation of standardized country coefficients (that reflect country average SAHSs) and estimation of correlations between the country SAHSs and macro country development measures (logarithm of per-capita GDP; Human Development Index; life expectancy; per-capita health expenditures; percentage of GDP spent on education; income inequality).

Investigation of SAHS determinants is reported in many studies. The second stage is novel and will also contribute to the discussion on the correlation between individuals' subjective characteristics and aggregate macro characteristics of their countries of residence. There is already an extensive heated debate on this topic, regarding individuals' well-being and country characteristics. We will extend the debate in the direction of *correlations between SAHS and macro development variables.*

3.1 *SAHS regression equation: Determinants of subjective-health*

Since reported subjective-health is intrinsically ordinal (with 5 values of 1-5), the natural way to estimate a SAHS equation is by using Ordered Logit or Ordered Probit. However - as discussed in Ferrer-i-Carbonell and Frijters (2004), in Frey and Stutzer (2002), and in van Praag et al.(2010) – when the dependent variable relates to satisfaction scores, the use of a linear model instead of an Ordered Logit model, does not change the basic results.[12] The simpler OLS method allows coefficients to be read off as cardinal subjective-health scores.

The dependent variable is the respondent's subjective assessment of her/his health-status, ranging from 1 (worst imaginable condition) to 5 (best imaginable condition). Standard errors are adjusted for clustering at the country level.

Table 1 presents the OLS regression results. Experimenting with Ordered Logit regressions, resulted in minor changes (in terms of sign, magnitude, and significance of coefficients, see Appendix Table A.2).

Table 1: Determinants of SAHS, OLS regression, clustered (at the country level) standard errors, SHARE 2011

Variables		Coefficients (t-statistics)
(i) Socio-demographic personal variables		
Male		-0.068 (-5.171)***
Age (years)		
	50-60	Ref.
	61-70	0.001 (0.065)
	71-80	-0.042 (-1.557)
	81-90	-0.062 (-2.080)*
	more than 90	0.067 (1.159)
Education		
More than 12 years of schooling		0.128 (11.239)***
Marital status		
	Single/Divorced/Separated	Ref.
	Married	0.036 (2.558)**
	Widowed	0.036 (1.798)*
Number of children in household		0.022 (0.822)
Living parents		
	Mother	0.058 (4.845)***
	Father	0.079 (4.324)***
Old age pension		0.039 (2.225)**
(ii) Medically based health		

[12] Oswald and Wu (2010), in their Science paper, justify the use of OLS even when their dependent variable is a 4-category variable

Variables	Coefficients (t-statistics)
Drug use	-0.081 (-9.336)***
Health conditions – diagnosed with	
Heart problems	-0.122 (-10.845)***
Hypertension	-0.030 (-1.956)*
Cerebral vascular disease	-0.141 (-5.695)***
Diabetes	-0.117 (-7.715)***
Chronic lung disease	-0.160 (-8.200)***
Arthritis	-0.191 (-11.238)***
Osteoporosis	-0.103 (-3.814)***
Cancer	-0.319 (-9.652)***
Number of medical symptoms	-0.121 (-14.293)***
Medical consultation (number)	-0.012 (-10.024)***
Hospitalization (dummy)	-0.182 (-16.262)***
Quality of eyesight (range of 1-50	0.167 (17.517)***
(iii) Behavioral risks	
Alcohol consumption	0.027 (2.959)***
Obesity (BMI>30)	-0.100 (-6.484)***
(iv) Functional Capacity Indices	
ADL	-0.030 (-5.839)***
IADL	-0.022 (-4.031)***
(v) Cognitive abilities	
Number of remembered animals	0.011 (9.314)***
(vi) Country dummy variables	
Austria	**Ref.**
Germany	**-0.294 (-38.499)*** **
Sweden	**-0.031 (-5.929)*** **
The Netherlands	**-0.076 (-13.150)*** **
Spain	**-0.211 (-15.751)*** **
Italy	**-0.061 (-5.195)*** **
France	**-0.187 (-16.863)*** **
Denmark	**0.188 (27.380)*** **
Switzerland	**0.132 (24.300)*** **
Belgium	**0.032 (2.720)** **
The Czech Republic	**- 0.292 (-32.207)*** **
Poland	**-0.374 (-22.949)*** **
Hungary	**-0.340 (-22.210)*** **
Portugal	**-0.363 (-22.485)*** **
Slovenia	**-0.335 (-62.781)*** **
Estonia	**-0.660 (-50.401)*** **
Constant	2.703 (89.477) ***
Sample Size	32,768
R-squared	0.4484

* significant at 0.10; ** significant at 0.05; ***significant at 0.01

The pattern that emerges from Table 1 is clear: while health conditions (obviously) play a significant role in the individual's subjective-health-assessment, non-medical factors are also significant contributors to the SAHS. More specifically: suffering from diseases and bad health conditions lower the subjective assessment of health. Diagnosed with Cancer leads to an average drop of about 0.3 (on a scale of 1-5), while suffering from other major diseases (heart, cerebral vascular, diabetes, arthritis, and chronic lung disease) leads to a drop of around 0.1. Other indications of poor health conditions (use of drugs, hospitalization, number of annual medical consultations, number of medical symptoms) also lead to significant drops in the self-assessment-of-health, whereas better eye sight has a pronounced positive effect on SAHS (a change of 1 unit in the measure of eyesight that ranges between 1 and 5, leads to a change of 0.17 in SAHS). Lack of functional capacity (ADL and IADL) has a negative effect. .

