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Impact of work, social participation and retirement on health of older citizens in Europe

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Tesi di Dottorato di Gulnara Huseynli, matricola 955951

Coordinatore del Dottorato	**Tutore del Dottorando**
Prof. Michele Bernasconi	**Prof. Mario Padula**

1 Estratto per riassunto della tesi di dottorato

L'estratto (max. 1000 battute) deve essere redatto sia in lingua italiana che in lingua inglese e nella lingua straniera eventualmente indicata dal Collegio dei docenti.

L'estratto va firmato e rilegato come ultimo foglio della tesi.

Studente: *Gulnara Huseynli matricola: 955951*

Dottorato: *PhD in Economics*

Ciclo: *27th*

Titolo della tesi[1] : Impact of work, social participation and retirement on health of older citizens in Europe

Abstract:

In the first chapter of the thesis I studied effect of retirement on cognition among Europeans, using cross-country survey data from eleven European countries. I found that using the OLS regression the retirement is highly negatively correlated with the memory performance only for the male subsample. In addition, when I used the IV approach separately for subsamples of physically demanding and undemanding jobs, I found that the effect of the retirement on memory in both subsamples is negative. At the next step, I divided my sample into 2 groups of countries with high or low memory performance. This analysis led to the finding that in countries characterized by high memory performance the effect of the retirement on cognition is positive and highly significant. I interpreted this finding as the memory performance of retirees in high-memory level countries declines at slow rate.

Although empirical studies find that participation in social activities positively affects health of older citizens in the Western societies, little attention so far was paid to the problem of potential endogenity. It is likely, however that healthier people are more able to participate in social activities or that both variables influence each other. Indeed, some authors acknowledge that the existing studies have not yet adequately answered this question. The second chapter of my thesis contributes to closing this gap. Using two waves of the Survey of Health Ageing and Retirement in Europe, I suggest that the measure of individual trust could serve as an instrument to isolate the causal path from participation in social activities to different levels of the reported self-perceived health. My findings confirm that trust causes the change in the health status of individuals through social activity participation.

Socio-economic shocks, such as job loss due to layoffs or plant closure may lead to worse health because of the financial strain associated with these events. This could occur either because of stress or simply because the financial consequences make it hard to access health care. The third chapter of the thesis applies data from SHARELIFE to investigate the effect of involuntary job loss on health. My findings suggest that males have significant higher likelihood of reporting poor or fair health if they experienced layoff, whereas females are more likely to suffer from depression if they experienced a plant closure.

Firma dello studente

Gulnara Huseynli

[1] Il titolo deve essere quello definitivo, uguale a quello che risulta stampato sulla copertina dell'elaborato consegnato.

PhD Thesis

Chapter 1

Retirement and memory performance among older citizens in European Countries

Gulnara Huseynli

University of Ca Foscari Venice

PhD in Economics

An analysis based on SHARE micro-data survey

Supervisor: Professor Mario Padula

ABSTRACT

The policy makers became increasingly concerned with the stability of the social security systems, which led to changes in public retirement provisions. However, many scholars point out that since retirement is a major life transition, the retirement age may have strong effect on the health of retirees, which should be taken into account. In this research I studied effect of retirement on cognition among Europeans, using cross-country survey data from eleven European countries. I found that using the OLS regression the retirement is highly negatively correlated with the memory performance only for the male subsample. In addition, when I used the IV approach separately for subsamples of physically demanding and undemanding jobs, I found that the effect of the retirement on memory in both subsamples is negative. At the next step, I divided my sample into 2 groups of countries with high or low memory performance. This analysis led to the finding that in countries characterized by high memory performance the effect of the retirement on cognition is positive and highly significant. I interpreted this finding as the memory performance of retirees in high-memory level countries declines at slow rate.

1. Introduction

One of the greatest social and economic challenges for the contemporary world is demographic transition, which involves aging of population and therefore increasing number of retirees. According to the latest Aging Report (EU, 2012 Ageing report that was published on 15 May 2012) in 10 years more than fifth of European population is forecasted to be of 65 years old or over, while the number of people over-80s being increased. At the same time the portion of people in working ages will drop by over 10 percent in the next 5 decades; whereas the number of those at the age of 65 and over will increase up to 30 percent (Eurostat news release, 2011). Therefore, while today the dependency ratio in the European Union is 4 workers to each retiree, by 2060 it will decrease to 2. The decreasing workforce is expected to drive the public expenditure on pensions to about 13% of the Gross Domestic Product. In this context the policy makers became increasingly concerned with the stability of the social security systems, which led to changes in public retirement provisions. For example, many European states increased the age of eligibility for pension benefits. However, many scholars point out that since retirement is a major life transition, the retirement age may have strong effect on the health of retirees, which should be taken into account. The current study contributes to the ongoing scientific debate about the timing of retirement and its health effects. In particular, I focus on the relationship between retirement duration and memory performance of older Europeans. In addition, I also take into account that this effect of retirement can vary depending on the physical load of an occupation. To study causal effect on cognitive performance, we should take care of possible endogenity. For example, it is possible that retirement is caused by poor health (Mazzonna and Peracchi, 2012). In order to address this challenge I apply the Instrumental Variable (IV) approach. Namely, as an instrument for retirement I suggest using variation in retirement ages (Full and early) that were imposed by legislation in different European countries. The rest of the paper is organized as follows. Next I present a review of literature, then I introduce strategy and model for empirical analysis. Afterwards I describe my dataset and variables and report descriptive statistics. This is followed by results of multivariate analyses. The final section concludes.

2. Literature Review

Empirical research contains contradictory evidence about the effect of retirement on mental health and cognitive performance. Several studies found positive impact, which was attributed to extra free time that retirees enjoy to take care of themselves, as well as to absence of job-related stress. Early investigations argued that retirement has no detrimental impacts on health (Moen 1996, Portnoi 1981). For example, Thompson and Streib (1958) found strong positive correlation between retirement and mental health. Later, Westerlund (2010) found that retirement affects mental health beneficially, however he was not able to determine its effect on physical health. These authors claimed that the retirement diminishes the decline in self-reported health for all the workers, who have less than perfect working conditions. This finding suggests that improvement in the working conditions is warranted to encourage job-market participation among older workers.

Burdorf's empirical study (2010) finds that retirement leads to decrease in stress and states that for workers under poor working conditions, the retirement might mean relief. The authors claim that the further research should take into account both differences in the physical burden of different occupation types, as well as different types of retirement arrangements, such as voluntary, involuntary and regulatory. Bound and Waidmann (2007) found no support for negative impact of retirement on health in the US and the UK, and some evidence about its positive effect, at least for men.

Notwithstanding, other studies found evidence on detrimental effect of retirement on health. In particular, studies such as Adam et al. (2006) found that remaining in the labour market or doing other types of socially useful activities contribute to better cognitive functioning among older adults. Rohwedder and Willis (2010) attributed such effects to mentally devastating feeling of lack of purpose in life, associated with retirement. According to Mazzonna and Peracchi (2012), the retirees lack motivation to invest in activities that may maintain a high level of cognitive functioning. Another explanation was supplied by Coe and Zamarro (2011) and Borsch-Supan and Schuth (2013), according to whom the retirement leads to shrinking of social life and to social isolation, which result in depressive attitudes and finally in cognitive decline.

Another important consideration is that the effect of retirement on health and cognition may

vary by occupation. According to Case and Deaton (2005) the retirement is beneficial for the health of those, working in manual jobs. Mazzonna and Peracchi (2012) found adverse effect of retirement on cognition, however this effect was beneficial for a subsample of those, who worked in physically demanding jobs.

The literature pays attention to possible endogenity problems, when estimating the effect of retirement on cognition. In particular, there is a possibility of reverse causality, when older workers with better cognitive performance chose to remain longer in the labour force, while their less healthy colleagues may prefer to leave. Researchers addressed this problem by using instrumental variables approach. In his research about the effect of retirement on health, Neuman (2008) suggested to instrument retirement with discontinuities in age-specific retirement incentives (at ages 62, 65, 70 and 72) provided by the U.S Social security policies. Coe and Zamarro (2008), who found that quitting the labour force has beneficial effect for European men's health, instrumented retirement with early and full retirement ages legislated by different European countries.

From this discussion I conclude the following. First, there are equivocal findings with respect to the effect of retirement on health and cognition and more research is warranted. In addition, there is a need to study this effect separately for those in manual or physically demanding jobs. Finally, to deal with the exogenity of retirement, it is necessary to use the instrumental variables approach.

Other Determinants of Memory Performance

According to the vast amount of literature, it is widely accepted that cognitive decline, specially working and episodic memory is negatively associated with age (Van der Linden,Brédart, Beerten, 1994) and it has been proved from both, functional and neurological point of view. Although, this negative relationship between memory skills and age is associated with structural changes in the brain (Raz, 2004) according to Schaie (1989, 1994) this related decline is not inevitable. There are many examples, which provide clear examples of elderly people who maintain their cognitive vitality, even in the extreme old age. This can be achieved through

intellectual, social and physical activities. For instance, Newson and Kemps (2005) find that there is a positive relationship between participating in intellectual, social and physical activities. The effect of participation in lifestyle activities to prevent the working memory in older age is widely accepted in the literature.

Moreover, most of studies show that more education is linked to better cognitive (memory) performance much later in life. Schneeweis et al. investigate the relationship between education and cognitive functioning at older ages by exploiting compulsory schooling reforms, implemented in six European countries. Their results show that there is a positive effect of schooling years on memory skills. More precisely, they find that one year of education increases the delayed memory score by about 0.3, which amounts to 16% of the standard deviation. Accordingly, Adam et al. (2006) show that occupational activities, including paid work and non-paid work as well as professional, leisure, physical, and other activities , are highly correlated with psychological health. All these statements from the literature above have important implications for cognitive performance (memory) and the structure of retirement in older age. Bearing this in mind and taking into account the factors related to the social and economic status give us enough evidence to investigate the relationship between retirement and cognitive ability (memory).

