The cumulative toll of economic fluctuations: How does exposure to economic booms and recessions over the life-course impact old-age disability?

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ABSTRACT

Studies suggest that health temporarily improves during economic recessions, but whether these effects are offset by long-run negative health effects has not been established. We examine whether economic recessions and booms during middle age (ages 16-49) have negative long-lasting effects on health at ages 50-74. We link data on macroeconomic fluctuations in 1930-2001 for 11 countries to data from the Survey of Health, Ageing and Retirement in Europe (SHARE). We estimate the impact of business cycle at each decade of life on physical function and grip strength in country-fixed effect models. Controlling for early life circumstance, each additional recession during middle age is associated with worsening health at old age, while each additional boom was associated with reduced disability. This pattern holds for both levels and longitudinal changes in functional status at ages 50-74. Our findings suggest that the long-run negative effects of economic downturns outweigh potential positive short-term effects.

INTRODUCTION

Over the last century, European populations have witnessed marked fluctuations in the economy including several major expansions and contractions. In addition to their direct effects on labour market outcomes, business cycles may also have long-lasting effects on health, for example, as a result of their impact on psychological, behavioural or financial outcomes (Catalano et al., 2010). At the individual level, studies suggest that unemployment, job-loss and -insecurity are associated with increased risk of depression and anxiety (Catalano et al., 2000; Dooley et al., 2000; Jane et al., 2001; Thomas et al., 2005), substance abuse (Eliason & Storrie, 2009b; Falba et al., 2005; Gallo et al., 2001; Janlert & Hammarström, 1992), violent behaviour (Catalano et al., 1993a), suicide (Fergusson et al., 2007; Kposowa, 2001) cardiovascular disease (Gallo et al., 2004; Gallo et al., 2006) and obesity (Deb et al., 2011). However, no consensus exists on how economic cycles affect health with evidence for both a procyclical (increased mortality and worse health during good economic times) as well as a countercyclical effect (Catalano et al., 2010). Studies have found higher unemployment rates to be associated with both decreases (Freeman, 1999; Ruhm, 1995) and increases in substance use (Gascon & Spiller, 2009; Stuckler et al., 2009), decreases (Catalano et al., 1997) as well as increases in violent behaviour (Gillham et al., 1998), increases (Gunnell et al., 2003; Yang, 1992) and declines in suicide (Barstad, 2008; Neumayer, 2004), increases (Gerdtham & Johannesson, 2005; Svensson, 2007) (Gerdtham & Johannesson, 2005; C. J. Ruhm, 2007)as well as decreases (Ruhm, 2007) in cardiovascular disease and decreases (Gerdtham & Ruhm, 2006; Neumayer, 2004; Ruhm, 2000) and increases in

general mortality (Gerdtham & Johannesson, 2005; Svensson, 2007). In addition, some studies suggest that during periods of massive lay-off and downsizing, workers who retain their job have increased risk of sickness absence (Kivimaki et al., 2000) and psychotropic drug use (Kivimaki et al., 2007), but reduced levels of violent behaviour (Catalano et al., 1993a) and alcohol abuse (Catalano et al., 1993b; Khan et al., 2002).

These studies almost all focus on the contemporaneous effects of economic conditions on health. Although some studies have shown negative effects of job displacement (Eliason & Storrie, 2009a; Sullivan & von Wachter, 2009), unemployment (Lundin et al., 2010) or economic insecurity (Ferrie et al., 1998) on health up to several years after exposure, little attention has been paid to the potential cumulative effect of life-course experiences of booms and recessions on late-life health. Some studies have analysed the effects of economic conditions around birth on subsequent mortality, generally showing that being born under adverse economic conditions may have long-lasting negative effects on health (van den Berg et al., 2011; van den Berg et al., 2009). In these studies, birth or early childhood is mostly understood as a critical period in an individual's life with a particular biological sensibility to external influences and circumstances. One example is the so called Barker-hypothesis (Barker, 1998), which argues that reduced foetal growth as a result of maternal malnutrition during pregnancy may lead to increased risk of chronic conditions in later life. However, there is limited knowledge on critical periods beyond birth and how they may influence health outcomes later in life.

In contrast to the critical period approach, it has been argued that the determinants of health at old age need to be conceptualized in a life-course perspective (Bartley et al., 1997). This view, known as the accumulation hypothesis, postulates that risks gradually accumulate over the life-course, so that life-time experiences shape health and mortality outcomes at old age (Hallqvist et al., 2004; Wunsch et al., 1996). By focusing only on short-term effects, most previous studies on the effects of macroeconomic conditions on health ignore that most diseases in adulthood take years to develop and have complex aetiologies involving exposure over the entire life-course (Bartley et al., 1997), with clinical manifestations only evident at relatively old age. For example, risk factors such as tobacco and alcohol consumption have cumulative effects on chronic disease and may result in disability and poor health at old age, without any clinical manifestation during young and middle adult life.

This study aims to bridge the gap between studies focusing on the contemporaneous and long-term effects of economic cycles and unemployment on health. Linking data on macroeconomic cycles during the period 1930-2001 to individual data for 11 countries participating in the Survey of Health, Ageing and Retirement in Europe (SHARE), we examine whether cumulative exposure to economic recessions and booms during early and middle age (16-49 years) has long-lasting cumulative effects on health at ages 50 to 74. This exposure period covers major critical life-course events potentially influenced by macroeconomic shocks including entrance into the labour market, leaving the parental home, the establishment of own residence, family formation and the transition into parenthood (Bartley et al., 1997). We focus on an extensive set of measures of old-

age physical disability and function, including grip strength as an objective measure of health at old age. In addition, we examine longitudinal changes in these outcomes over the follow-up period. Our dataset allows us to control for a broad range of potential cofounders and mediators such as childhood health and socioeconomic circumstances, educational attainment, income, wealth and health behaviour. Expanding previous literature on the short-term effects of economic recessions, we hypothesized that each additional economic recession experienced throughout young and middle age has a cumulative toll on health, resulting in worse disability outcomes at old age.

DATA AND METHODS

Individual data

SHARE is a sister-study of the US Health and Retirement Study (HRS), is a longitudinal survey designed to provide comparable information on the health, employment and social conditions of Europeans aged 50+. Detailed information about the methodology is available elsewhere (Börsch-Supan A, 2005; Börsch-Supan & Schröder, 2011a, b; Schröder, 2011). Nationally representative samples in 13 European countries were drawn either from national or regional population registries, or from multi-stage sampling in Northern Europe (Sweden and Denmark), Western Europe (Austria, France, Germany, Switzerland, Belgium, and the Netherlands), Southern Europe (Spain, Italy and Greece) and Eastern/Central Europe (Poland and Czech Republic), as well as Ireland and Israel. Participants in each country were interviewed in 2004 and subsequently re-interviewed in 2006/7 and 2008/9. Interviews were face-to-face and took place in the household using structured computerized questionnaires. Expert agencies translated items, with extensive pre-testing to ensure comparability. Response rates varied from country to country, but overall household response at enrolment was 62% (Börsch-Supan A, 2005; Börsch-Supan & Schröder, 2011a, b; Schröder, 2011).

We included respondents who completed the retrospective life-histories expanding through early childhood until last interview assessed in 2008/9, and who had enrolled in the study in either 2004/5 or 2006/7. Data from Czech Republic and Poland were not included due to lack of comparable data on GDP before 1990. In addition, Ireland and

Israel were excluded because they did not participate in the life history interview. The total sample included 20,780 participants in 11 Western European countries. We restricted the sample to participants aged 50 to 74 years at study entry and born between 1930 and 1956 (N=14,754) and excluded individuals with missing information on relevant health outcomes (n=4), childhood-health (n=188), socioeconomic conditions (n=321), sampling weights (n=41) or control variables (n=267). The final sample included 13,933 men and women from 11 countries.