Obese people have lower subjective-health assessments (by 0.10). However, individuals who drink report higher SAHSs. The difference between the effects of these 2 risk factors is somewhat unexpected. Could be that psychological factors are at work – while obese people feel less attractive, drinking is accepted in Western society as a social positive norm and promotes social ties (SIRC, 1998). Moreover, drinking results in a mood upgrade, that probably leads also to more favorable subjective-health assessments.

As for the socio-economic personal variables: men have lower average valuations of SAHS than women. Murtang and Hubert (2004) claimed that at older age, women experience more health-related problems and functional limitations than men, leading to lower valuations of SAHS. However, as we control for a large series of health-related problems, this argument is not valid anymore. *Could be* that men are more hypochondriac than women and/or more ignorant on disease/health issues, leading to more pessimistic reports on their health status.

More educated individuals (those with 13+ years of schooling) tend to report higher SAHS levels (after controlling for household wealth). In line with the speculation that ignorance (of men) leads to lower reports of SAHS, highly educated individuals have the knowledge how to better control diseases, and therefore feel healthier.

As expected, members of wealthier households feel healthier. Wealth adds an element of protection and confidence that a need to deal with health problems will not be confounded by financial restrictions. Age does not affect subjective-health scores.[13]

Interestingly, living parents add significantly to the valuation of subjective health. One explanation for this finding can be related to genetics – parents of individuals who are at the age of 50 and over, must be at least in their late 70s. This is an indication of high life expectancy that might affect health valuations of their offspring. Another option is that parents provide affection and psychological/emotional support (although they also demand help) that affects SAHS.

Married and widowed individuals report higher SAHSs compared to those who belong to any other group (single, divorced).

3.2 *Country effects*

Of special interest are the coefficients of the country dummies, which measure the contribution of the country of residence to the subjective-health of its residents, beyond the effects of all other personal explanatory variables that are included in the regression analysis. Austria is the reference country, and the standardized country coefficients can be used for the ranking of the 16 countries from highest to lowest, in terms of a country-specific component of SAHS. As Table 1 indicates, first ranks Denmark and second Switzerland. Last ranks Estonia.

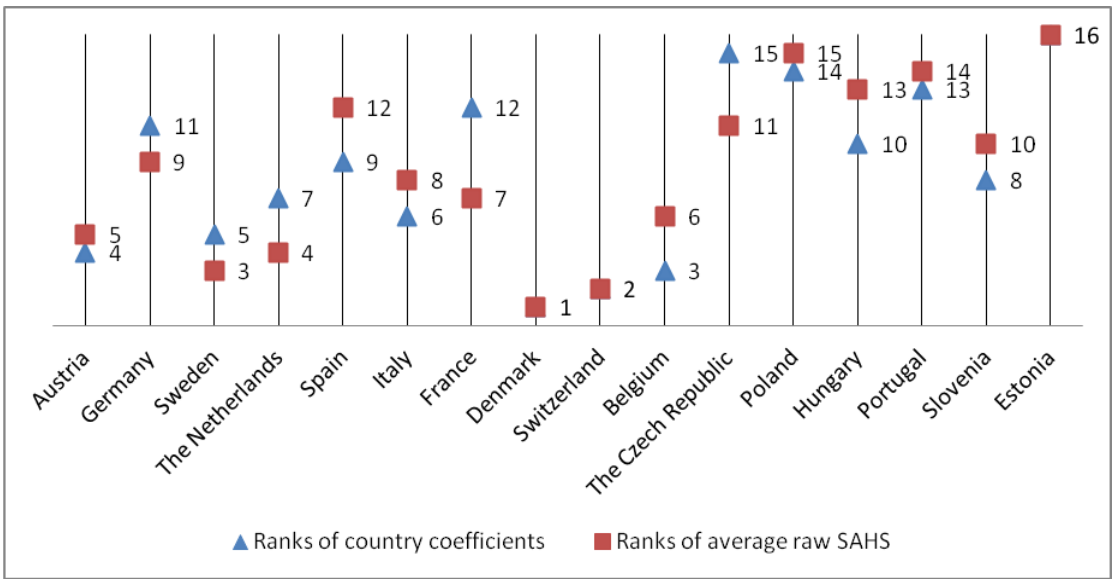
Table 2 presents the raw (not controlled for characteristics of individuals) average SAHSs of the 16 countries included in our sample (in parentheses is the rank), along with the standardized country dummies (rank in parentheses). Figure 3 is a graphical presentation of the rankings of the 2 measures (presented in Table 2). The difference in raw country average SAHSs is partly explained by differences in the populations' personal characteristics. It follows that after the personal characteristics are controlled for, the rankings of aggregate country SAHSs (estimated by the country dummies) will change.

[13] Some studies that looked at aged respondents (cited in the section of variables' description) found a minimum point at the age of 50-60. Our data does not support this finding.