3. Methods and models

The model below represents memory performance as a linear function of retirement and a vector of controls that were found in the literature as good predictors.

$$C_i = \gamma + \alpha R_i + \beta X_i + u_i \qquad (1)$$

where C_i = the measure of memory performance for each individual i, R_i = number of years spent in retirement. X_i = set of other explanatory variables, including measures of human capital, socio-economic status, or demographic characteristics (see full description of the variables

below). Finally, u_i = error term.

In the current analysis I cannot use OLS since I expect that one of the condition E(u|X)=0 is not satisfied. This is because of potential endogeniety problem, since older workers with lower memory performance may retire earlier, as well as it is possible that there are some omitted unobservables. As to the latter Coe and Zamarro, 2011 mention that people in physically demanding jobs tend to retire earlier. To tackle this endogenity problem, I suggest using the instrumental variable technique. The IV approach requires finding a variable Y that is correlated with the endogenous independent measure of retirement, but affects the outcome of memory performance only indirectly (i.e. via the retirement indicator) and is uncorrelated with the outcome. Mathematically, these conditions can be written as Cov (Y; R) ≠ 0; Cov (Y; u) = 0. Next, I describe the suggested IV approach.

3.1 Instrumental Variable Approach

As follows from the previous research, the legal age of eligibility for both early and full pension benefits differ across countries. In addition, these eligibility ages affect the retirement decision of older workers. Hence, I can exploit these two facts to instrument possibly endogenous retirement indicator. Table 1 below reports retirement ages by country and gender.

Table 1. Eligibility ages for pension benefits in 11 European countries

Country	Woman Early/Full	Men Early/Full
Austria	57/60	60/65
Germany	63/65	63/65

Sweden	61/65	61/65
The Netherlands	60/65	60/65
Spain	60/65	60/65
Italy	57/65	57/65
France	57/60	57/60
Denmark	65/65	65/65
Greece	57/65	57/65
Switzerland	62/64	63/65
Belgium	60/65	60/65

Following the recent paper by Peracci & Mazonna, 2014 I define my instrumental variables as follows:

$$DistE_i = \text{Max}\{0; Age_i - E_i\}, DistF_i = \text{Max}\{0; Age_i - F_i\} \quad (1)$$

where $DistE_i$ and $DistF_i$ are calculated as difference between the age of an individual at the time of the interview and eligibility age for early or full retirement respectively.

Now, I can rewrite the structural form of the equation (1), using the following equation for the first stage of the IV approach:

$$R_i = \theta_1 X_i + \theta_2 DistE_i + \theta_3 DistF_i + \varepsilon_i \quad (2)$$

Plugging (2) into the equation (1) we can write the reduced from for Mi – which is the unbiased and consistent – as follows

$$C_i = \gamma + \alpha\dot{\widehat{R}}_i + \beta \mathrm{X_i} + \mathrm{v_i} \quad (3)$$

4. Data, Variables and Descriptive Statistics

I use the data from the Survey of Health, Ageing and Retirement in Europe (SHARE). SHARE is a multidisciplinary and cross-national panel database of micro data on health (including memory performance), social and economic variables (such as employment status or current or last occupation of the respondent) and a rich set of demographic and other characteristics of 110,000 respondents aged 50 and over from 20 European countries (and Israel). For the current analysis I combine wave 1 (2004), wave 2 (2006) and wave 4 (2013) of SHARE dataset, release 2.6.0 (November 2013). Hence my working sample contains eleven countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, Spain, Sweden, Switzerland), for which information from the first wave (2004) was available. Next, I removed from this sample records that had missing values for at least one of my variables. In addition, I kept only respondents, who reported that they are employed, unemployed or retired. I also discarded cases, which did not have information on the past employment status, were outside labor market at the age of 50, who never worked or did not work after the age of 50. My resulting dataset consists of 14,300 observations. Finally, I added to these data also the variables that contain information on the legal early and full retirement age.

4.1 Variables

4.1.1 Dependent Variable

I measure memory skills using the following method. In SHARE, individuals are asked to recall the list of 10 common words (butterfly, letter, queen, ticket, grass, corner, stone, book, stick),

which were implemented twice. In the first stage, they had to memorize and repeat the words immediately after interviewer asked(immediate recall) and in the second step they had to repeat these words in any order again several minutes later(delayed recall), after responding to some other questions. The respondents total memory score are calculated as the number of words that the respondent recalled from the first stage(the immediate recall) plus the words recalled from the second stage (delayed recall). Total score ranges between 0 and 20 with 10 being maximum in each stage.

4.1.2 Independent Variables

Years in *retirement* are considered as the period of a person's life during which he/she is no longer working, or the commencement of that period. In this paper I define retirement based on the self-reported retirement status of the individuals. Hence, individuals whose current job status was reported as retired, unemployed, disabled or sick and left the labor force job permanently are all regarded as retired in my analysis. As my main explanatory variable, I consider the number of years spent in retirement to visualize change in memory performance after the individual leaves the job market. The number of years spent in retirement is calculated as the difference between the respondent's age when he retired and the age at interview year.

Instruments

Distance from full retirement is a difference between the actual age and the legislated age of eligibility for full retirement, set by the government in each country. Eligibility ages for the full retirement range between 57 and 65, depending on the country and the gender. *Distance from early retirement* is difference between the actual age and the legislated age of eligibility for early retirement. Eligibility for early retirement age ranges between 55-63 depending on the country and gender.

Socio-Economic Variables

To control for the level of education I use the following dummies. *Higher education* corresponds to levels 5 and 6 (tertiary education) of the International Standard Classification of Education 1997 (ISCED 1997), found in SHARE. *Medium education* corresponds to the levels 3 and 4 (upper secondary or post-secondary non-tertiary education) of ISCED. *Income* is measured as

income per number of household members.

Quality of the Job

Physically demanding job is a dichotomous variable, dividing the sample into two groups, those worked in less physically demanding jobs (value 0) and those in more physically demanding jobs (value 1). In SHARE the respondents were asked to answer the following question, is your job physically demanding. The answer categories were as follows 1 strongly agree, 2 agree, 3 disagree, 4 strongly disagree. Since this question was asked only to those, who currently work, I constructed an index using the method proposed by Mazzonna and Peracchi (2014). Equation (4) below is used to linearly estimate the index

$$PD_{ij} = \varphi_1 + \varphi_2 W_i + \varphi_3 O_{ij} + U_{ij} \qquad (4)$$

where PD_{ij} = psychical burden of an occupation j of an individual i based on the self-reported evaluation; W_i contains gender and country of individual i, O_{ij} = vector of binary indicators for each occupation recorded in SHARE based on the ISCO-88 classification, and U_{ij} is the error term. I used OLS to estimate the equation (4) and to obtain $\varphi_3 \widehat{O_{ij}}$. Next I used the value 2 (corresponds to agreement with the statement in the questionnaire) as a cut point to split the sample into two groups.

The next job related variable is *Public employment.* This is a dummy for working in a public sector, it assumes the value 1 if the respondent is retired and his last job was in a public sector or if he is currently employed in a public sector; otherwise it takes the value 0. *Self-employment* is also a dummy, taking the value 1 if the respondent is retired and declares his last job as self-employed or if he reports that his current employment status is self-employed; otherwise the variable takes the value 0.

Health-Related Variables

Chronic diseases is a variable that ranges from 0 to 10 and counts number of reported chronic conditions. *Activities of Daily Living (ADL)* is a number of limitations with activities of daily living, which contains 6 main limitations that individuals may have with such daily acitiviteis as dressing, walking, or eating; it ranges between 0 and 6. *Instrumental Activities of Daily Living (IADL)* contains number of limitations with instrumental activities of daily living, such as preparing a hot meal or making a telephone call; it ranges from 0 to 7. Doing *Moderate Sport Activities* is a dummy that takes the value 1 if the respondent declares that he has done one of activities that require moderate level of energy (such as gardening or cleaning house) at least once a week and 0 otherwise.

Demographic Variables

Age of the respondent is calculated as difference between the year of interview and the year of his/her birth. *Marital status* is a dummy variable taking the value 1 if the respondent is living with a spouse or partner and 0 otherwise. *Gender* is a dummy variable, which assumes 1 for being a female and 0 for male. *Foreigner* is a dummy variable, taking the value 0 if the respondent was born in the country he/she is living and 1 otherwise.

Finally, I included a variable called *Unpaid Social Activities*. SHARE asks the respondents if in the month preceding the interview they did one or more out of 7 activities, such as voluntary or charity work, taking care of a sick or disabled adult or attendance of an educational or training course. I constructed an index that ranges from 0 to 7.

4.3 Descriptive Statistics

Summary statistics for all variables are given in Table 2. The sample of study constitutes 14,300 observations. Average cognition score is 9 out of 20. The average number of years spent in retirement is 4.17. Only 20% of the respondents reported that they worked/working in a public sector and 16 percent has identified themselves as self-employed. Eighty percent of the individuals are married or living with a partner. More than one fifth of the respondents hold

higher education, where about one third have got medium education. Average income per household member is 10857 euros. The percentage of those having chronic diseases and limitations with activities in daily living is very low as 10% and 1.32% respectively. The mean values for my instrumental variables (full and early retirement ages) are 1.19 and 2.72 years respectively. Only 14% of the respondents participate in the unpaid social activities. Almost all (90%) of the respondents reported that they are engaged in moderate sport activities.

Table 2. Descriptive statistics

Variable	Obs	Mean	S.D.	Min	Max
Cognitive	14363	9.04	3.28	0	20
Retirement	14300	4.18	7.41	0	61
Age	14431	59.79	5.97	50	70
Age^2	14431	3610.5	718.26	2500	4900
Public	14431	0.18	0.38	0	1
Self-employed	14431	0.17	0.36	0	1
Marital status	14431	0.802	0.38	0	1
Higher education	14431	0.25	0.42	0	1
Medium	14431	0.35	0.46	0	1

education					
Income	14431	0.011	0.04	0	2.5
Foreigner	14431	0.08	0.25	0	1
Chronic diseases	14423	1.23	1.23	0	10
ADL	14429	0.078	0.43	0	6
IADL	14429	0.12	0.51	0	7
Unpaid social activities	14431	0.99	1.12	0	7
Moderate Sport activities	14431	0.88	0.32	0	1
Gender	14431	1.45	0.48	0	2
DistF	14431	1.18	2.31	0	13
DistE	14431	2.73	3.60	0	15

4.3.1 Validity of the Instrumental Variables

As was stated above, one of the conditions for validity of instrumental variables is high correlation with the endogenous variable. I used Spearman test to check this assumption and found that the correlation coefficient between the instrumental variables (DistF, DistE) and the instrumented variable are 0.72 and 0.74 respectively. It is, therefore, evident that the assumption Cov (Y; R) $\neq 0$ holds.