Health outcomes

Physical functioning and disability

Measures of functional status (Tsae-Jyy, 2004) and disability included the following indicators: The Katz Activities of Daily Living (ADL) scale assessed difficulties with six basic self-care tasks (bathing, dressing, toileting, transferring, continence, and eating) (Katz et al., 1970); the index of Instrumental Activities of Daily Living (IADL) assessed difficulties with more advanced activities (using a map, preparing hot meals, shopping, telephone use, taking medications, housekeeping tasks, and managing money) (Lawton & Brody, 1969); and an index of mobility, partly based on the Nagi-scale (Nagi, 1976), assessed difficulties with 10 mobility and fine motor control items such as walking 100 meters, sitting two hours and climbing stairs. Summary scores for every single item were constructed based on the total number of difficulties reported.

Maximum Hand Grip Strength (GS)

Hand grip strength is an objective measure of physical performance measure that does not suffer the biases inherent to self-reports (Mackenbach et al., 1996; Salomon et al., 2004), and it is a strong predictor of disability (Ishizaki et al., 2000; D. Kuh et al., 2005; Diana Kuh et al., 2006; Nybo et al., 2001; Rantanen et al., 1994; Rantanen et al., 1999; Rantanen et al., 1998), morbidity (Griffith et al., 1989; D. Kuh et al., 2005; Milne & Maule, 1984; Nybo et al., 2001) and mortality (Fujita et al., 1995; Gale et al., 2007; Pincus & Callahan, 1992; Rantanen et al., 2000; Sasaki et al., 2007) at older ages. GS was measured by trained interviewers using a handheld dynamometer (Smedley, S Dynamometer, TTM, Tokyo, 100 kg) (Andersen-Ranberg et al., 2009). Participants were instructed to stand (preferably) or sit, with the elbow at a 90^0 angle, the wrist in neutral position, keeping the upper arm tight against the trunk, and the inner lever of the dynamometer adjusted to suit the hand. Participants were then instructed to squeeze as hard as possible for a few seconds. Two values were recorded for each hand. Measurements were considered valid if the two measurements of one hand differed by less than 20 kg (Survey of Health, Ageing and Retirement in Europe, 2006). Values of zero (‘0’) or those above 100 kg (≥100 kg) were considered invalid. We used the maximum value of all measurements of grip strength in both hands. To adjust for country and gender differences in GS, we calculated country and gender specific quartiles of GS.

564 individuals of our sample had missing or invalid data on GS. Therefore, we applied multiple imputation methods (Rubin, 1987; Yuan, 2000) to impute GS based on a model that regressed GS on all available covariates.

Individual Level Controls

All models include controls for sex, age, country of birth and if a respondent was born before or after 1945, the end of the Second World War (WWII). We control for childhood socio-economic status using two measures: (a) the number of books in the parental home at age 10; and (b) the occupation of the main breadwinner at age 10, collapsed into four major categories of the International Standard Classification of Occupations (ISCO) (low skilled blue collar-, high skilled blue collar-, low skilled white collar- and high skilled white collar-worker). In addition, we incorporate two extensive measures of childhood health: (a) self-rated health during childhood based on a binary variable distinguishing fair/poor from excellent/very good/good; (b) self-reported diagnosis of major childhood-illnesses, reclassified into two binary indicators capturing whether the respondent suffered any major infectious or non-communicable condition as a child.

In additional models, we also control for socioeconomic status and health behaviours at later life, including: (a) Educational attainment, based on three broader categories from the International Standard Classification of Education (ISCED); (b) country-specific quartiles of households net wealth; (c) alcohol consumption, measured by the number of alcoholic drinks consumed per day; (d) smoking, distinguishing whether the

respondent currently smokes daily or was a smoker formerly; and (c) body mass index (BMI), estimated based on self-reported body weight divided by the square of self-reported height (kilograms/meters^2).

Table 1 here

Data on Economic Cycles

Studies typically use Gross Domestic Product (GDP) or unemployment rates to measure business cycles. Although it would be desirable to use both indicators, comparable information on unemployment rates for the relevant countries is only available from the year 1956 onwards, while relevant exposure typically started decades before this period. Therefore, we focus on GDP as indicator of the business cycle because comparable data are available for extended series covering the entire 20th century.

We use historical time-series data on annual GDP and GDP per capita in constant prices obtained from 'The World Economy: A Millennial Perspective' studies(2001, 2003). This database was constructed by Angus Maddison for the Organisation of Economic Cooperation and Development (OECD) and covers the last 2000 years up to the year 2001, providing the most comprehensive dataset of historical trends in GDP (Federico, 2002).

For cohorts participating in SHARE, the relevant exposure period covers the years 1929-2001. Over this period, GDP exhibited a linear positive trend of increase in all European countries. However, our exposure of interest is the business cycle, namely the repeated sequences of economic expansion and recession. Therefore, we separated the cyclical component from the increasing secular trend in the log of GDP for each country using a Hodrick-Prescott Filter (HP) (Hodrick & Prescott, 1997), an approach widely applied in the analysis of business cycles. The HP-Filter separates the cyclical component of a time-series from its general trend by estimating the annual deviation from a smoothed curve that captures the trend. We used a smoothing parameter of 100, but results were very robust to alternative parameters. A positive deviation from the smoothed trend indicates an increase in the log of GDP with respect to the smoothed trend, while a negative deviation signals a decrease.

To derive information on individual exposure to booms and recessions over the life-course, we implemented the following steps: Based on the approach by Doblhammer et al. (2011), we converted the cyclical component for each country into two main categories distinguishing booms from recessions. For each country, a deviation from the trend in GDP that fell in the highest quartile was classified as a boom, while a deviation falling in the lowest quartile was classified as a recession. We then linked this information to individual records from SHARE based on the year at every age since birth and the country of origin. The result was a dataset indicating whether an individual experienced a recession or boom at every single age from the year of birth up to age 49. We choose this upper age bound because SHARE participants enrolled at age 50 or

older, and because the series stopped in 2001, so that 49 was the highest age for which comparable information on GDP was available for most individuals. For 17% (n=2,475) of participants aged 45 to 49, data on the business cycle for the period after 2001 were missing. We assigned a separate dummy for these respondents in order to be able to incorporate them in the analysis, but excluding these individuals led to similar results.

We used yearly information on life-time exposure to the business cycle to create a variable measuring exposure to recessions and booms during consecutive decades of life from age 16 until age 49. For this purpose, we created a set of variables each indicating separately the number of booms and recessions an individual experienced at ages 16-24, 25-34 and 35-44. The last interval, 45-49, was treated as a separate period. The maximum number of booms or recessions experienced during the first three intervals is thus 10 and 5 for the last interval (49-49).

For illustration, Figure 1 shows the annual deviations from the smoothed trend of (log) GDP per capita for four representative countries (Germany, Denmark, Spain and Switzerland) for the years 1930 to 2001. A positive deviation indicates a cyclical upturn and a negative deviation a cyclical downturn. In addition to the annual deviations from the smoothed trend, the light-grey shaded areas show if there was a boom and the dark-grey shaded bars show if there was a recession in a specific year. As the deviations from the smoothed trend highlight, in all four countries there are marked fluctuations in the development of (log) GDP per capita over this time-period, thus making it possible to identify booms and recessions from the data.