Table 2: Country averages of SAHS – raw versus controlled for personal characteristics (standardized country dummies)

Country	Raw country SAHSs (rank)	Standardized Country dummies (rank)
Austria	3.06 (5)	0 (4)
Germany	2.72 (9)	-0.054 (11)
Sweden	3.19 (3)	-0.006 (5)
The Netherlands	3.06 (4)	-0.016 (7)
Spain	2.55 (12)	-0.043 (12)
Italy	2.75 (8)	-0.015 (6)
France	2.77 (7)	-0.059 (10)
Denmark	3.47 (1)	0.040 (1)
Switzerland	3.34 (2)	0.027 (2)
Belgium	2.97 (6)	0.007 (3)
The Czech Republic	2.65 (11)	-0.097 (15)
Poland	2.30 (15)	-0.072 (14)
Hungary	2.39 (13)	-0.052 (10)
Portugal	2.31 (14)	-0.064 (13)
Slovenia	2.71 (10)	-0.041 (8)
Estonia	2.18 (16)	-0.138 (16)

Figure 3: Ranks of country coefficients versus ranks of average country raw SAHSs



As is obvious from Table 2 and Figure 3, controlling for individual characteristics, leads

to a change in country ranking of most countries. In Denmark, Switzerland and Estonia the ranks of the two measures are identical. Denmark ranks first and Estonia levels last – within the two measures. Germany, Sweden, The Netherlands, France, and The Czech Republic drop to lower ranks when controlled country dummies are considered. Some countries move up, when personal characteristics are accounted for (Austria, Spain, Italy, Belgium, Poland, Hungary, Portugal and Slovenia).

3.3 *Correlations between standardized subjective country effects and country-specific macro development measures*

A novel question that this paper attempts to address is whether objective country-specific development measures are affecting significantly the country population's average subjective-health-assessments. Is the country's level of development (proxied by per-capita GDP, and its economic/social/welfare performance) also contributing to SAHS (beyond the effects of personal traits of the residents)? In other words: is subjective-health affected by 'where you live' and not only 'how you live'? The standardized country dummies are used for the exploration of correlations between aggregate country SAHSs and country-specific objective economic performance characteristics (logarithm of per-capita GDP; Human Development Index; life expectancy; per-capita health expenditure; public expenditure on education – percentage of GDP; and income inequality). The statistical analysis that is employed follows Oswald and Wu (2010 – see Introduction). The standardized country coefficients of the 16 countries included in our sample (see Table 2) are plotted against various country macro development measures. Pearson correlations are calculated and tested for significance. Below are presented the results.

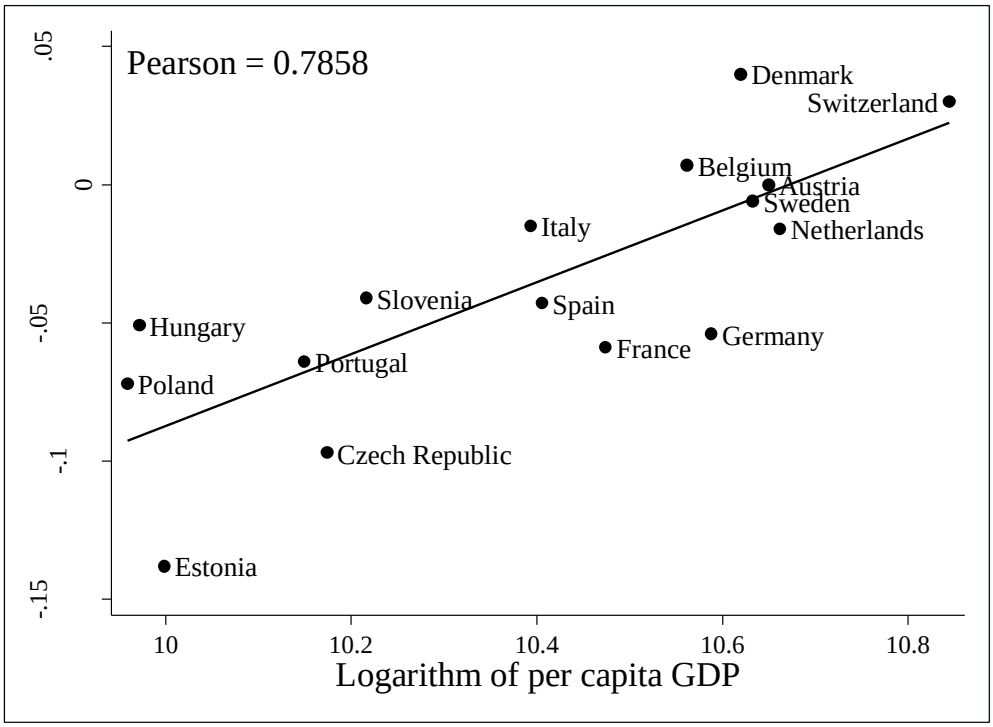
(A) *Logarithm of per-capita GDP*

Per-capita GDP is the most common indicator for a country's level of economic development and economic performance. International institutions, such as the United Nations Organization, the World Bank, the OECD, and the International Monetary Fund, classify countries as developed, intermediate or under-developed, depending on whether they are above or below certain thresholds of GDP per-capita. It is also used frequently as a marker of the population's standard of living. The logarithm of GDP per-capita (that

relates to the change in GDP per-capita) is often used in empirical studies as a better measure of development and economic power (e.g., Sacks et al., 2010; Clark and Senik, 2011; Easterlin et al., 2011).[14]

As figure 4 indicates, in 2011, the correlation between the logarithm of GDP per-capita, and the country standardized effects is positive (Pearson coefficient = 0.7858), and highly significant (p-value=0.0003).