5. Findings

The results of multivariate analyses are presented in Table 3. The specification contains all the study variables, including country dummies. I divided the whole sample into subsamples for males and females and ran analyses separately for each of them. For each of the three samples the left column of the Table A.5 reports the OLS estimation and the right column reports estimation, using the IV approach. The main finding is that retirement is highly negatively correlated with the memory performance only in the males subsample. It is not correlated with the outcome, when I use the IV estimation. One intuition for the significant negative effect of retirement on men's memory functioning might be that since this population group retires later than women and has lower life expectancy, on average the retirement is closer to the end of life for the men, and therefore may reflect the age of cognitive decline. Other variables that had positive significant effect on cognitive performance were marital status, education, participation in unpaid social activities and doing moderate sport activities. In addition, such health measure as having IADL limitations consistently has negative significant effect on the memory performance, while controlling for all other variables.

Table 3. OLS and IV for Male, Female and the Whole Subsamples

	all		**males**		**females**	
	OLS	*IV*	OLS	*IV*	*OLS*	*IV*
Retirement	**-0.0003**	**0.038**	**-0.034*** **	**0.062**	**-0.005**	**-0.134**

	all		**males**		**females**	
	OLS	*IV*	OLS	*IV*	*OLS*	*IV*
	(0.005)	**(0.037)**	**(0.009)**	**(0.12)**	**(0.006)**	**(0.15)**
Age	0.109	0.269	-0.098	0.211	0.264*	-0.457
	(0.097)	(0.181)	(0.129)	(0.404)	(0.143)	(0.844)
Age^2	-0.002**	-0.004*	0.0003	-0.003	-0.003**	0.005
	(0.001)	(0.002)	(0.0012)	(0.004)	(0.002)	(0.007)
Employment in						
Public Sector	0.014	0.02	-0.31***	-0.336***	-0.109	-0.212
	(0.07)	(0.07)	(0.1)	(0.11)	(0.096)	(0.16)
Self-employed	-0.096	-0.018	-0.074	0.071	-0.212*	-0.58
	(0.071)	(0.103)	(0.089)	(0.2)	(0.115)	(0.441)
Marital status	0.164***	0.199***	0.252***	0.298***	0.419***	0.417***
	(0.065)	(0.072)	(0.097)	(0.114)	(0.09)	(0.09)
Education[1]						
Higher	1.75***	1.802***	1.77***	1.853***	1.766***	1.562***
	(0.07)	(0.087)	(0.092)	(0.14)	(0.104)	(0.261)
Medium	0.971***	0.994***	1.004***	1.026***	1.016***	0.924***
	(0.063)	(0.066)	(0.083)	(0.088)	(0.092)	(0.145)
Income	-1.1912**	-1.224***	-0.917	-0.931	-1.513***	-1.337**
	(0.43)	(0.43)	(0.611)	(0.62)	(0.59)	(0.65)
Foreigner	-0.604***	-0.601***	-0.701***	-0.707***	-0.525***	-0.534***
	(0.095)	(0.096)	(0.131)	(0.132)	(0.14)	(0.144)
Chronic diseases	-0.03	-0.05*	-0.03	-0.055	-0.053*	0.004
	(0.022)	(0.03)	(0.03)	(0.05)	(0.0312)	(0.073)
ADL	-0.103	-0.12	-0.054	-0.098	0.014	0.1
	(0.073)	(0.075)	(0.1)	(0.12)	(0.11)	(0.15)
IADL	-0.327***	-0.359***	-0.399***	-0.486***	-0.366***	-0.308***
	(0.0655)	(0.0725)	(0.0945)	(0.144)	(0.0898)	(0.115)
Unpaid Social	0.214***	0.22***	0.21***	0.21***	0.22***	0.2***

	all		**males**		**females**	
	OLS	*IV*	OLS	*IV*	*OLS*	*IV*
Activities						
	(0.022)	(0.022)	(0.031)	(0.032)	(0.033)	(0.046)
Moderate Sport Activities	0.291***	0.3104***	0.1912*	0.2402*	0.3841***	0.3449**
Countries[1]						
	(0.083)	(0.08442)	(0.11)	(0.13)	(0.1233)	(0.1369)
Germany	0.3081**	0.3589***	0.2601	0.4101	0.2469	0.08
	(0.1222)	(0.1319)	(0.1668)	(0.2509)	(0.1758)	(0.27)
Sweden	0.85***	0.9601***	0.5729***	0.7942**	0.9861***	0.5401
	(0.1229)	(0.1639)	(0.1711)	(0.3229)	(0.18)	(0.5478)
the Netherlands	0.15	0.2001	-0.073	0.05	0.7201***	0.61**
	(0.1301)	(0.1402)	(0.1709)	(0.23)	(0.2)	(0.25)
Spain	-1.76***	-1.661***	-1.597***	-1.441***	-1.824***	-2.145***
	(0.15)	(0.174)	(0.191)	(0.272)	(0.234)	(0.445)
Italy	-1.24***	-1.2702***	-1.0702***	-1.089***	-1.38***	-1.0822***
	(0.1319)	(0.14)	(0.18)	(0.1801)	(0.1938)	(0.3951)
France	-0.8912***	-0.8532***	-1.0239***	-0.9411***	-0.8002***	-0.9529***
	(0.1239)	(0.130)	(0.1709)	(0.20)	(0.18)	(0.26)
Denmark	0.5229***	0.5931***	0.241	0.39	0.764***	0.5113
	(0.14)	(0.1532)	(0.19)	(0.263)	(0.1984)	(0.36)
Greece	-0.1602	-0.1137	-0.051	0.03959	-0.23	-0.37
	(0.13)	(0.14)	(0.1708)	(0.21)	(0.1959)	(0.2608)
Switzerland	0.98***	1.0638***	0.792***	1.0222***	1.1592***	0.92**
	(0.1632)	(0.1829)	(0.221)	(0.3629)	(0.24)	(0.3743)
Belgium	-0.3119**	-0.32***	-0.3973**	-0.373**	-0.1443	-0.02
	(0.1218)	(0.123)	(0.162)	(0.17)	(0.18)	(0.24)
Constant	7.47***	3.15	12.921***	4.6204	2.6432	21.914
	(2.86)	(5.02)	(3.813)	(10.992)	(4.27)	(22.723)

	all		males		females	
	OLS	*IV*	OLS	*IV*	*OLS*	*IV*
Observations	14,227	14,227	7,875	7,875	6,352	6,352
R-squared	0.195	0.190	0.191	0.178	0.210	0.129

Standard errors in parentheses

* p<0.05, ** p<0.01, ***p<0.001

Reference categories: 1. Low education 2. Austria

In the next step I ran the analyses to test whether the relationship between the retirement and memory performance varies by physical load of the respondent's job (Table 4). Similar studies (Mazzonna & Peracchi, 2014, Case & Deaton) found that while there is a negative effect of the retirement on the memory performance, this effect only on the subsample of workers in physically demanding jobs is positive in contrast to those, working in physically undemanding jobs. In my analysis, instead, I find that the effect of the retirement on memory in both physically demanding and undemanding occupations is negative. However, similarly to Mazzonna & Peracchi (2014) those, working in physically more demanding jobs experience less negative effect of the retirement on their memory.

Table 4: Multivariate analysis by occupational groups

	Physically demanding jobs		**Physically undemanding jobs**	
	OLS	*IV*	*OLS*	*IV*
Retirement	**-0.005**	**-0.16*** **	**-0.011**	**-0.1834*** **
	(0.01)	**(0.041)**	**(0.01)**	**(0.039)**
Age	0.09	-0.4623**	0.03	-0.7304***
	(0.14)	(0.2038)	(0.1429)	(0.23)
Age^2	-0.001	0.004**	-0.001	0.01***
	(0.001)	(0.002)	(0.0013)	(0.0021)

	Physically demanding jobs		**Physically undemanding jobs**	
	OLS	*IV*	*OLS*	*IV*
Employment in Public Sector	0.5612***	0.43***	0.2612***	0.1519
	(0.1)	(0.11)	(0.093)	(0.1)
Self-employed	0.06	-0.31**	-0.13	-0.45***
	(0.09)	(0.14)	(0.1209)	(0.143)
Marital status	0.2238***	0.066	-0.0042	-0.13
	(0.09)	(0.1009)	(0.0942)	(0.1019)
High education	1.7541***	1.6032***	1.4***	1.27***
	(0.1241)	(0.14)	(0.1)	(0.11)
Medium education	1.1801***	1.06***	0.8701***	0.9001***
	(0.08)	(0.09)	(0.1)	(0.1009)
Income	1.1	0.992	-0.4012	-0.67
	(0.752)	(0.8)	(0.5231)	(0.55)
Foreigner	-0.4501***	-0.5242***	-0.22	-0.2431*
	(0.13)	(0.14)	(0.1421)	(0.15)
Chronic diseases	-0.066**	0.012	-0.04	0.016
	(0.03)	(0.04)	(0.033)	(0.04)
ADL	0.01	0.06	-0.2511**	-0.095
	(0.1)	(0.097)	(0.13)	(0.14)
IADL	-0.34***	-0.22**	-0.072	0.03121
	(0.079)	(0.089)	(0.13)	(0.14)
Unpaid Social Activities	0.3731***	0.3521***	0.25***	0.2301***
	(0.036)	(0.04)	(0.030)	(0.032)
Moderate activities	0.48***	0.30**	0.5011***	0.4231***

	Physically demanding jobs		Physically undemanding jobs	
	OLS	*IV*	*OLS*	*IV*
	(0.11)	(0.13)	(0.1242)	(0.1302)
Constant	6.972*	21.502***	9.4632**	29.881***
	(4.02)	(5.7441)	(4.23)	(6.32)
Observations	7,264	7,264	6,963	6,963
R-squared	0.145	0.043	0.080	0.005

Standard errors in parentheses

* p<0.05, ** p<0.01, ***p<0.001

Reference categories: 1. Low education

5.1 Panel Data analysis

To capture the relationship between retirement and memory performance across different years I exploit panel data analysis based on the three available waves of SHARE dataset (I, II and IV). The availability of a panel dataset allows us to use the fixed effect estimator, which is crucial to test the between individual transition to retirement and the measure of memory performance. In addition, to tackle the endogeneity issue I apply the fixed-effects IV approach, where my instruments for retirement are full and early retirement ages as described in section 3. Since such data as education or country variables don't vary across the waves of the survey, they are excluded by estimation with fixed effects model. Table 5 shows that the relationship between retirement and cognition is positive, although the coefficients are not significantly different from zero. This signals us that memory of retirees has a trend of slow decline from one wave to another in retirement period.