Figure 1 here

When comparing the recession-periods identified by our approach with the periods of recession defined as a contraction of GDP per capita, there is a very high level of agreement. For example, Denmark witnessed negative growth rates in real GDP in the years 1932, 1940-41, 1945, 1963, 1974/5 and 1980/1. As the panel for Denmark shows, all these years were also identified as recessions by our approach. Similar results can be found for all countries when comparing the negative growth rates of real GDP with the results of our identification strategy. Furthermore, in the majority of countries, during every 10-year period there was at least one boom or recession.

Our identification strategy relies on variations in the number of booms and recessions experienced in each decade of life across cohorts of individuals from the same country but born in different years. To illustrate this, consider an individual born in 1930 in Spain and who turned 16 in 1946. This individual experienced two recessions (1949/50) and one boom-year (1952) at ages 16 to 24. Furthermore, this individual was exposed to three recession-years (1959-61) and three booms (1956/7 & 1964) at ages 25 to 34. In contrast, an individual born in 1935 (five years later) in the same country, experienced three booms (1952 & 1956/7) but only one recession at ages 16 to 24 (1959) and consecutively one boom (1964) and two recessions (1960/1) at ages 25 to 34. On average, cohorts of individuals experienced between 1.3 and 1.85 recessions and

between 2.02 and 2.67 recessions during every decade of life (Table 2). The maximum number of boom- or recession-years during one of the age-intervals was 5.

Table 2 here

Statistical Analysis

We started by examining functional limitation mean scores as well as quartiles of GS by the number of recessions and booms at ages 16 to 49, adjusting for age, sex and country. We then used (ordered) logistic regression to model the probability of reporting 1 or more limitations with ADL and IADL; 2 or more limitations with mobility; and the probability of falling in the lowest country and gender specific quartile of GS. In sensitivity analyses we also estimated all models using Poisson and negative Binominal models for ADL, IADL and mobility but found similar results. To control for differences across countries that could bias estimates, we estimated a country-fixed effect model exploiting within-country variation across cohorts. The basic model was of the following form:

$$\log[P(y_i = 1)] = \alpha_i + X_i\beta + R_{ct}\gamma + B_{ct}\gamma + C_c \quad (1)$$

Where $P(y_i = 1)$ is the probability of each health outcome for individual *i*, α_i is the intercept, X_i is a vector of individual-level controls, $R_{ct}\gamma$ is a vector of indicators for the number of recessions at each age interval in country *c* at time *t* and $B_{ct}\gamma$ is a vector of

indicators for the number of booms at each age interval. The country-fixed effect C_c controls for all unmeasured differences across countries such as institutional characteristics, economic development or levels of health.

Analyses were first conducted for the entire sample and subsequently stratified according to gender to examine differential effects for these sub-groups. Regression estimates were exponentiated to obtain odds ratios (OR) and corresponding 95% confidence intervals (CI).

Primary analysis focus on disability outcomes as measured at study enrolment. In addition, we examined whether booms and recessions experienced at ages 16-49 were associated with longitudinal changes in disability outcomes and GS over a two-year follow-up period. Changes were defined as the onset of a new limitation with ADL, IADL or mobility between wave 1 and 2. For GS, change was defined as the probability of moving to a lower country- and sex-specific quartile during the follow-up.

A potential concern is non-response and sample attrition bias. Therefore, all analyses were conducted using calibrated sampling weights to account for the potential selectivity bias generated by unit nonresponse and sample attrition (De Luca & Claudio, 2011). Based on the procedure by Devile and Sarndal (1992), weights were designed to match the size of national populations of individuals born in 1956 or earlier that survived up to 2008 (De Luca & Claudio, 2011). Weights also accounted for mortality of the target

population between the second and the third waves by using estimates of mortality rates obtained from life tables. All analyses were conducted in Stata/SE 12.0.

RESULTS

Table 1 shows basic characteristics of the sample for all European countries. Mean age was 63 and 54% of the sample was female. 43% of the sample had only primary education, while 26% had post-secondary education. 5% had experienced at least one limitation with ADL, 8% with IADL and 15% had experienced 2 or more limitations with mobility. Mean GS (in kg) was 46.7 for men and 28.6 for women.

For graphical illustration, Figure 2 shows the probability of physical limitations at old age according to the number of recessions and booms experienced at ages 16 to 49, adjusted by age, sex and country. The top panel shows that a larger number of recessions experienced at early- and middle-life is associated with a higher probability of reporting ADL, IADL or mobility limitations at old age. For example, individuals who experienced 1 to 3 recessions during ages 16 to 49 had a 5% probability of reporting at least one limitation in ADL at ages 50 to 74, as opposed to 9% among those who experienced 7 or more recessions. Similarly, having experienced 7 or more recessions at ages 16-49 is associated with a higher probability of falling in the lowest quartile of measured GS at ages 50-74 as compared to individuals who experienced less recessions over the life-course. As shown in the bottom panel, associations for economic booms were less consistent. ADL limitations were not associated with the number of booms, and more booms were associated with higher probability of falling in the lower quartile of GS. However, having experienced 7 or more recessions at ages 16-49 was associated with a higher probability of reporting limitations with IADL and mobility.

Figure 2 here

Table 3 shows odds ratios of the impact of experiencing an additional recession during each decade of life, controlling for sex, age, being born before or after WWII, educational attainment, childhood health and socio-economic conditions during childhood. The number of recessions experienced at any age period between ages 16 and 49 were associated with poorer health for at least one of the outcomes examined. For example, controlling for recessions and booms experienced at other periods, each additional recession experienced at ages 16 to 24 was associated with a 20% (95%CI 1.11, 1.30) increased odds of limitations with ADL, a 11% (95%CI 1.00, 1.23) increased odds of limitations with IADL, and an 8% (95%CI 1.03, 1.14) increased odds of falling in a lower GS quartile at ages 50-74. Similarly, each additional recession at ages 45-49 was associated with increased odds of limitations with IADL (OR=1.17, 95%CI 1.12, 1.23) and mobility (OR=1.26, 95%CI 1.01, 1.56) at old age. Negative effects for at least one health outcome were observed in all age periods, suggesting that recessions experienced at any age over the life-course can have long-run cumulative effects on health.

Table 3 here

Results from Table 3 suggest that economic booms experienced at ages 16 to 49 were not associated with limitations with ADL and mobility at old age. However, each

additional economic boom reduced the odds of reporting limitations with IADL at old age if experienced at ages 25-34 (OR=0.88, 95%CI 0.81, 0.95), 35-44 (OR=0.88, 95%CI 0.81, 0.95), and 45-49 (OR=0.79, 95%CI 0.92, 0.87). In addition, each additional boom at ages 25-34 was associated with a reduced odds of falling in a lower quartile of GS at ages 50-74 (OR=97%, 95%CI 0.94, 1.00).

Table 4 here

Table 4 shows estimates from a model that further incorporates potential explanatory variables associated with disability at old age. Current smoking was significantly associated with more IADL limitations, while drinking $\geq$2 glasses a day was not significantly associated with any disability outcomes. Higher financial wealth protected against limitations with all activities and was associated with less likelihood of having low GS. Higher BMI was associated with more limitations with ADL, IADL and mobility, but lower odds of being in a lower quartile of GS. Major injuries and periods of financial hardship experienced during adult life were strongly associated with more disability limitations old age. Despite these associations, controlling for these variables, estimates of the impact of recessions and booms experienced over the life-course were robust and remained almost unchanged.