Figure 4: Logarithm of per-capita GDP versus country effects, 2011



Source: for per-capita GDP, in 2011 - OECD (2013)

(B) *Human Development Index - HDI*

The Human Development Index (HDI) is a composite summary measure of human development that is published by the United Nations Development Program.[15] It

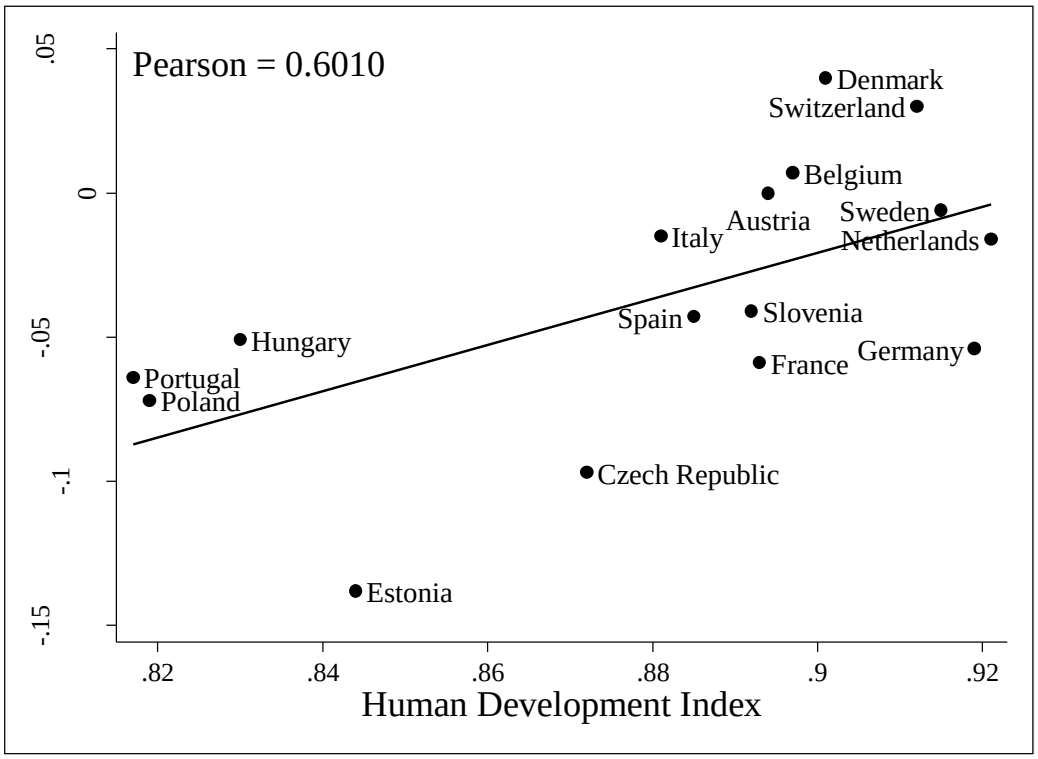
[14] This functional form implies that that a given percentage rise in income has the same impact (on the independent variable: well-being, country SAHS etc.), regardless of the initial level of income: moving from $500 to $600 per year, has the same impact as moving from $5,000 to $6000. This specification is in line with the standard assumption in Economics that the marginal impact/value of a dollar of income is diminishing.

[15] http://hdr.undp.org/en/statistics/hdi/

combines indicators of health, education and standard-of–living and provides an alternative to the common practice of evaluating a country's progress in development based on per-capita Gross Domestic Product. The HDI ranges from 0 to 1.

As Figure 5 indicates, there is a positive correlation (Pearson coefficient = 0.6010) of country HDI and the country standardized effects. It is significant at the 5% level (p-value=0.0138). It indicates that residents of countries with higher human development rates tend to report significantly higher ratings of their subjective health (everything else being equal).