Table 5: Panel data analysis using Fixed effect Approach

	Fixed Effect	
		IV
Retirement	**0.003**	**0.11**
	(0.010)	**(0.14)**
Age	0.58***	0.43*
	(0.13)	(0.2241)
Age^2	-0.005***	-0.003*
	(0.001)	(0.002)
Public	-0.2*	-0.27**
	(0.11)	(0.14)
Self-employed	-0.42	-1.32
	(0.45)	(1.16)
Marital status	0.16	0.1541
	(0.1531)	(0.1543)
Income	0.00000041	0.00000052*
	-0.00000031	-0.00000033
Chronic Diseases	0.04	0.041
	(0.029)	(0.03)
ADL	-0.04	-0.03
	(0.07)	(0.076)
IADL	-0.1982***	-0.21***
	(0.06)	(0.07)
Wave 2	0.2061	0.2501
	(0.16)	(0.1642)
Wave 4	0.5341	0.5844
	(0.4042)	(0.4114)
Constant	-8.3203*	
	(4.77)	

	Fixed Effect	
		IV
Observations	61,523	19,074
R-squared	0.023	0.011
Number of i	51,000	8,551

Standard errors in parentheses

* p<0.05, ** p<0.01, ***p<0.001

Reference categories: 1. Low education

Vanishing effect of retirement on cognition poses different questions: Are all effects of retirement on cognition driven by country differences? What are those country specific differences that could drive the results? I try to come up with these questions by differentiating the level of memory performance by countries. Hence I split the sample into 2 groups, in one there are countries with high memory performance (Germany, Sweden, Netherlands, Switzerland, Denmark, Belgium, Austria) and in the second there are those with low memory performance (Italy, Spain, France, Greece). Table 6 demonstrates interesting results. Fixed effect IV estimation for high memory countries is positive and significant. The intuition behind my analysis is that cognitive skills of retirees among high memory level countries do not depreciate by years spent in retirement. My investigations in this paper do not reject previous findings of overall negative effect of retirement on cognition; however I discover a country specific factor driving opposite results.

Table 6: Panel data results for high memory and low memory countries

	High memory		Low memory	
VARIABLES	fe	fe iv	fe	fe iv
Retirement	**0.04**	**1.1841*** **	**0.02701**	**-0.71**
	(0.08)	**(0.42)**	**(0.1142)**	**(0.5502)**

	High memory		Low memory	
VARIABLES	fe	fe iv	fe	fe iv
Age	0.41***	0.5812***	0.81***	0.81***
	(0.12)	(0.1331)	(0.1442)	(0.1441)
Age^2	-0.0043** *	-0.006***	-0.0063***	-0.0061***
	(0.001)	(0.001)	(0.0011)	(0.0011)
Public	-0.18**	-0.12	-0.063	-0.053
	(0.09)	(0.1)	(0.17)	(0.17)
Self-employed	-0.052	-0.2611	-0.33*	-0.24
	(0.24)	(0.2522)	(0.19)	(0.2013)
Marital Status	0.13	0.1103	0.32	0.3433
	(0.1402)	(0.14)	(0.22)	(0.22)
Income	5.44e-07**	7.63e-07***	-7.34e-07	-9.57e-07
	(2.23e-07)	(2.40e-07)	(1.14e-06)	(1.15e-06)
Chronic Diseases	0.03	0.02	-0.0023	0.00035
	(0.027)	(0.03)	(0.035)	(0.035)
ADL	0.04	0.04	-0.09	-0.09
	(0.07)	(0.066)	(0.09112)	(0.0914)
IADL	-0.21***	-0.2213***	-0.2332***	-0.2353***
	(0.062)	(0.0623)	(0.079)	(0.08)
Wave 2	0.61***	0.5312***	0.0014	-0.0162
	(0.1622)	(0.1643)	(0.18)	(0.1802)
Wave 4	1.3001** *	1.09**	0.59	0.5731

	High memory		Low memory	
VARIABLES	fe	fe iv	fe	fe iv
	(0.42)	(0.43)	(0.4643)	(0.48)
Constant	0.5		-17.592***	
	(4.64)		(5.34)	
Observations	35,300	21,076	20,110	11,364
R-squared	0.016	-0.001	0.047	0.042

Standard errors in parentheses

* p<0.05, ** p<0.01, ***p<0.001

Reference category: 1. Low education

6. Conclusion

In this research I studied effect of retirement on cognition among Europeans, using cross-country survey data from eleven European countries. I found that using the OLS regression the retirement is highly negatively correlated with the memory performance only for the male subsample. In addition, when using the IV approach separately for subsamples of physically demanding and undemanding jobs, I find that the effect of the retirement on memory in both subsamples is negative. Although it is different from Mazzonna & Peracchi (2014), who found that this effect on the subsample of workers in physically demanding jobs is positive, it is still evident that people working in physically more demanding jobs experience less negative effect of the retirement on their memory.

Subsequently I ran panel analysis to test the relationship between the retirement and memory performance across different years. I found a positive correlation, however not significant. At the next step, I divided my sample into 2 groups of countries with high or low memory performance. This analysis led to the finding that in countries characterized by high memory performance the effect of the retirement on cognition is positive and highly significant. I interpreted this finding

as the memory performance of retirees in high memory level countries declines at slow rate.

These findings have several implications. First, they motivate further analyses. It is interesting to find out what is the reason for the negative effect of retirement on the memory of men. In addition, it is worthy of investigation to figure out what factors contribute to the differences in memory performance by countries (such as cultural differences or availability of social activities for retirees). Second, also several policy suggestions may follow from my findings. One is if it is possible to improve cognitive skills in low memory countries, then perhaps retirees also in this group will enjoy from lower cognitive decline. Another is that when deciding to postpone the retirement age, the policymakers should take into account that in some countries the retirement might have positive effect on memory performance.

7. References

Blake, T. (1995): Economic Context and the Health Effects of Unemployment, Journal of Health and Social Behavior, 36 :3, p.. 213-230.

Browning, Martin, Anne Moller Dano, and Eskil Heinesen. "Job Displacement and Stress-related Health Outcomes." Health Economics 15, no. 10 (October 2006): 1061-1075. doi:10.1002/hec.1101.

Crimmins, Eileen, Jung Ki Kim, and Sarinnapha Vasunilashorn. "Biodemography: New Approaches to Understanding Trends and Diferences in Population Health and Mortality." Demography 47 Suppl (2010): S41-64.

Chandola, T., E. Brunner and M. Marmot (2005): "Chronic Stress at work and the Metabolic Syndrome: Prospective Study", British Medical Journal 332: 7540.

Gerdtham, Ulf-G, and Magnus Johannesson. "A Note on the Efect of Unemployment on Mortality." Journal of Health Economics 22, no. 3 (May 2003): 505-518. doi:10.1016/S0167-6296(03)00004-3.

Kessler, Ronald C., J. Blake Turner, and James S. House. 1987. "Intervening Processes in the Relationship between Unemployment and Health." Psychological Medicine 17:949-61.

McEwen, B. S. and E. Stellar (1993). "Stress and the individual. Mechanisms leading to disease." Arch Intern Med 153(18): 2093-2101

Moen, Phyllis. 1983. "Unemployment, Public Policy, and Families: Forecasts for the 1980s." Journal of Marriage and the Family 45:751-60.

Rosengren A, Hawken S, Ounpuu S, Sliwa K, Zubaid M, Almahmeed WA, et al. Association of psychosocial risk factors with risk of acute myocardial infarction in 11 119 cases and 13 648 controls from 52 countries (the INTERHEART study): case-control study. Lancet 2004; 364: 953-62.

Salm, M. (2009): "Does Job Loss Cause Ill Health", Health Economics, 18, pp. 1075-1089.

Schröder, Mathis. "Jobless Now, Sick Later? Investigating the Longterm Consequences of Involuntary Job Loss on Health." SHARELIFE - One Century of Life Histories in Europe 18, no.1 (March 2013): 5-15. doi:10.1016/j.alcr.2012.08.001.

Seeman, T. E., S. H. Burton, et al. (1997). "Price of Adaptation – Allostatic Load and Its Health Consequences: MacArthur Studies of Successful Aging." Archives of Internal Medicine 157.

Seeman, T. E., E. Crimmins, et al. (2004). "Cumulative biological risk and socio-economic diferences in mortality: MacArthur Studies of Successful Aging." Social Science & Medicine 58: 1985 - 1997.

Seeman, T. E., S. S. Merkin, et al. (2008). "Education, income and ethnic differences in cumulative biological risk profiles in a national sample of US adults: NHANES III (1988-1994)." Social Science & Medicine 66: 72-87.

Schnorpfeil P, Noll A, Schulze R, Ehlert U, Frey K, Fischer JE. (2003): "Allostatic load and work conditions" Social Science and Medicine, 57, pp.647-56.Smith, James. "Healthy Bodies and Thick Wallets: The Dual Relation between Health and Wealth." The Journal of Economic Perspectives (1999).

Sterling, P. and J. Eyer (1988). Allostasis: A New Paradigm to Explain Arousal Pathology. Handbook of Life Stress, Cognition and Health. S. Fisher and J. Reason. New York, John Wiley & Sons: 629-649.