Table 5 presents results stratified by sex. Overall, results did not differ significantly by sex, but effects for some outcomes were more consistent for men than women. For all

age periods, each additional recession was associated with at least one health outcome among men. Among women, associations of recessions with at least one health outcome were observed at all ages but 35-44. The number of recessions at ages 16-24 and 45-49 was associated with the risk of lower GS among men, while effects on GS for women were only observed for recessions at ages 16-24. Despite these discrepancies, overall results suggest that recessions and booms experienced in adult life had an effect on late-life health among both men and women.

Table 5 here

Longitudinal Changes in Physical Health

Table 6 shows the effect of economic recessions and booms at ages 16-49 on the onset of a new limitation and a decline in GS over a two-year follow-up. Overall, longitudinal results for recessions support findings based on assessments at enrolment. For at least one outcome, recessions experienced at ages 16-24, 34-44 and 45-49 increased the onset of a new limitation at old age over a two-year follow-up. More consistent effects were observed for recessions experienced at the two highest age periods than at earlier ages. For example, each additional recession increased the odds of a new ADL limitation over a two-year period by 14% (95%CI 1.02, 1.28) if experienced at ages 35-44, and by 34% (95%CI 1.08, 1.66) if experienced at ages 45-49.

Results for grip strength suggest that recessions experienced over the life course are also associated with increased risk of declining GS function. For example, each additional recession experienced at ages 34-44 increased the odds of a two-year decline in GS quartile by 7% (95%CI 1.00, 1.15), and by 11% (95%CI 1.02, 1.21) if experienced at ages 45-49. We explored to what extent these results may be due to changes in the distribution of country- and sex-specific quartiles of GS across waves rather than individual-level declines in function using changes in z-scores of GS (in kg) calculated using baseline means and standard deviations (results not shown). Although confidence intervals were wider, results from this analysis generally showed the same pattern as for changes in the probability of falling in the lowest quartile of GS.

Economic booms experienced at ages 16-49 were not associated with changes in mobility limitations or GS function. However, each additional boom experienced at ages 16-24, 35-44 and 45-49 reduced the onset of a new ADL or IADL limitation at old age over a two-year period. For example, each additional boom decreased the odds of a new limitation at old age if experienced at ages 16-24 (OR=0.83, 95%CI 0.73, 0.95), 35-44 (OR=0.91, 95%CI 0.85, 0.96) and 45-49 (OR=0.78, 95%CI 0.73, 0.83). These findings suggest that both economic recessions and booms experienced at early- and mid-age can have significant influence on the risk of a new disability limitation at old age.

Table 6 here

DISCUSSION

Some studies suggest that health temporarily improves during economic recessions while deteriorating during economic upturns. Our findings are in sharp contrast with these findings and suggest that any short-term positive effects of economic recessions are offset by negative long-run effects manifesting at old age. Based on macro-economic data linked to representative surveys for 11 European countries, we were able to show that each additional recession experienced at any age period between 16 and 49 years is associated with worse health outcomes at old age. Conversely, each additional economic boom experienced at ages 16-49 is associated with lower risk of some disability outcomes later in life. Results were consistent for both self-reported disability as well as objectively measured GS, and for disability levels as well as longitudinal changes. While these effects were consistent for men and women, economic recessions were particularly harmful for the long-term health of men. Our findings support the hypothesis that accumulated experiences of economic hardship over the life-course can have long-lasting effects leading to poor health at old age, raising important questions on the potential mechanisms linking the economy to health in the long-run.

Limitations

A strength and innovation of this study is the focus on long-run health effects of booms and recessions experienced over a critical period of adult life. The rich individual data from SHARE also allowed us to control for a broad set of individual socio-economic characteristics as well as potential mechanisms linking economic cycles to health.

Despite these strengths, some limitations and potential sources of bias should be considered.

Recall bias on early life variables is a potential concern. Respondents may inaccurately report on events that occurred several decades earlier, and recall bias may be differential. Although retrospective information on complex behaviours such as diet may indeed be inaccurate, studies indicate a level of agreement of around 80-90% between data from life-history event questionnaires and population registries for the timing of major events related to employment, health and marriage (Blane, 1996; Courgeau & Lelievre, 1992). These errors have been shown to have a relatively minor effect on estimates (Blane, 1996; Courgeau & Lelievre, 1992). In addition, business cycles, our main variable of interest, were assessed using external data and were therefore not influenced by recall bias.

Another concern is non-response and sample attrition bias. We conducted all analyses using calibrated sampling weights that account for nonresponse, attrition and mortality between waves (De Luca & Claudio, 2011). Nonetheless, selective mortality associated with experiences before enrolment is of potential concern, as those suffering most from the negative impact of economic downturns may not have survived to old age. Although there is no perfect way to account for this, mortality selection is likely to be most important at relatively old ages. In supplementary models, therefore, we estimated effects for the age-group 50 to 64 only, which would presumably be less affected by premature mortality than older age groups. Results for this group were very consistent

and showed the same pattern as for ages 50 to 74, suggesting that selective survival may not fully account for our results.

Our approach assumes that macroeconomic conditions are exogenous to the health of individuals. However, bias would occur if cohorts were different in other aspects other than their life-time experiences of booms and recessions. We therefore conducted supplementary analysis including 5-year birth cohort dummies. Results revealed a pattern consistent with our main results. Although we cannot control for all differences across cohorts within each country, these findings suggest that our results are not explained by differences that have affected cohorts in all countries.

To further assess the robustness of our results, we also conducted an extensive set of analysis with additional controls and alternative specifications. We estimated all models using the number of booms and recessions experienced every 5-year age period; we introduced controls for economic conditions at the time of interview; and we performed analyses incorporating information on macroeconomic conditions at ages 0 to 15. In all these specifications, the overall pattern was very similar to that observed in our main models.

Explanation of results

To our knowledge, this is the first study to examine the long-term effects of macroeconomic conditions in early- and middle-age on late-life health. Our findings are in agreement with previous studies suggesting that individual factors associated with

economic recessions, particularly job loss and job insecurity, are associated with poor health outcomes in later life (Catalano, 1991; Eliason & Storrie, 2009a; Lundin et al., 2010; Sullivan & von Wachter, 2009). In addition, our results might also reflect the influence of economic downturns via mechanisms other than unemployment, including higher life-time prevalence of health-related behaviours such as smoking and alcohol use; increased chronic stress associated with economic uncertainty; and reduced life-time opportunities for income and wealth accumulation as well as occupational upward mobility.

Several pieces of evidence suggest that behavioural mechanisms may be offer a partial explanation. Previous studies suggest that adverse financial circumstances and job loss can decrease resources for healthy behaviours such as exercise and nutrition, and may trigger use of alcohol or drugs as a coping mechanisms to face adversity (Catalano et al., 2010). Studies also suggest that higher unemployment rates are associated with increased substance use (Gascon & Spiller, 2009; Stuckler et al., 2009). The impact of risk factors such as smoking and alcohol use on chronic disease risk is cumulative, operating over long aetiological periods with clinical outcomes manifesting relatively late in life (Kuh & Ben-Shlomo, 2004; Wadsworth, 1997). Repeated exposures to economic downturns may ultimately lead to poorer behavioural outcomes whose effects take a toll during old age.