Figure 5: Human Development Index versus country effects, 2011



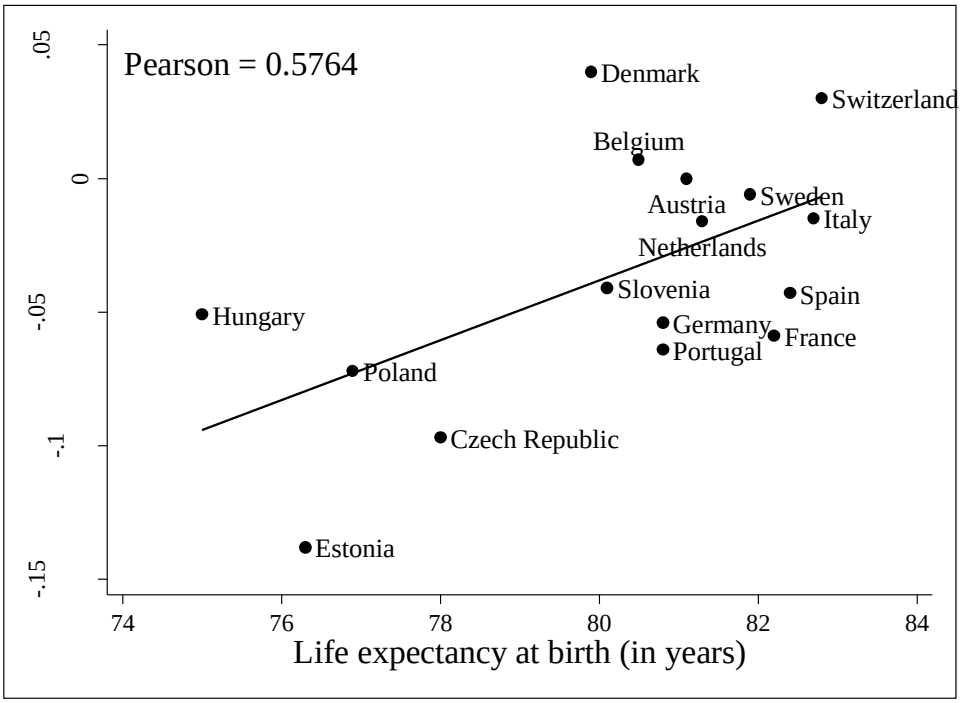
Source: for HDI, in 2011 – OECD (2013)

(C) *Life expectancy at birth*

Life expectancy at birth is defined as the average number of years that a newborn is expected to live, assuming that current mortality rates will not change. It is one of the measures of economic development. The correlation between life expectancy at birth (in

2011) and the country effects (see Figure 6) is positive (Pearson coefficient = 0.5764) and significant at the 5% level (p-value=0.0194).

Figure 6: Life expectancy at birth versus country effects, 2011



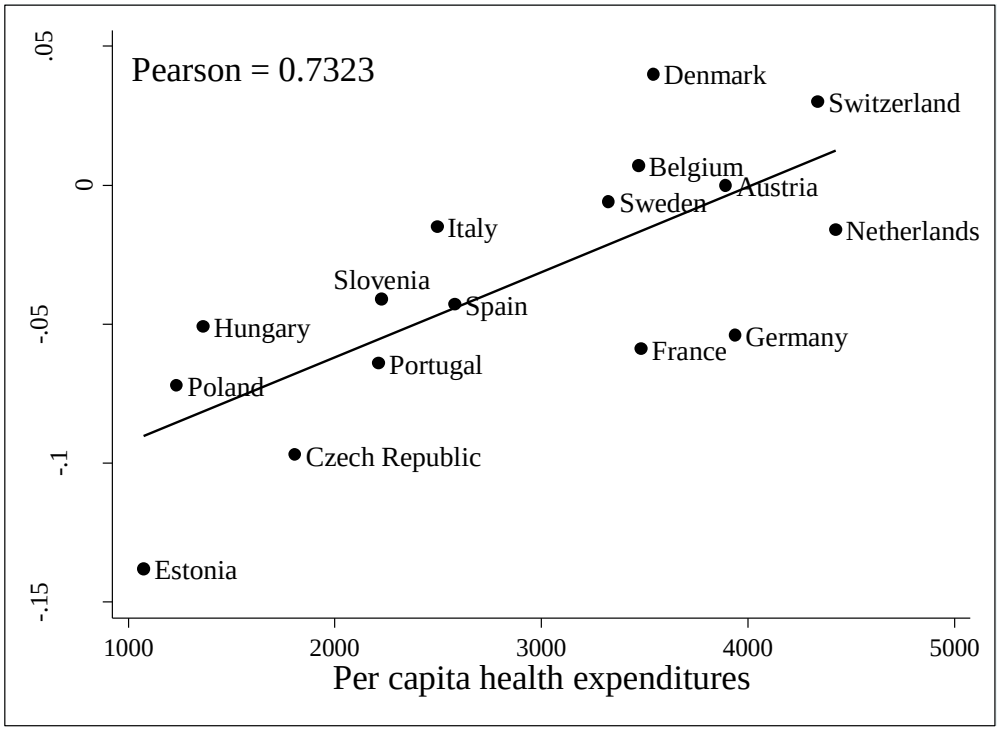
Source: for life-expectancy-at birth, in 2011 – OECD (2013)

(D) *Per-capita expenditures on health*

Per-capita expenditures on health relate to total public and private health expenditures (ppp in 2005 US$) covering expenditures for: the provision of health services (preventive and cure), family planning, nutrition consultation, and medical emergency aid. It does not include provision of water and sanitation.

As figure 7 indicates, per-capita expenditures on health (in 2011) are positively correlated with country SAHS effects. (Pearson coefficient = 0.7327). The correlation is significant at the 1% level (p-value=0.0012).