Sullivan, Daniel, and Till von Wachter. "Job Displacement and Mortality: An Analysis Using Administrative Data." The Quarterly Journal of Economics 124, no. 3 (August 1, 2009): 1265-1306. doi:10.1162/qjec.2009.124.3.1265.

Voydanof. Patricia. 1984. "Economic Distress and Families: Policy Issues." Journal of Family Issues 5:273-88.

CHAPTER 2

The effect of social activities on health among older people in Europe

Gulnara Huseynli

University of Ca Foscari Venice

PhD in Economics

An analysis based on SHARE micro-data survey

Supervisor: Professor Mario Padula

Abstract

Although empirical studies find that participation in social activities positively affects health of older citizens in the Western societies, little attention so far was paid to the problem of potential endogenity. It is likely, however that healthier people are more able to participate in social activities or that both variables influence each other. Indeed, some authors acknowledge that the existing studies have not yet adequately answered this question. The proposed research contributes to closing this gap. Using two waves of the Survey of Health Ageing and Retirement in Europe, I suggest that the measure of individual trust could serve as an instrument to isolate the causal path from participation in social activities to different levels of the reported self-perceived health. My findings confirm that trust causes the change in the health status of individuals through social activity participation. Hence, I conclude that that the participation in at least one of the seven social activities leads to higher self-perceived health, while absence of such activities has negative impacts on self- perceived health. It is thus possible to determine that the path of causality leads from participation in social activities to better health.

1. Introduction

Literature gives us a lot of evidence about how psychological and physical wellbeing of elderly is improving with increase of active social participation. Greaves et al. (2006) show that depression and isolation affect people over 65 adversely in long-term health. As the number of older people increases, more are living alone. Loneliness primarily reflects the depressive symptoms, causing various mental or even physical disorders. Greaves et al. (2006) claim that policies, which encourage active social participation, are likely to have beneficial effect on physical and mental health. In particular, effectiveness of interventions involving creative activity appears to be very valuable for psychological wellbeing. Alongside with creative activity, the authors also use mentoring approaches (i.e. when older people worked as mentors to educate and empower peers about their health).

Abu-Rayya (2006) determined that, without notable gender differences, European elders participate less in social activities with increasing age to statistically significant degrees; younger elders tend to be more socially involved and older elders less so. Symptoms of depression also emerged as negatively correlated with social involvement. The study's findings imply that by increasing their social participation, European elders might be able to stave off feelings of depression.

Berkman et al. (2000) point out that the structure of social network varies by the social and cultural environment. Moreover they accentuate on the bigger macro-social contexts in which social networks form. The analysis of Litwin (2009) based on SHARE data considers social networks in two different social scopes- Mediterranean and non-Mediterranean countries. This in turn suggests different well-being and health conditions with respect to the countries the older people come from. The results also distinguish the levels of the elderly's engagement in social activities in Mediterranean and non-Mediterranean countries.

Gilmour in her paper *Social participation and the health and wellbeing of Canadian seniors* obtains similar to other researches results. Namely, the greater the number of frequent social activities, the higher the odds of positive self-perceived health, and the lower the odds of loneliness and life dissatisfaction. However, the author also points out that social participation may not be entirely dependent upon personal choice — external factors can play a role. For

example, the cost and the availability of activities in the area or at a suitable time or location can influence participation. Despite the fact that her study does not rule out the inverse causality between health and social activity participation, Gilmour mentions reciprocity between social participation and health and wellbeing. That is, better health allows greater social participation, which, in turn, improves or maintains health, allowing for the maintenance or increase in the level of social participation.

Thus investment of older adults in social capital could help maintaining them in good health. At least two arguments may justify this assumption. First, the number of cohort acquaintances an individual has throughout his life may decrease after a certain age (Glaeser, Laibson, & Sacerdote, 2002). Involvement in associations and other social groups may help maintaining (if not increase) the size of social networks. Second, retirement has been found to be associated with a decrease in cognitive capacities of individuals (Adam et al. 2006). Social participation may slow down this process as it often requires cerebral efforts from the individuals and thus help preserve their mental health (cf. Almedom, 2005).

Recent research literature found that many different social activities are variously associated with health outcomes (Hawe & Shiell, 2000, Szreter & Woolcock, 2004; Islam, et al, 2006). In the current paper I suggest using a definition of social activities as participation in socially valued endeavors or providing help and care to others in the society. For example, these might include doing voluntary or charity work, caring for a sick or disabled adult, providing informal help to family, friends or neighbors, attending an educational or training course, going to a sport or social club, taking part in a religious organization or a political organization. The rest of the paper is organized as follows. Section 2 proposes empirical approach and formulates the research question and hypothesis. Next, I describe my data and variables. Section 4 presents the results, descriptive and bivariate statistics that are followed by the multivariate analyses. The last section concludes.

2. Empirical Approach and the Research Question

Current research follows the common empirical finding, i.e. that the participation in social activities positively affects the respondents' health status, though it is aware of likely endogenity. That is, it well may be that the causality is reversed (healthier people are more able to participate in social activities) or that both variables influence each other. There is still a big debate in literature regarding this issue, and Kawachi (2007) acknowledges that the existing studies have not yet adequately answered this question. I suggest using the advantage of my survey data (the Survey of Health Ageing and Retirement in Europe), which include a variable, measuring individual trust. I use this variable to instrument possibly endogenous social activities index.

The instrumental variable approach is able to address the endogeneity and reverse causality problem. Namely, the method of instrumental variables (IV) is used when the explanatory variables (covariates) are correlated with the error term of a regression relationship. Such correlation may occur when, e.g. the dependent variable causes at least one of the covariates. To apply this method, the instrument must be correlated with the endogenous explanatory variables, conditional on the other covariates. In addition, the instrument cannot be correlated with the error term in the explanatory equation, that is, the instrument cannot suffer from the same problem as the original predicting variable.

I used individual "trust" variable as the instrument in this paper. It is obtained from the questionnaire of the second wave of my panel data. The respondents were asked if they trust when dealing with other people. The reason behind the choice of "trust" as an instrument is that trusting other people can directly influence the people's decision and willingness to participate in social activity and also determines their sociability. On the other hand, trusting in people does not affect one's health status.

Hence this study aims at estimating the impact of social activities on the health of older individuals, when controlling for the endogenous effect of health and using the Survey of Health Ageing and Retirement in Europe. My hypothesis is that social participation positively affects the health condition of European older population, when this participation is instrumented by the trust variable. Therefore, there it is possible to determine that the path of causality leads from participation in social activities to better health.

3. Data and Variables

I use the Survey of Health Ageing and Retirement in Europe (SHARE) wave 1 (2004) and wave 2 (2006). SHARE is a multidisciplinary and cross-national panel database of micro data on health, socio-economic status and social and family networks. The first wave database contains 27,536 respondents 50 years old and older from 11 European countries (Austria, Germany, Sweden, Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium). The wave 2 sample contains 34,415 respondents from 14 European countries (Austria, Germany, Sweden, Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, Czech Republic, Poland, and Ireland). These data enable me to study the relationships between self-reported health and participation in social activities among older adults as the survey questionnaires contain a rich set of socio-economic variables, such as income or wealth, health status, demographics, as well as a measure of individual trust.

The variables that I use are located in different modules, such as the demographic module, health module, etc. In order to gather all of them in one database, I had to combine (merge) these modules. Therefore, I begin with a module about social activities, and then I merged all other modules. Finally, since I need information about respondents' individual trust, which is found in the wave 2 of SHARE data, I merge the wave 1 with the wave 2. After merging, the resulting database consists of 13,947 respondents.

3.1 Dependent Variable

I use the so-called 'US version' of self-reported health. It is based on the question "Would you say your health is" and the corresponding answers are 1. Excellent 2. Very good 3. Good 4. Fair and 5. Poor. I recoded this variable to run from 1. Poor to 5. Excellent.

3.2 Independent Variables

To measure the influence of social activity participation on the self-perceived health, I constructed an index, based on the respondents' answers about their participation in a list of activities in the month preceding the interview. These included seven activities: performing voluntary or charity work, caring for a sick or disabled adult, providing help to family, friends or neighbors, attending an educational or training course, going to a sport, social or other kind of club, taking part in a religious organization, and finally taking part in a political or community-

related organization. The index was then coded as a dummy variable, assuming the value 0 if the respondent said that he did not participate in any type of social activities and the value 1 if the respondent takes part in at least one of the given 7 types of social activities. I made an assumption that the people, who had missing values as the answer, did not participate in this activity, and hence the value attached to their participation was set to 0. Income variable was created as the quotient between household total gross income and the square root of the household size. Household net worth was taken as a proxy for the wealth variable and was divided by 5 quintiles. In SHARE individual's highest educational degree appears in the form of the 1997 International Standard Classification of Education (ISCED). Since the number of individuals in the 6^{th} level of ISCED (corresponds to PhD) was small, I combined the 5^{th} and 6^{th} level in one category, the higher education. In accordance with my hypothesis, I also include into the analysis the measure of individual trust. It is obtained from the questionnaire for the second wave of SHARE. The respondents were asked if in their opinion "most people can be trusted or that you can't be too careful in dealing with people?" The corresponding answers range on a scale from 0 to 10, where 0 means you can't be too careful and 10 means that most people can be trusted.

Demographic variables included age, gender, and marital status. Gender was recoded into a variable named Female, which assumes value of 1 for females and 0 for males. Marital Status was recoded into a dummy variable, which takes value 1 if respondent lives with a partner or a spouse and 0 if he/she lives as a single. Age was computed as the difference between the interview year and year of birth. For few respondents for whom year of birth was absent, the age was set to missing values. The number of children was used as a measure of family structure. Finally, I also control for country dummies.

4. Results

4.1 Descriptive Statistics

Table 1 below reports the descriptive statistics. More than a half (58 %) of the respondents said that they have good or very good health. A bit more than quarter of the respondents (27%) said that they have fair health; only about 8% of the respondents have reported that they have poor health. Approximately one half of the sample reported that they take part in one of the

seven social activities. The most frequent among them were "provided help to family, friends or neighbors" (17%) and "gone to a sport, social or other kind of club" (17%). The vast majority of the sample (78%) had education from elementary up to the high school; 13% have higher education and remaining 9% reported having no education. Quarter (26%) of respondents said that they live as a single, whereas 74% live with a spouse or partner. Females constitute 46 % of the sample.