Our findings are in contrast to previous studies suggesting that health and mortality temporarily improves during economic downturns, while worsening during economic

upturns (Barstad, 2008; Freeman, 1999; Neumayer, 2004; Ruhm, 1995). Some studies suggest that economic downturns may lead to positive changes in health-related behaviour by temporarily reducing obesity, smoking and physical inactivity (Ruhm, 2005). In addition, economic downturns may also reduce the risk of working in hazardous conditions, working extended hours and job-related stress (Catalano et al., 2010). Our results suggest that the potential temporary positive effect of economic downturns on these mechanisms is offset by the cumulative detrimental effect of repeated experiences of economic downturns over the life-course. For instance, excessive drinking may temporarily decrease during economic downturns due to consumption constrains. However, over the long-run, the social and economic cost associated with a life-time of difficult macroeconomic circumstances may lead to higher risk of chronic excessive alcohol consumption and abuse. Given the complex aetiology of chronic diseases (Bartley et al., 1997) likely to lead to disability, it is more likely that health in later life will be determined more by permanent behaviours than behavioural fluctuations lasting over short periods. A similar argument can be made with regard to the effect of cyclical upturns on working conditions. While economic booms may temporarily increase the fraction of the population working and therefore potentially exposed to hazardous working conditions, over the long-run, the benefits of job tenure may offset these effects and result in better late-life outcomes for those who endured lives under more favourable job market conditions.

Another important explanation lies in the relationship between permanent income and wealth effects of booms and recessions and health. Each additional recession experienced over the life-course may reduce life-time earnings by directly influencing job opportunities or the number of hours worked. A macroeconomic shock experienced at middle-ages can also lead to substantial drops in housing wealth, influencing life-time accumulation of financial resources to finance consumption at old age and maintain living standards (Banks et al., 2012; Gist et al., 2012). Over the long-run, reduced earnings and wealth may trigger several mechanisms potentially harmful to health (Holland et al., 2000; Lynch et al., 1994; Lynch et al., 1997; Smith, 1999; Wunsch et al., 1996), contributing to the poorer disability outcomes for cohorts that experienced less favourable economic conditions over their adult life.

Finally, economic downturns experienced at critical periods in the life-cycle may have long-term effects that persist many decades after exposure. Example of this is recent evidence that less favourable economic conditions at the time of college graduation may lead to less favourable career prospects and long-term income-losses over several years or decades (Kahn, 2010; Oreopoulos et al., 2012). Economic conditions (Kahn, 2010; Oreopoulos et al., 2012) in the period of transition into the labour market may also delay marriage and limit the range of potential partners (McDonough et al., 1997). Evidence also suggests that individuals entering in less well-paid jobs are more likely to experience job insecurity or physical or chemical hazards at work during their working life (Goddard, 1988). Thus, exposure to adverse economic conditions earlier in life may

set individuals into less favourable life-course trajectories (Bartley et al., 1997) leading to increased risks of chronic illnesses (Bartley & Plewis, 2002).

Conclusions

Results from our study suggest that each additional recession experienced at ages 16 to 49 is associated with worse health at old age, while each additional boom at these ages is associated with better late-life health. Economic downturns experienced during early- and middle age may trigger a life-time of cumulative disadvantage which outweigh any temporary improvements in health during adverse economic times. Our results highlight the need to examine the multiple behavioural, work and financial mechanisms linking economic fluctuations to health in the long-run. If replicated in future studies, our findings suggest that policies to mitigate the impact of economic recessions on some of these mechanisms may contribute to better health at old age.

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TABLES AND FIGURES

Table 1

Descriptives[a]

Variable	n [Mean]	% [SD]	Variable	n [Mean]	% [SD]
Health outcomes			Main breadwinner ISCO		
ADL (>=1 limitations)	657	4.72	Low skilled blue collar	3,809	27.34
IADL (>=1 limitations)	1106	7.94	High skilled blue collar	6,249	44.85
Mobility (>=2 limitations)	2075	14.89	Low skilled white collar	1,997	14.34
Grip strenght (Kg)			High skilled white collar	1,878	13.48
Men	[46.73]	[9.24]	Education		
Women	[28.63]	[6.65]	Primary education	5,961	42.78
Sex			Secondary education	4,287	30.77
Male	6,374	45.75	Post-secondary education	3,685	26.45
Female	7,559	54.25	Current smoker (yes)	3,284	23.57
Age	[62.87]	[6.17]	Drinking 2 drinks/day (yes)	1,471	13.49
Age 50-54	1,300	9.33	Household net wealth (Euro/PPP)	[141,977]	[181,682]
Age 55-59	3,447	24.74	BMI	[25.61]	[5.97]
Age 60-64	3,494	25.08	Major injury during adulthood (yes)	1,726	12.39
Age 65-69	3,119	22.39	Experience of periods of financial hardship during adulthood (yes)	4,625	33.19
Age 70-74	2,573	18.47			
			Country (at birth)		
WWII (born after 1945)	6,438	46.21	Austria	465	3.34
Bad SRH as child (yes)	1,104	7.92	Belgium	1,713	12.29
Childhood infectious diseases (yes)	11,917	85.53	Denmark	1,432	10.28
Childhood physical injuries (yes)	3,764	27.02	France	1,225	8.79
No. of books at home			Germany	1,217	8.73
None or very few (0-10 books)	5,687	40.82	Greece	1,815	13.03
Enough to fill one shelf (11-25 books)	3,160	22.69	Italy	1,654	11.87

Enough to fill one bookcase (26-100 books)	3,152	22.62	Netherlands	1,434	10.29
Enough to fill two bookcases (101-200 books)	961	6.90	Spain	1,104	7.92
Enough to fill two or more bookcases (200+ books)	973	6.98	Sweden	1,119	8.03
			Switzerland	738	5.30

N=13,933

Abbreviations: ADL, Activities of Daily Living; IADL, Instrumental Activities of Daily Living; WWII, World War II; SRH, self-rated health; ISCO, International Standard Classification of Occupations; PPP, purchasing power parities; SD, standard deviations.

[a] Calculations based on data from SHARELIFE rel. 1 and SHARE rel. 2.5.0; results are weighted.