Figure 7: Per capita health expenditures versus country effects, 2011

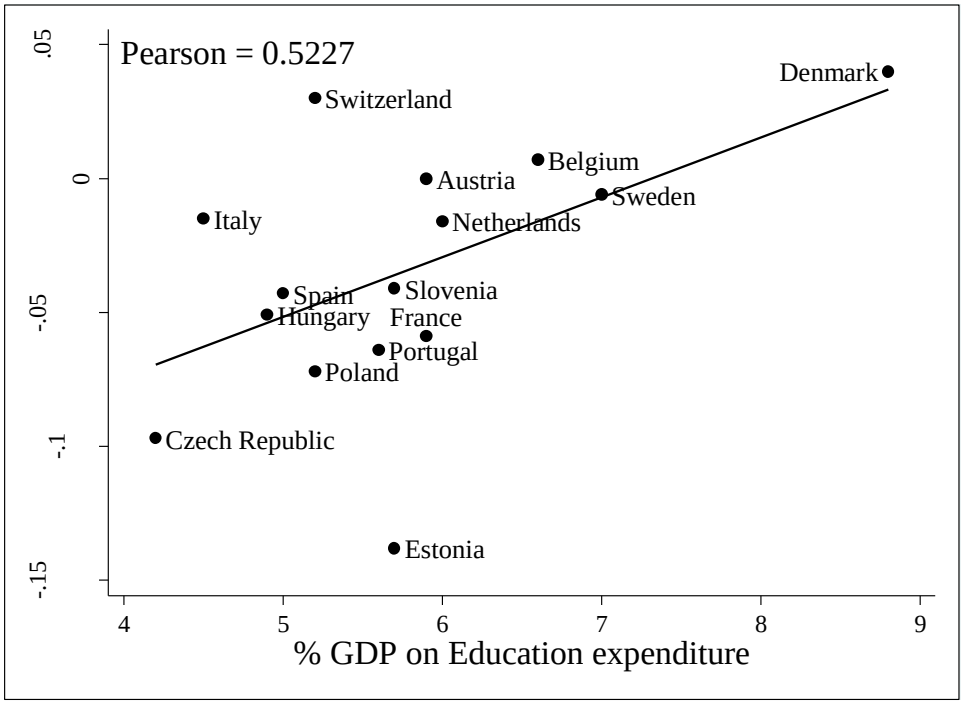


Source: for Per-capita expenditures on health (in 2011, ppp., 2005 US dollars) - OECD (2013)

(E) *Percentage of GDP spent on education*

OECD (2013) provides data (for 2010) on public expenditure on educational institutions plus public subsidies to households, as a percentage of GDP. As Figure 8 indicates, this measure is positively correlated with country SAHS effects (Pearson coefficient = 0.5227, p-value = 0.0456).

Figure 8: Percentage of GDP spent on education versus country effects

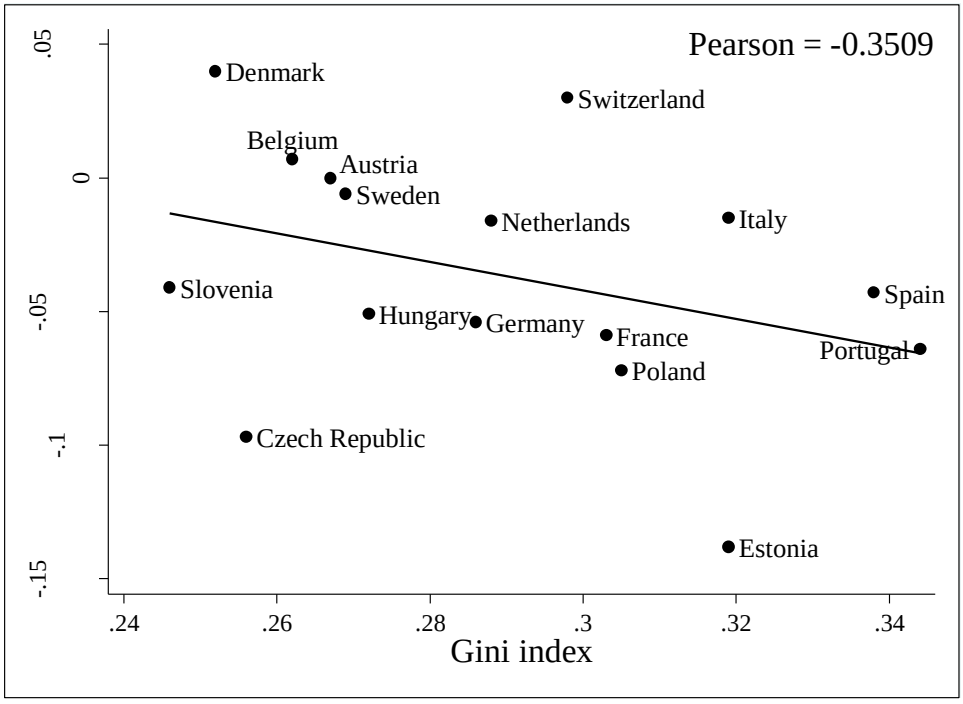


Source: for Percentage of GDP spent on education, in 2010 – OECD (2013)

(F) *Income inequality – The Gini Index*

The economic literature suggests that income inequality affects health (e.g., Rodgers, 1979; Lynch et al., 1998; Deaton, 2001a, 2001b; Judge and Patterson, 2001; Deaton, 2002). We therefore experimented with income inequality (the Gini index in 2011) speculating that income inequality will be negatively correlated with country SAHSs. However, we do not find a significant correlation between the two measures.