Table 1. Descriptive Statistics

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Self-reported health	13945	3.179	1.032	1	5
Participation in social activities	13947	0.553	0.497	0	1
Trust	13835	0.497	0.5	0	1
Income	13947	93582.7	165809.5	0	3467042
Wealth	13947	2.998	1.414	1	5
Education	13847	2.653	1.542	0	5
Marital status	13933	0.741	0.437	0	1
Number of children	13947	2.138	1.373	0	17
Female	13947	0.458	0.498	0	1
Age	13947	64.781	9.733	50	102

4.2 Bivariate Associations

Table 2 shows coefficients for Spearman bivariate correlations between the study and independent variables. All the study variables except for the number of children were found as highly significant correlates of the dependent variable. The variables most strongly correlated with the outcome variable (rho between 0.20 and 0.30) were as follows: income, net worth, education (all of them positively). The next group of variables was found to be correlated with the rho of 0.10 to 0.20: participation in social activities and trust (positively) and age negatively

correlated. The final group was correlated with rho less than 10 % was number of children (not significant), female and marital status.

Table 2. Bivariate Spearman correlations between self-perceived health and dependent variables

Independent Variables	**Self-reported health**
Social activity participation	0.170***
Trust	0.137***
Income	0.267***
Wealth	0.239***
Education	0.260***
Marital status	0.081***
Number of children	0.016
Female	-0.053***
Age	-0.272***

* p<0.05, ** p<0.01, *** p<0.001

4.3 Multivariate analysis

First I run multivariate analysis without the instrument to see if the relationship between the variables fit into the previous studies. Since my dependent variable is ordinal, I apply ordered probit regression. This method is a generalization of the probit analysis to the case of more than two outcomes of an ordinal dependent variable and allows us to interpret the sign and significance of the regression parameters (β). The sign determines whether the outcome variable increases with the regressors: if β is positive, then an increase in x_{ij} necessarily decreases the probability of being in the lowest category (y_i=1) and increases the probability of being in the highest category (y_i=m). Significance of the regressors is also an important feature that might be inferred from the output. The marginal effect of the regressors can be obtained, using the *margins* command (Cameron and Trivedi 2010, 527-528). Therefore next I computed marginal

effects, which provide a good approximation for the amount of change in y_i that will be produced by a 1-unit change in x_{ij}.

Table 3 shows the results. After controlling for many other relevant variables in all of the three regressions the main variable of interest – participation in social activities was found highly significantly associated with the health outcome. Moreover the correlation is positive, giving us the insight to the following statement: with higher probability of engagement in social activities we have the higher probability of reporting the better health. Apart from this, wealth and education also appear to be significant and positively correlated with health. These results fit well well-known findings in the literature, stating that the wealthier and more educative people have better health condition. The variable Female has a negative sign and is highly significant. One of the reasons is that women in older ages tend to be sicker with respect to men. Finally the age variable negatively and significantly affects the health outcome. Interpreting further, the older is the individual, the poorer is his health.

Table 3**.** Ordered probit regression for self-perceived health, 50+

	Self-reported health
Participation in social activities	0.179***
	(0.020)
Wealth[1]	
2nd quintile	0.101***
	(0.030)
3rd quintile	0.160***
	(0.03)
4th quintile	0.244***
	(0.03)
5th quintile	0.389***
	(0.035)

Education[2]	
1.Level	0.274***
	(0.049)
2. Level	0.460***
	(0.052)
3. Level	0.514***
	(0.051)
4. Level	0.665***
	(0.075)
5. Level	0.726***
	(0.052)
Marital Status	-0.034
	(0.023)
Number of children	0.006
	(0.007)
Female	-0.119***
	(0.019)
Age	-0.025***
	(0.001)
Countries[3]	
Germany	-0.364***
	(0.046)
Sweden	0.370***
	(0.046)
Netherlands	0.123**
	(0.047)
Spain	-0.086
	(0.053)
Italy	-0.170***
	(0.046)

France	-0.119**
	(0.044)
Denmark	0.206***
	(0.05)
Greece	0.123**
	(0.044)
Switzerland	0.292***
	(0.058)
Belgium	0.049
	(0.041)
N	13831
Pseudo Rsq	0.071

* p<0.05, ** p<0.01, *** p<0.001

Standard errors in parentheses

Reference categories: 1. 1st quintile; 2. Basic Level of ISCED 3. Austria

As we are applying the oprobit model, marginal effect for each category of dependent variable should be considered. Table 4 shows the results. As we see, all the marginal effect coefficients are highly significantly associated with health. Specifically, we observe a negative correlation for poor, fair and good health. It could be interpreted in the following way. Being in poor and fair health 1 unit increase of the probability of participation in social activities decreases the health by 0.01 and 0.03 percentage points relatively. Whereas 1 unit increase in social participation increases health by 0.03 points estimates under the condition of very good and excellent health.

Table 4. Marginal effects of social activity participation for each category of the self-perceived health variable

	Marginal effects
Poor	-0.016***
	(0.002)
Fair	-0.034***
	(0.004)

Good	-0.01 ***
	(0.001)
Very good	0.03***
	(0.003)
Excellent	0.032 ***
	(0.004)

* p<0.05, ** p<0.01, *** p<0.001

Standard errors in parentheses

Instrumental variable approach

Next, I ran iv-oprobit regression, using conditional mixed process estimator (CMP). The results, shown in Table 5 are positive and significant at 0.01 percentage level indicating that 1 unit increase in trust causes 0.05 points of higher probability in social activity participation. Moreover, marginal effects (see Table 6 below) show that 1 unit increase of social activity participation ameliorates health by 0.08 and 0.12 points estimates under the condition of very good and excellent health respectively. Hence, we can claim that trust through social activity participation, indirectly, can cause the change in the health status of individuals.

Table 5. Oprobit regression on self-reported health using IV approach

1st stage			**2nd stage**		
Self-reported health			*Social activities participation*		
		0.663***	*Trust*		0.0478***
Social activities participation					
		(0.0864)			(0.00462)
Education[1]			Education[1]		
	1.Level	0.262***		1.Level	-0.013
		(0.049)			(0.063)

	2.Level	0.433***		2.Level	0.036
		(0.053)			(0.067)
	3.Level	0.473***		3.Level	0.091
		(0.052)			(0.065)
	4.Level	0.596***		4.Level	0.234*
		(0.077)			(0.095)
	5.Level	0.633***		5.Level	0.340***
		(0.056)			(0.067)
Wealth[2]			Wealth[2]		
	2nd quintile	0.087**		2nd quintile	0.046
		(0.029)			(0.036)
	3rd quintile	0.131***		3rd quintile	0.125***
		(0.030)			(0.037)
	4th quintile	0.203***		4th quintile	0.175***
		(0.031)			(0.037)
	5th quintile	0.330***		5th quintile	0.253***
		(0.037)			(0.042)
Marital status		-0.023	Marital status		-0.062*
		(0.023)			(0.029)
Number of children		0.003	Number of children		0.012
		(0.007)			(0.008)
Female		-0.121***	Female		0.028
		(0.019)			(0.024)
Age		-0.0210***	Age		-0.015***
		(0.001)			(0.001)
Country[3]			Country[3]		
	Germany	-0.355***		Germany	0.0286
		-0.0453			-0.0549
	Sweden	0.311***		Sweden	0.240***

	-0.0474		-0.0563
Netherlands	0.0633	Netherlands	0.278***
	-0.048		-0.0574
Spain	0.0405	Spain	-0.713***
	-0.0579		-0.068
Italy	-0.0713	Italy	-0.471***
	-0.0495		-0.0568
France	-0.123**	France	0.0991
	-0.0439		-0.054
Denmark	0.157**	Denmark	0.177**
	-0.0501		-0.0609
Greece	0.102*	Greece	0.135*
	-0.0444		-0.0536
Switzerland	0.243***	Switzerland	0.191**
	-0.0582		-0.0701
Belgium	0.0102	Belgium	0.227***
	-0.0418		-0.0503
N	**13831**		
Pseudo R-sq	0.0791		

* p<0.05, ** p<0.01, *** p<0.001

Standard errors in parentheses

Reference categories: 1. 1st quintile; 2. Basic Level of ISCED 3. Austria

Table 6. Marginal effects of social activity participation for each category of the self-perceived health variable (ordered probit IV regression)

Poor	-0.066 ***
	(0.011)
Fair	-0.116 ***
	(0.013)

Good	-0.033***
	(0.004)
Very good	0.087 ***
	(0.008)
Excellent	0.128 ***
	(0.019)

* p<0.05, ** p<0.01, *** p<0.001

Standard errors in parentheses

5. Conclusions

This study addressed the question of estimation of the impact of social activities on the health of older individuals, taking into account possible endogenous effect of health. I suggested using the data from the Survey of Health Ageing and Retirement in Europe and to instrument European older citizens' social participation with a measure of individual trust to solve the endogeneity issue. I hypothesized that under this condition social participation will positively affect the health of the older population. My findings confirm that trust causes the change in the health status of individuals through social activity participation. The results indicate that 1 unit increase in trust causes 0.05 points of higher probability in social activity participation. Moreover, I found that 1 unit increase of social activity participation ameliorates health by 0.08 and 0.12 points estimates under the condition of very good and excellent health respectively. Hence, I conclude that that the participation in at least one of the seven social activities leads to higher self-perceived health, while absence of such activities has negative impacts on self- perceived health. It is thus possible to determine that the path of causality leads from participation in social activities to better health.