Table 2

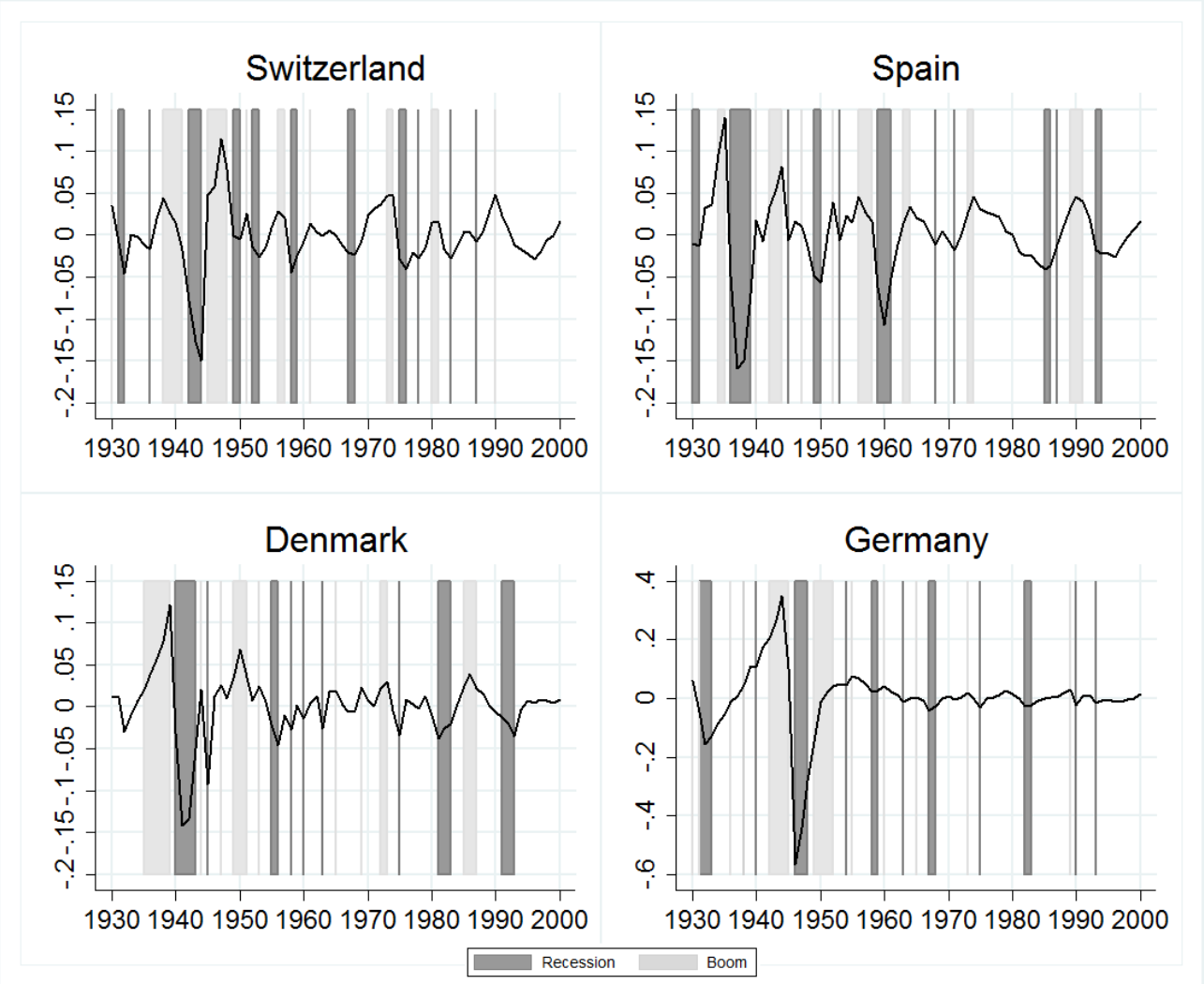
Descriptives for Booms and Recessions[a]

Variable	Mean	SD
Recessions 16-24	1.61	1.39
Recessions 25-34	1.30	1.25
Recessions 35-44	1.30	1.15
Recessions 45-49	1.85	4.14
Booms 16-24	2.02	1.38
Booms 25-34	2.08	1.38
Booms 35-44	2.53	1.36
Booms 45-49	2.67	3.96

Abbreviations: SD, standard deviation.

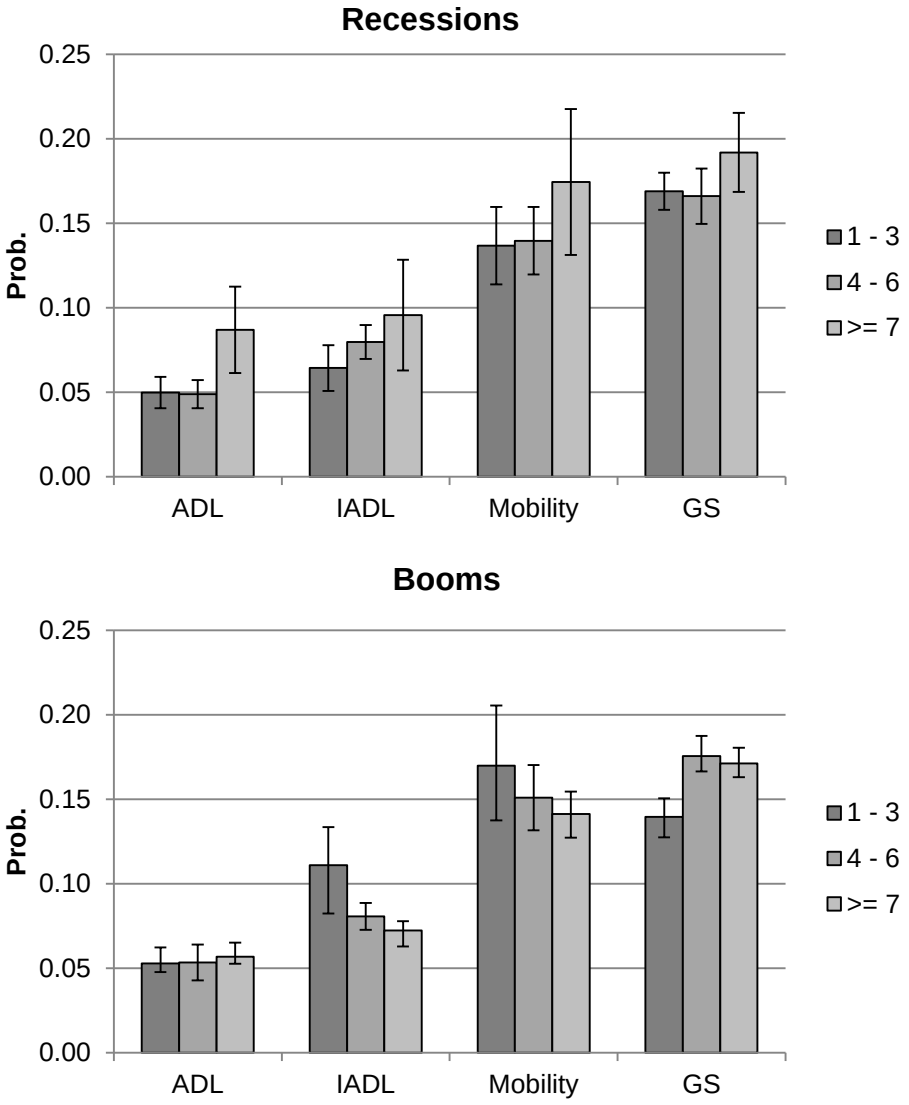
[a] The Table shows the average number of booms and recessions experienced during each 10- (and 5-year) period for 13,399 individuals from 11 European countries born between 1930 and 1956.

Fig. 1. Deviations from the Trend in GDP per Capita and Recessions and Booms in four European countries, 1930 - 2000[a]



[a] The Figure shows the deviations from the smoothed trend as well as the years in which there was a recession or a boom, defined as deviations from the trend falling in the lowest or highest country-specific quartile respectively.

Fig. 2. Number of booms and recessions at ages 16 to 49 and later-life physical health[a]



Abbreviations: ADL, Activities of Daily Living; IADL, Instrumental Activities of Daily Living; GS, grip strength.

[a] The Figures show the probabilities and 95% confidence intervals of reporting 1+ limitation in ADL or IADL, 2+ limitations in mobility and of being in the lowest country- and sex-specific quartile of GS in relationship to the number of recessions and booms during ages 16 to 49. Probabilities are adjusted by sex, age and country.