Figure 9: Income inequality (Gini index) versus country effects



Source: for the Gini Index, in 2010 – OECD (2013)

Table 3 summarizes the results:

Table 3: Pearson correlation coefficients – size and significance (country development measures versus standardized SAHS dummies)

Correlation between	Country SAHS	Significance level
Logarithm of per-capita GDP	0.7858***	0.0003
HDI- Human Development Index	0.6010**	0.0138
Life expectancy at birth	0.5764**	0.0194
Per-capita expenditures on health	0.7323***	0.0012
Percentage of GDP spent on education	0.5227**	0.0456
Income inequality (Gini Index)	-0.3509	0.1826

** significant at 0.05; *** significant at 0.01

As is indicated by Table 3, the significant correlations vary between 0.58-0.78. It should be noted that a correlation coefficient (r) of about 0.6 is unusual by standards of behavioral science. It is high by the cut-offs suggested by Cohen's (1988) rules-of-thumb, which argued that in human data an r value over 0.5 should be seen as large association, and 0.3 as a medium one. An r=0.6 is the same degree of correlation as, for example, has been found for people's own life-satisfaction readings, taken 2 weeks apart (that is, using the same well-being question, asked of the same person) (Oswald and Wu, 2010).

4. Conclusions and discussion

Our empirical study is based on data for more than 32,700 respondents from 16 European countries and employs numerous variables from the SHARE data base.

The core conclusions that are derived from the 2 parts of the statistical analysis are the following:

(i) The estimation of a self-assessed-health-status regression shows clear evidence of the significant effects of socio-economic variables, above and beyond the effects of medical factors. While it is not surprising that socio-economic factors play a role in building the individual's well-being, it is much less expected that they also play a major role behind the individual's rating of her/his subjective-health.

(ii) The second, more innovative, finding is related to the effects of country-specific economic development variables on the subjective-health of the residents, beyond and above those of the personal characteristics. It is therefore not only 'who you are' that affects the subjective rating of health, but also 'in which country you live'. Following the technique presented in Oswald and Wu (2010), country dummy variables are added to the SAHS regression, to derive the country-specific aggregate SAHSs. These country dummies are then examined for correlations with a set of objective country macro measures. They include: logarithm of GDP per-capita, the Human Development Index (HDI), life expectancy at birth, health expenditures per-capita, education expenditures as percentage of GDP, and income inequality. It appears that the first 5 country measures have a positive significant

correlation with country controlled SAHS (standardized country dummy variables). The income inequality measure does not correlate significantly with country SAHSs. Similar investigations have been performed within the field of well-being/happiness. To the best of our knowledge, the extension of the investigation into the domain of health, using the technique presented in Oswald and Wu (2010), is novel.[16]

(iii) The evidence that country development measures (in particular the logarithm of per-capita GPD) do affect subjective-health, can be related also to the heated debate between the supporters and the opponents of the so-called 'Easterlin Paradox', extending it into the domain of health, rather than the original field of well-being/happiness.

Richard Easterlin, who pioneered the Economics of Happiness in the mid-1970s, suggested that wealthy people tend to be happier than poor people in the *same country*, but that there is no such relationship *across countries*, or *over time*. This assertion is known as the 'Easterlin Paradox'. Easterlin has examined the relationship between happiness and GDP, both across countries and within individual countries through time (Easterlin, 1974, 1995, 2001, 2005). In both types of analysis he found little significant evidence of a link between aggregate income (per-capita GDP) and aggregate happiness, concluding that "*what is true for the individual is not true for society as a whole*" (Easterlin, 1973, page 4, italics in the original). Layard (1980) presented evidence that supported the 'Easterlin Paradox'. Layard was even more succinct and concluded: "a basic finding of happiness surveys is that, though richer societies are not happier than poorer ones, within any society happiness and riches go together" (page 737). Graham and Pettinato (2001) examined data for a sample of 17 developing economies in Latin America and arrived at a similar result: No clear relationship between gross national

[16] More insight can be gained by also looking at *changes* over time in country SAHSs versus *changes* in country macro measures. This can be and will be done when the SHARE survey will have longitudinal data from more waves.

product and happiness.[17] Several studies challenged the 'Easterlin Paradox'. Two of the more determined opponents are: Deaton (2008) and Stevenson and Wolfers (2008). Using the 2006 Gallup World Poll that was conducted in 132 countries, Deaton arrived at a clear-cut conclusion that average life satisfaction is strongly related to per-capita national income.[18] Stevenson and Wolfers (2008) were even more determined. Based on a statistical analysis of several rich data bases, they conclude that "*Across the world's population, variation in income explains a sizable proportion of the variation in subjective well-being. There appears to be a very strong relationship between subjective well-being and income, which holds for both rich and poor countries*" (page 2). Sacks, Stevenson and Wolfers (2010) reconfirm these results.[19]

Overall, our findings (twisted from the well-being to the health domain) show that *residents of more developed countries have significantly higher valuations of their subjective-health (everything else being equal)*. This seems to be at odds with the 'Easterlin Paradox' that denies differences across countries.

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[17] In an attempt to explain the paradox, researchers used models emphasizing reference-dependent preferences, relative income, and satiation point models (see for instance: Veenhover, 1991; Diener et al., 1993; and Clark, Frijters and Shields, 2008 for a review paper).