6. References

Abu-Rayya, H.M., 2006, Depression And Social Involvement Among Elders. *The Internet Journal of Health*

Adam, Stéphane & Christelle Bay & Eric Bonsang & Sophie Germain & Sergio Perelman, 2006. "Occupational Activities and Cognitive Reserve: a Frontier Approach Applied to the Survey on Health, Ageing, and Retirement in Europe," CREPP Working Papers 0605, *Centre de Recherche en Economie Publique et de la Population (CREPP) (Research Center on Public and Population Economics) HEC-Management School, University of Liège.*

Almedom, Astier, 2005. Social capital and mental health: An interdisciplinary review of primary evidence Social science & medicine 61 (5), 943-964

Berkman, L.F., Glass, T., Brissette, I., & Seeman, T.E. (2000). From social integration to health: Durkheim in the new millennium. Social Science and Medicine, 51, 843–857

Cameron, Colin and Pravin K. Trivedi, 2010, *Microeconometrics Using Stata*, Stata Press

Debrand T., N. Sirven, 2008. "Promoting Social Participation for Healthy Ageing - A Counterfactual Analysis from the Survey of Health, Ageing, and Retirement in Europe (SHARE)," Working Papers DT7, *IRDES institut for research and information in health economics, revised Jan 2008.*

Gilmour Heather. Social participation and the health and well-being of Canadian seniors. Health Rep. 2012 Dec;23(4):23-32.

Glaeser, Edward L. & David Laibson & Bruce Sacerdote, 2002. "An Economic Approach to Social Capital," Economic Journal, Royal Economic Society, vol. 112(483), pages 437-458, November.

Greaves CJ, Farbus L. Effects of creative and social activity on the health and well-being of socially isolated older people: outcomes from a multi-method observational study. J R Soc Promo Health. 2006; 126(3):134-142. Kawachi I., S.V. Subramanian, Kim D. (eds). *Social Capital and Health*. New York: Springer, 2008

Hawe, P., & Shiell, A. (2000). Social capital and health promotion: a review. Social Science & Medicine, 51, 871-885

Islam, M.K., J. Merlo, I. Kawachi, M. Lindström and U.G. Gerdtham (2006), "Social Capital and Health: Does Egalitarianism Matter? A Literature Review", *International Journal for Equity in Health*, Vol. 5, No. 5, p. 3.

Litwin, H., Social networks and well-being: A comparison of older people in Mediterranean and non-mediterranean countries. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 2009

Szreter, S. & Woolcock, M. (2004) Health by association? Social capital, social theory, and the political economy of public health. International Journal of Epidemiology, 33(4), pp. 650-67

CHAPTER 3

Working Lives and International Health Differences

Gulnara Huseynli

University of Ca Foscari Venice

PhD in Economics

An analysis based on SHARE and SHARELIFE

Supervisor: Professor Mario Padula

Abstract

Socio-economic shocks, such as job loss due to layoffs or plant closure may lead to worse health because of the financial strain associated with these events. This could occur either because of stress or simply because the financial consequences make it hard to access health care. This study applies data from SHARELIFE to investigate the effect of involuntary job loss on health. My findings suggest that males have significant higher likelihood of reporting poor or fair health if they experienced layoff, whereas females are more likely to suffer from depression if they experienced a plant closure.

1. Introduction

The gradient between socio-economic status (SES) and health expands over working years (Smith, 1999). As events unfold over the working life, there is potential for both health and SES shocks to generate an expansion of the gradient. Health shocks may lead to reduced earnings and prolonged periods out of the labor force which may lead to lower socio-economic status. Similarly SES shocks, such as job loss due to layoffs or plant closure may lead to worse health due to the financial strain associated with these events. This can occur either because of stress or simply because the financial consequences make it hard to access health care (for example due to an inability to pay for insurance). Economic instability may be a powerful driver of the expansion of the gradient. New theories, based on biological processes, have been proposed to understand the link between economic instability and health (Sterling and Eyer, 1988; McEwen and Stellar, 1993). These postulate that experiencing frequent or prolonged episodes of stress can lead to damage to the body, which disrupts the body's regulatory systems and ultimately worsens health. Taken globally, these theories highlight a set of indicators of physiological dysregulation as the mechanisms through which stressful events lead to worse health outcomes in the long term. Several studies provide evidence of the mediating role of physiological dysregulation between stresses associated with low socioeconomic status, poor work conditions including job demands and future mortality (Seeman, Burton et al. 1997; Schnorpfeil et al, 2003; Seeman, Crimmins et al. 2004; Seeman, Merkin et al. 2008). Studies in several social sciences have documented that stress associated with job loss results primarily from financial strain (Moen, 1983; Voydanof, 1984). Financial strain has been found to be strongly associated with psychological distress among the unemployed (Kessler, Turner and House, 1987). Blake (1995) finds that stress is greater when job loss occurs in a region with low unemployment levels. Stress

associated with working conditions has been found to be associated with indicators of cardiovascular dysregulation (Rosengren et al., 2004) and metabolic syndrome in the White Hall II study (Chandola, Brunner and Marmot, 2005). Michaud et al. (2014) ran multivariate analyses with the outcome variable of biomarkers, and found positive associations between dysregulation and layoff. This was stronger for males. One study by Schroder (2013) focused on the long-term effects of layoffs and plant closure in self-reported health outcomes at older ages and found a mixed pattern of negative effects on health with the largest effects occurring for females. Some studies find no effect of job displacement on health, in particular when looking at short-run effects of job displacement due to plant closure on self-reported health (e.g. Salm, 2009) or hospital visits (Browning et al., 2006).

This paper investigates the effect of job displacement on individual's health using self-reported health and depression as health outcomes. In order to estimate long-term effects, I link SHARE data to life histories of the respondents (SHARELIFE), which provides information on jobs, marital history, and childhood conditions. Havari and Mazzonna (2011) demonstrate that SHARELIFE data are quite reliable and may indeed be powerful in explaining current health status. I analyse how these health measures are related to life events and in particular the occurrence of layoffs and plant closures.

The rest of the paper is structured as follows. In section 2, I present the data and the construction of the variables used. Section 3 presents estimation results while section 4 draws conclusions from the results.

2. Sample

To study the research questions I use the Survey of Health, Ageing and Retirement in Europe (SHARE). Since in this paper I am interested in studying the effects of past job loss events (layoff or plant closure) on the current state of health of the respondents, I use mainly

SHARELIFE variables. SHARELIFE is a wave of retrospective data, collected in the framework of SHARE and recording the past of the respondents. In particular, the SHARELIFE questionnaire records all the necessary information about all job loss events that respondents could experience, as well as information on the respondents' childhood circumstances. SHARELIFE data were collected in 2008-2009 and included 13 European countries with 30,000 respondents aged 50 and older. To control for demographic characteristics of the respondents, I also used information from the regular (prospective) waves of SHARE, i.e. waves 1 (2004) or 2 (2006), dependent on when a respondent joined the survey. After merging datasets, the resulting sample included 12500 respondents.

Following my research interests, I removed from my working sample people who never worked. In addition, as I want to study the effect of job loss on people who spent enough time in the job market, I only included respondents who entered the market no older than age 30. Since I want to consider only people with homogeneous circumstances in the labor market, when they entered employment, I only include the respondents who started work after 1950. This is because, as highlighted by Schroder (2013), the labor market entrance conditions were different before the WWII. Next, as this paper focuses on the impact of past job loss on current health, I allow a time-interval long enough for long-term consequences of job losses to take effect. Therefore, I include only those respondents who had already lost their first job by 1984, i.e. 25 years before SHARELIFE data were collected in 2009. Again, as I we want to have as homogeneous a sample as possible, first I exclude workers from the former communist countries and secondly workers in the agricultural sector. Finally, I consider only employees in the private sector. This is firstly because plant closure for civil servants is a rare event and secondly for the self-employed it might not be an exogenous event. For each job that was terminated, the reason for termination is indicated in SHARELIFE. Two events are particularly relevant in our context. First, respondents can report that the job was terminated due to a layoff. Second, they can also report that the job was terminated due to the closing of the business. Since both these events occurred, I construct three groups: (1) those individuals who left their job voluntarily; (2) those who, if they were forced to leave their job, were subject to plant closure and never laid off, and (3) those who, if they were forced to leave their job, were laid off and never experienced a plant closure. I do not consider the respondents who had both layoff and plant closure occurring during their lifetime. My final working sample contains 6167 cases.

2.1. Variables

2.1.1. Dependent Variables

My outcome variables are self-reported health and a measure of depression. The self-reported health was recorded by SHARELIFE. I recoded this ordinal variable into a dummy, where 1 means fair health or worse, while 0 means good or better. The measure of depression is a dummy variable, indicating if a respondent had suffered from 3 or more depressive symptoms in the last month. This variable is computed, using Euro-D scale in the Mental Health module of the SHARE wave 2 questionnaire.

2.1.2. Independent Variables

SHARELIFE provides information about the mode, in which the respondents had quit each of the jobs that they had throughout their life-course. In particular, it is possible to distinguish 3 events. One is quitting a job voluntarily, one is a layoff and the other is a plant closure. I created an indicator for job loss, so that it has value 1 if a respondent experienced a layoff or a plant closure and 0 if s/he quitted the job voluntarily.

In addition to the job loss indicator I control for four different blocks of variables. The first block contains variables that describe early life circumstances of the respondents, based on a retrospective recall technique used to conduct SHARELIFE. In particular, I included self-reported childhood health, number of stays in hospital during childhood, and whether a respondent had one or more serious health conditions from a list in the questionnaire. Next, I also included a variable describing the quality of a respondent's housing at the age of 10. I recoded

this variable into a binary indicator called “home poorly equipped”, in such a manner that the value of 1 means no items from the list of household equipment, and zero if at least one of the items was present. I also included such indicators of household conditions as the number of books at home at the age of 10. Also in this I created a dummy, where the value 1 corresponds to having few books at home and 0 corresponds to having more books. As a final variable for quality of childhood housing I used three dummies describing the number of persons per room. The reference category is 1.25 or fewer persons per room, and the first dummy in the regression is having 1.25 to 2.0 persons per room and having more than 2.0 persons per room. Finally, I also created a variable describing parental health and health- related behavior. This variable was set to value 1 if a respondent said that his/her parents had a mental illness or were smoking or drinking heavily during his/her childhood, 0 otherwise. The second block of variables gives proxies for the respondents’ parents’ health as current health is also affected by genetic inheritance. In particular, for each parent I included information about his/her present age or the age at death. In addition I use dummies indicating whether the parents are alive or dead. The third block consists of variables describing the respondents’ conditions as well as the characteristics of the workplace and when s/he entered her/his first job. These include age and age squared at the beginning of the first job, whether the respondent was married and whether s/he had children. The workplace characteristics are whether the first job was full-time or part-time and dummies for industry type, such as construction work or work in the field of education. Finally, I add current socioeconomic and demographic characteristics as the final block of the variables. In particular, this block contains the current age of the respondent, age squared, gender, whether a respondent was born in the country of the interview and years of education.