Table 3

Exposure to Recessions and Booms During Early- and Late-Adulthood and Later-Life Physical Functioning for Men and Women in 11 Western European Countries[a]

	ADL		IADL		Mobility		GS	
	OR	CI	OR	CI	OR	CI	OR	CI
Female	0.80	(0.59-1.07)	1.79	(1.07-2.97)	1.94	(1.61-2.33)	1.18	(1.12-1.25)
Age	0.98	(0.92-1.04)	1.08	(1.03-1.13)	1.08	(1.04-1.12)	1.08	(1.06-1.11)
WWII (born before 1945)	1.39	(0.62-3.12)	0.58	(0.29-1.17)	0.65	(0.45-0.93)	0.95	(0.78-1.15)
Secondary education (ref.: primary)	0.67	(0.50-0.90)	0.62	(0.46-0.85)	0.68	(0.56-0.83)	0.93	(0.80-1.07)
Post-secondary education	0.31	(0.13-0.76)	0.41	(0.28-0.59)	0.49	(0.41-0.59)	0.81	(0.67-0.98)
Bad SRH as child	1.72	(1.42-2.08)	1.84	(1.49-2.27)	1.83	(1.62-2.06)	1.28	(1.11-1.48)
Childhood infectious diseases	0.64	(0.46-0.87)	0.80	(0.55-1.16)	0.71	(0.53-0.94)	0.89	(0.77-1.02)
Childhood physical injuries	1.56	(1.22-1.98)	1.29	(1.10-1.52)	1.39	(1.19-1.62)	1.14	(1.03-1.25)
No. of books at home (ref.: None or very few (0-10 books)								
Enough to fill one shelf (11-25 books)	0.73	(0.60-0.88)	0.93	(0.70-1.25)	0.74	(0.57-0.97)	0.89	(0.79-1.01)
Enough to fill one bookcase (26-100 books)	1.13	(0.78-1.65)	1.04	(0.78-1.39)	0.83	(0.58-1.19)	0.92	(0.79-1.08)
Enough to fill two bookcases (101-200 books)	1.01	(0.56-1.82)	1.16	(0.66-2.03)	0.45	(0.26-0.79)	0.79	(0.71-0.89)
Enough to fill two or more bookcases (more than 200 books)	0.79	(0.57-1.09)	0.72	(0.46-1.11)	0.52	(0.39-0.69)	0.89	(0.78-1.01)
Main breadwinner ISCO (ref.: low skilled blue collar worker)								
High skilled blue collar worker	0.59	(0.38-0.91)	0.84	(0.55-1.28)	0.78	(0.65-0.95)	0.98	(0.92-1.03)
Low skilled blue white worker	0.75	(0.36-1.54)	0.93	(0.53-1.62)	1.05	(0.80-1.37)	1.15	(1.00-1.32)
High skilled blue white worker	0.62	(0.36-1.07)	0.76	(0.60-0.98)	0.96	(0.85-1.09)	1.15	(1.01-1.31)

Recessions 16-24	1.20	(1.11-1.30)	1.11	(1.00-1.23)	1.01	(0.97-1.04)	1.08	(1.03-1.14)
Recessions 25-34	1.33	(1.20-1.48)	1.21	(1.00-1.48)	1.08	(0.96-1.21)	1.07	(0.92-1.25)
Recessions 35-44	1.31	(0.89-1.93)	1.24	(1.02-1.50)	1.19	(0.98-1.44)	1.04	(0.88-1.23)
Recessions 45-49	1.47	(0.96-2.24)	1.17	(1.12-1.23)	1.26	(1.01-1.56)	1.06	(0.94-1.19)
Booms 16-24	1.04	(0.92-1.18)	0.94	(0.81-1.10)	0.92	(0.83-1.03)	1.02	(0.95-1.09)
Booms 25-34	1.00	(0.81-1.23)	0.88	(0.81-0.95)	0.94	(0.81-1.08)	0.97	(0.94-1.00)
Booms 35-44	0.91	(0.79-1.04)	0.82	(0.71-0.94)	0.95	(0.84-1.09)	0.93	(0.86-1.01)
Booms 45-49	1.02	(0.94-1.10)	0.79	(0.72-0.87)	0.97	(0.88-1.06)	0.99	(0.95-1.03)

Abbreviations: OR, odds ratio; CI, 95% confidence interval; ADL, Activities of Daily Living; IADL, Instrumental Activities of Daily Living; GS, grip strength; ISCO, International Standard Classification of Occupations.

[a] Coefficients are from a single model controlling for all covariates listed and including country fixed effects but estimates are excluded from the Table.

Table 4

Exposure to Recessions and Booms During Early- and Late-Adulthood and Later-Life Physical Functioning for Men and Women in 11 Western European Countries (Including Additional Controls)[a]

	ADL		IADL		Mobility		GS	
	OR	CI	OR	CI	OR	CI	OR	CI
Female	1.02	(0.77-1.34)	1.92	(1.14-3.22)	2.40	(2.04-2.83)	1.08	(0.99-1.19)
Age	0.99	(0.93-1.05)	1.08	(1.03-1.13)	1.09	(1.05-1.13)	1.08	(1.06-1.11)
WWII (born before 1945)	1.37	(0.63-2.99)	0.56	(0.28-1.11)	0.61	(0.43-0.87)	0.95	(0.79-1.13)
Secondary education (ref.: primary)	0.76	(0.54-1.08)	0.67	(0.50-0.91)	0.77	(0.65-0.91)	0.96	(0.85-1.10)
Post-secondary education	0.45	(0.16-1.22)	0.49	(0.33-0.72)	0.66	(0.55-0.79)	0.87	(0.72-1.05)
Bad SRH as child	1.61	(1.37-1.90)	1.69	(1.38-2.07)	1.71	(1.40-2.08)	1.22	(1.04-1.43)
Childhood infectious diseases	0.63	(0.49-0.80)	0.80	(0.55-1.15)	0.70	(0.53-0.93)	0.90	(0.78-1.05)
Childhood physical injuries	1.42	(1.12-1.80)	1.22	(1.04-1.43)	1.34	(1.12-1.60)	1.14	(1.03-1.27)
No. of books at home (ref.: None or very few (0-10 books)								
Enough to fill one shelf (11-25 books)	0.80	(0.62-1.03)	1.05	(0.79-1.41)	0.80	(0.64-1.00)	0.82	(0.74-0.90)
Enough to fill one bookcase (26-100 books)	1.26	(0.86-1.86)	1.12	(0.83-1.52)	0.89	(0.64-1.24)	0.86	(0.76-0.98)
Enough to fill two bookcases (101-200 books)	0.94	(0.44-2.00)	1.26	(0.62-2.56)	0.48	(0.25-0.92)	0.64	(0.48-0.86)
Enough to fill two or more bookcases (more than 200 books)	0.90	(0.60-1.36)	0.80	(0.55-1.18)	0.60	(0.41-0.90)	0.76	(0.67-0.87)
Main breadwinner ISCO (ref.: low skilled blue collar worker)								
High skilled blue collar worker	0.65	(0.43-0.98)	0.92	(0.60-1.42)	0.88	(0.75-1.03)	0.94	(0.88-1.00)
Low skilled blue white worker	0.80	(0.44-1.46)	0.96	(0.59-1.56)	1.16	(0.96-1.41)	1.10	(0.93-1.29)