[18] Moreover, unlike most previous findings, he found that the effect holds across the full range of international incomes, and it is even slightly stronger among rich countries.

[19] An extensive literature overview of criticisms of the 'Easterlin Paradox', as well as the replies, is obviously beyond the scope of this paper. References include: Oswald (1997); Hagerty and Veenhoven (2003); Inglehart et al. (2008); Easterlin and Sawangfa (2009); Angeles (2011); Easterlin et al., 2011.

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APPENDIX

Table A.1: Sample characteristics

	Mean (standard deviation)
Dependent Variable. SAHS (range of 1-5)	2.81(1.06)
(i) Socio-demographic personal variables	
Male (%)	45.09
Age in years (%)	
50-60	27.67
61-70	37.34
71-80	25.05
81-90	9.36
more than 90	0.58
Education	
More than 12 years of schooling (%)	30.30
Marital status (%)	
Married	74.79
Widowed	12.43
Number of children in household	0.01 (0.14)
Living parents (%)	
Mother	18.33
Father	7.02
Old age pension (%)	55.74
(ii) Medically based health	
Drug use (number of drugs)	1.64 (1.65)
Health conditions – diagnosed with..(%)	
Heart problems	13.28
Hypertension	40.08
Cerebral vascular disease	3.95
Diabetes	12.96
Chronic lung disease	6.52
Arthritis	24.07
Osteoporosis	1.46
Cancer	5.14
Number of medical symptoms	1.70 (1.74)
Medical consultation (annual-number)	6.81 (9.39)
Hospitalization (%)	15.98
Quality of eyesight (range of 1-5)	3.33 (0.98)
(iii) Behavioral risks (%)	
Alcohol consumption (at least 5 days a week)	23.07
Obesity (BMI>30)	21.12
(iv) Functional Capacity Indices (standardized)	
ADL	-0.12 (1.51)
IADL	-0.16 (1.52)

	Mean (standard deviation)
(v) Cognitive abilities	
Number of remembered animals	19.88 (7.70)
(vi) Country shares in the sample (%)	
Austria	11.49
Germany	3.99
Sweden	4.75
The Netherlands	5.48
Spain	4.85
Italy	6.91
France	12.77
Denmark	5.24
Switzerland	4.95
Belgium	7.92
The Czech Republic	14.25
Poland	4.38
Hungary	2.63
Portugal	3.59
Slovenia	1.66
Estonia	5.16
Sample Size	32,768

Standard deviations in parentheses

Table A.2: Determinants of SAHS, Ordered Logit regression, clustered (at the country level) standard errors, SHARE 2011

Variables		Coefficients (z-statistics)
(i) Socio-demographic personal variables		
Male		-0.176 (-6.101)***
Age (years)		
	50-60	Ref.
	61-70	0.004 (0.072)
	71-80	-0.079 (-1.226)
	81-90	-0.095 (-1.242)
	more than 90	0.485 (3.067)***
Education		
	More than 12 years of schooling	0.301 (11.771)***
Marital status		
	Single/Divorced/Separated	Ref.
	Married	0.088 (2.417)**
	Widowed	0.099 (1.853)*
Number of children in household		0.016 (0.214)
Living parents		
	Mother	0.137 (4.827)***
	Father	0.184 (4.291)***
Old age pension		0.118 (2.663)***
(ii) Medically based health		
Drug use		-0.212 (-9.574)***
Health conditions-diagnosed with..		
	Heart problems	-0.358 (-14.172)***
	Hypertension	-0.036 (-0.970)
	Cerebral vascular disease	-0.478 (-6.318)***
	Diabetes	-0.331 (-9.578)***
	Chronic lung disease	-0.483 (-9.345)***
	Arthritis	-0.445 (-9.236)***
	Osteoporosis	-0.146 (-1.800)*
	Cancer	-0.844 (-9.146)***
Number of medical symptoms		-0.330 (-17.836)***
Medical consultation (number)		-0.037 (-9.795)***
Hospitalization (dummy)		-0.454 (-23.350)***
Quality of eyesight (range of 1-5)		0.416 (16.451)***
(iii) Behavioral risks		
Alcohol consumption		0.082 (4.016)***
Obesity		-0.241 (-6.450)***
(iv) Functional Capacity Indices		
ADL		-0.152 (-7.329)***
IADL		-0.100 (-5.651)***
(v) Cognitive abilities		
Number of remembered animals		0.028 (9.617)***

Variables	Coefficients (z-statistics)
(vi) Country dummy variables	
Austria	Ref.
Germany	-0.699 (-28.029)***
Sweden	-0.109 (-10.127)***
The Netherlands	-0.243 (-15.511)***
Spain	-0.540 (-15.233)***
Italy	-0.190 (-6.450)***
France	-0.446 (-14.832)***
Denmark	0.404 (16.708)***
Switzerland	0.244 (18.686)***
Belgium	0.088 (3.902)***
The Czech Republic	- 0.705 (-25.472)***
Poland	-0.942 (-20.427)***
Hungary	-0.905 (-21.291)***
Portugal	-0.975 (-20.367)***
Slovenia	-0.826 (-28.507)***
Estonia	-1.734 (-31.963)***
Sample Size	32,768
R-squared	0.2208

* significant at 0.10; ** significant at 0.05; ***significant at 0.01