High skilled blue white worker	0.75	(0.40-1.40)	0.93	(0.66-1.29)	1.03	(0.82-1.29)	1.24	(1.06-1.45)
Currently smoking	1.02	(0.59-1.76)	1.21	(1.04-1.42)	1.06	(0.86-1.31)	0.86	(0.74-1.01)
Drinking 2 drinks/day	1.10	(0.88-1.37)	0.86	(0.60-1.23)	0.80	(0.59-1.09)	1.04	(0.87-1.24)
Household net wealth (ref.: 1st quartile)								
2nd quartile	0.82	(0.47-1.42)	0.88	(0.62-1.25)	0.77	(0.57-1.04)	0.77	(0.64-0.91)
3rd quartile	0.75	(0.52-1.09)	0.64	(0.51-0.81)	0.59	(0.45-0.79)	0.61	(0.53-0.71)
4th quartile	0.44	(0.26-0.74)	0.45	(0.34-0.59)	0.43	(0.35-0.52)	0.58	(0.52-0.65)
BMI	1.07	(1.03-1.11)	1.01	(1.00-1.03)	1.07	(1.06-1.09)	0.97	(0.95-0.99)
Major injury during adulthood	3.10	(2.42-3.97)	2.57	(2.31-2.86)	3.04	(2.47-3.76)	1.18	(0.97-1.44)
Experience of periods of financial hardship during adulthood	1.51	(1.21-1.89)	1.33	(1.16-1.52)	1.23	(1.15-1.32)	1.06	(0.92-1.21)
Recessions 16-24	1.20	(1.10-1.31)	1.10	(1.01-1.20)	1.00	(0.95-1.04)	1.09	(1.03-1.15)
Recessions 25-34	1.29	(1.18-1.40)	1.20	(1.00-1.43)	1.05	(0.96-1.14)	1.09	(0.93-1.27)
Recessions 35-44	1.29	(0.82-2.02)	1.23	(0.99-1.52)	1.18	(0.94-1.47)	1.06	(0.89-1.27)
Recessions 45-49	1.46	(0.86-2.48)	1.17	(1.10-1.25)	1.27	(0.98-1.64)	1.07	(0.96-1.20)
Booms 16-24	1.05	(0.92-1.19)	0.94	(0.82-1.09)	0.92	(0.83-1.01)	1.03	(0.96-1.10)
Booms 25-34	0.99	(0.80-1.23)	0.87	(0.81-0.94)	0.93	(0.80-1.07)	0.98	(0.95-1.00)
Booms 35-44	0.91	(0.78-1.07)	0.82	(0.72-0.94)	0.96	(0.82-1.11)	0.94	(0.87-1.02)
Booms 45-49	1.00	(0.89-1.13)	0.78	(0.71-0.86)	0.96	(0.84-1.08)	0.99	(0.95-1.03)

Abbreviations: OR, odds ratio; CI, 95% confidence interval; ADL, Activities of Daily Living; IADL, Instrumental Activities of Daily Living; GS, grip strength; ISCO, International Standard Classification of Occupations; BMI=body mass index.

[a] Coefficients are from a single model controlling for all covariates listed and including country fixed effects but estimates are excluded from the Table.

Table 5

Exposure to Recessions and Booms During Early- and Late-Adulthood and Later-Life Physical Functioning for Men and Women in 11 Western European Countries (for Men and Women Separately)[a]

Men

	ADL		IADL		Mobility		GS	
	OR	CI	OR	CI	OR	CI	OR	CI
Recessions 16-24	1.19	(1.05-1.33)	1.13	(0.96-1.33)	0.97	(0.87-1.09)	1.09	(1.02-1.17)
Recessions 25-34	1.37	(1.12-1.68)	1.04	(0.91-1.20)	1.02	(0.87-1.21)	1.07	(0.95-1.20)
Recessions 35-44	1.46	(0.90-2.35)	1.37	(1.08-1.74)	1.25	(0.97-1.60)	1.10	(0.94-1.28)
Recessions 45-49	1.61	(0.84-3.09)	1.24	(1.09-1.40)	1.59	(1.05-2.40)	1.23	(1.09-1.39)
Booms 16-24	1.05	(0.91-1.21)	0.92	(0.78-1.08)	0.92	(0.72-1.18)	1.02	(0.99-1.05)
Booms 25-34	1.14	(0.93-1.39)	0.93	(0.81-1.06)	0.93	(0.77-1.12)	0.97	(0.94-0.99)
Booms 35-44	0.93	(0.77-1.11)	0.82	(0.68-0.97)	0.89	(0.81-0.98)	0.87	(0.81-0.94)
Booms 45-49	1.10	(0.92-1.31)	0.85	(0.78-0.93)	1.00	(0.88-1.14)	0.98	(0.95-1.02)

Women

	ADL		IADL		Mobility		GS	
	OR	CI	OR	CI	OR	CI	OR	CI
Recessions 16-24	1.16	(1.09-1.24)	1.11	(0.95-1.31)	1.02	(0.95-1.09)	1.08	(1.00-1.17)
Recessions 25-34	1.25	(1.07-1.47)	1.31	(0.93-1.84)	1.08	(0.96-1.22)	1.08	(0.85-1.37)
Recessions 35-44	1.11	(0.78-1.58)	1.20	(0.95-1.53)	1.13	(0.91-1.42)	0.99	(0.79-1.25)
Recessions 45-49	1.26	(0.94-1.69)	1.15	(1.03-1.28)	1.10	(0.93-1.31)	0.93	(0.80-1.07)
Booms 16-24	1.00	(0.83-1.20)	0.96	(0.75-1.24)	0.91	(0.82-1.00)	1.01	(0.90-1.14)
Booms 25-34	0.88	(0.67-1.17)	0.85	(0.77-0.94)	0.93	(0.80-1.08)	0.97	(0.93-1.00)
Booms 35-44	0.90	(0.70-1.18)	0.82	(0.71-0.94)	0.98	(0.85-1.14)	0.99	(0.90-1.09)
Booms 45-49	0.96	(0.84-1.10)	0.77	(0.67-0.89)	0.95	(0.89-1.02)	0.99	(0.91-1.07)

Abbreviations: OR, odds ratio; CI, 95% confidence interval; ADL, Activities of Daily Living; IADL, Instrumental Activities of Daily Living; GS, grip strength.

[a] All models include the same covariates as included in Table 4 as well as fixed effects for country but estimates are excluded from the Table.

Table 6

Recessions and Booms During Early- and Late-Adulthood and Worsening of Physical Health for Men and Women in 11 Western European Countries[a]

	ADL		IADL		Mobility		GS	
	OR	CI	OR	CI	OR	CI	OR	CI
Recessions 16-24	1.13	(0.99-1.30)	1.03	(0.96-1.10)	1.04	(0.95-1.15)	0.96	(0.91-1.02)
Recessions 25-34	0.92	(0.68-1.23)	0.92	(0.72-1.19)	0.97	(0.81-1.15)	0.97	(0.93-1.01)
Recessions 35-44	1.14	(1.02-1.28)	1.15	(1.00-1.32)	1.15	(1.02-1.29)	1.07	(1.00-1.15)
Recessions 45-49	1.34	(1.08-1.66)	1.32	(0.91-1.90)	1.07	(0.81-1.40)	1.11	(1.02-1.21)
Booms 16-24	0.83	(0.73-0.95)	0.86	(0.76-0.97)	0.90	(0.79-1.02)	0.97	(0.90-1.05)
Booms 25-34	0.91	(0.79-1.04)	0.91	(0.81-1.02)	0.97	(0.88-1.06)	0.99	(0.93-1.05)
Booms 35-44	0.91	(0.85-0.96)	0.91	(0.82-1.01)	1.02	(0.95-1.11)	1.03	(0.95-1.11)
Booms 45-49	0.78	(0.73-0.83)	0.86	(0.70-1.05)	0.91	(0.80-1.03)	1.04	(0.97-1.11)

Abbreviations: OR, odds ratio; CI, 95% confidence interval; ADL, Activities of Daily Living; IADL, Instrumental Activities of Daily Living; GS, grip strength.

[a] The Table shows the OR associated with increases in limitations in ADL, IADL or mobility between wave 1 and wave 2. For GS the Table shows the OR associated with being in a lower country- and sex-specific quartile in wave 2 than in wave 1. Individuals who already reported the highest number of limitations at wave 1 or who were in the lowest quartile of GS were excluded from the analysis. All models include controls for time elapsed between wave 1 and 2 and the first and second observation (for GS) respectively, the same covariates as in Table 4 as well as fixed effects for country but estimates are excluded from the Table.