2.2. Descriptive Statistics

Descriptive statistics are reported in Table 1 below. Almost a third of the sample (29%) reported poor or fair health. A fifth of the respondents (19%) reported that they suffered from 3 or more depressive symptoms in the last month. The mean age of the respondents in the sample is 64

years old, and half of the respondents (49%) are women. They spent on average 11 years in full-time education. Two percent of the respondents were born in a country different from the country of interview. Nine percent of the respondents reported fair or poor health during their childhood and 6% said that during their childhood they were in hospital for one month or more. Fourteen percent of the respondents reported that during their childhood they had at least one serious illness. As to the socioeconomic conditions at the age of 10, a quarter of the respondents had none of the home facilities that they were asked about. Over 40% had none or very few books at home. Most of the sample (65%) reported that their parents had a mental illness or smoked/drunk heavily during the respondents' childhood. One third stated that they lived in accommodation with more than 1.25 but less than 2 persons per room, while another third reported having 2 or more persons per room. The average reported mother's age or mother's age at death was 77 years old, while for respondents' fathers it was 72 years old. A quarter of the sample had mothers still alive and 11% of the respondents reported that their father was alive. Nine percent of the respondents were married when they entered their first job and 5% reported that they had children at that time. On average, the respondents began working at their first job at the age of 18.6 years.Three percent of the respondents said that their first job was part-time. As to the industry, the most frequent were manufacturing (23%), wholesale (17%) and community jobs (14%). Nine percent worked in construction; 8% in health and education; 6% worked in public administration and less than 5% said that they worked in other industries.

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Self-Reported Health	6160	0.288474	0.45309	0	1
Depression	6097	0.19813	0.398624	0	1
Job displacement	6032	1.241877	0.572993	1	3
Age	6167	63.802	9.050	39	96
Age^2	6167	4152.529	1184.003	1521	9216
Female	6167	0.486	0.500	0	1
Years of education	6078	11.060	4.069	0	25
Citizenship	6167	0.018	0.134	0	1

Variable	Obs	Mean	Std. Dev.	Min	Max
Childhood health was bad	6126	0.088	0.283	0	1
Was at hospital at least once as a child	6158	0.061	0.239	0	1
Childhood illness	6167	0.138	0.345	0	1
Home equipped poorly	6167	0.237	0.425	0	1
Had few books as a child	6115	0.418	0.493	0	1
Parents smoke/drink/mental	6167	0.653	0.476	0	1
People per room >1.25 <2	6094	0.352	0.478	0	1
People per room >2	6094	0.350	0.477	0	1
Mother age	6076	77.324	13.002	18	105
Father age	6011	72.184	13.949	19	104
Mother alive	6125	0.248	0.432	0	1
Father alive	6123	0.101	0.301	0	1
Married at first job	5734	0.093	0.290	0	1
Children at first job	5318	0.053	0.224	0	1
Age at 1st job	6167	18.633	3.908	6	30
Age^2 at 1st job	6167	362.457	156.267	36	900
Part-time 1st job	6162	0.031	0.172	0	1
First job industry[1]					
Manufacturing	6100	0.233	0.423	0	1
Electricity	6100	0.025	0.157	0	1
Construction	6100	0.090	0.285	0	1
Wholesale	6100	0.169	0.375	0	1
Hotels	6100	0.025	0.157	0	1
Transport	6100	0.042	0.201	0	1
Financial intermediation	6100	0.029	0.168	0	1
Real estate	6100	0.007	0.081	0	1
Public admin	6100	0.063	0.242	0	1
Education	6100	0.076	0.265	0	1
Health	6100	0.082	0.274	0	1

Variable	Obs	Mean	Std. Dev.	Min	Max
Other community	6100	0.144	0.351	0	1

Reference categories: 1. Mining and quarrying

3. Multivariate Analysis

I ran a logistic regression model with robust standard errors (using self-reported health as a dependent variable) on the whole working sample as well as on the subsamples of males and females. Table 2 below presents the results of multivariate analysis, which included only individuals who either never lost their job involuntarily or were laid off. The results show that there is a positive significant effect of lay-off on self-reported health in the male subsample. The marginal effect indicates that being laid off increases the likelihood of reporting bad health by 6%. In addition, education is correlated negatively and significantly with bad self-perceived health in the whole subsample. Bad self-perceived childhood health is correlated positively with the outcome, except for males. The same is true with respect to few books in childhood (significant also for males). Respondents' own age at the first job is negatively associated with the outcome, except for males.

Table 2. Logit Regression of Self-Reported Health for Lay Off Sample

Self-reported health	Whole Working Sample	Male Subsample	Female Subsample
Lay-off	0.169	0.344*	-0.0154
	[0.131]	[0.171]	[0.204]
Age	-0.0353	0.187*	0.0593
	[0.0569]	[0.0908]	[0.0738]
Age^2	0.000534	0.00167*	-0.00017
	[0.000424]	[0.000678]	[0.000546]
Female	0.357***		

Self-reported health	Whole Working Sample	Male Subsample	Female Subsample
	[0.0822]		
Years of Education	-0.0287**	-0.0283	-0.0273
	[0.0111]	[0.0148]	[0.0171]
Citizenship	0.454	0.418	0.476
	[0.275]	[0.434]	[0.372]
Childhood health was bad	0.527***	0.367	0.638***
	[0.134]	[0.201]	[0.191]
Was at hospital at least once as a child	0.0634	0.238	-0.0947
	[0.160]	[0.227]	[0.228]
Childhood illness	0.125	-0.0901	0.28
	[0.108]	[0.164]	[0.151]
Home equipped poorly	0.121	-0.0199	0.287*
	[0.0894]	[0.125]	[0.131]
Had few books as a child	0.312***	0.266*	0.332**
	[0.0825]	[0.116]	[0.120]
Parents smoke/drink/mental	0.123	0.256*	-0.0288
	[0.0765]	[0.111]	[0.110]
People per room >1.25 <2	-0.169	-0.058	-0.299*
	[0.0906]	[0.129]	[0.132]
People per room >2	-0.137	-0.0467	-0.252
	[0.0950]	[0.136]	[0.138]
Mother's Age	-0.001	-0.00042	-0.0013
	[0.00283]	[0.00384]	[0.00427]
Father's Age	-0.00660*	-0.00814*	-0.00505
	[0.00259]	[0.00362]	[0.00382]
Mother Alive	-0.181	-0.483**	0.0738
	[0.107]	[0.156]	[0.155]
Father Alive	-0.334*	-0.0726	-0.585*
	[0.162]	[0.226]	[0.238]

Self-reported health	Whole Working Sample	Male Subsample	Female Subsample
Married at first job	0.125	0.415	-0.0447
	[0.187]	[0.263]	[0.274]
Children at first job	0.315	-0.584	0.775*
	[0.224]	[0.379]	[0.311]
Age at 1st Job	-0.249**	-0.158	-0.303*
	[0.0808]	[0.114]	[0.119]
Age^2 at 1st Job	0.00475*	0.00239	0.00583
	[0.00206]	[0.00293]	[0.00305]
Part-time 1st job	-0.0966	-0.811	0.0102
	[0.199]	[0.525]	[0.225]
First job industry[1]			
Manufacturing	-0.519	-0.599*	-0.749
	[0.266]	[0.299]	[0.667]
Electricity	-0.178	-0.336	-0.252
	[0.337]	[0.375]	[0.804]
Construction	-0.208	-0.287	0.236
	[0.280]	[0.308]	[0.761]
Wholesale	-0.632*	-0.664*	-0.898
	[0.271]	[0.313]	[0.667]
Hotels	-0.688*	-0.53	-1.035
	[0.343]	[0.487]	[0.712]
Transport	-0.279	-0.286	-1.065
	[0.303]	[0.333]	[0.777]
Financial intermediation	-0.676*	-0.678	-0.952
	[0.342]	[0.435]	[0.725]
Real estate	-0.871	-1.078	-1.039
	[0.661]	[1.226]	[0.957]
Public admin	-0.483	-0.58	-0.661
	[0.292]	[0.339]	[0.693]

Self-reported health		Whole Working Sample	Male Subsample	Female Subsample
	Education	-0.617*	-0.551	-0.875
		[0.296]	[0.387]	[0.684]
	Health	-0.700*	-0.254	-1
		[0.296]	[0.426]	[0.679]
	Other community	-0.579*	-0.663*	-0.832
		[0.274]	[0.327]	[0.668]
_cons		2.637	7.231*	1.039
		[2.083]	[3.223]	[2.801]
N		4249	2244	2005
Pseudo R 2		0.0767	0.0695	0.1032
Margins		0.0311	0.0615*	-0.003

Standard errors in parentheses

* p<0.05, ** p<0.01, ***p<0.001

Reference categories: 1. Mining and quarrying

I also regressed self-reported health on plant closure and other variables. However despite using an exogenous indicator for job loss, I found no significant correlation between my explanatory variable and the measure of health.

Table 3 reports the results of regressing depression on plant closure and other variables. The event of plant closure has a positive and significant impact on the probability of depression among women, however it is not significant either in the male subsample or in the whole working sample. The marginal effect indicates that experiencing plant closure increases the likelihood of reporting depression among females by 6%.

Table 3. **Logit regression of depression for plant closure subsample**

Depression	all	male	female
Plant closure	0.244	0.0859	0.335*
	[0.126]	[0.215]	[0.162]
Age	-0.0985	-0.198	-0.0564
	[0.0546]	[0.101]	[0.0641]
Age^2	0.000872*	0.00164*	0.000534
	[0.000407]	[0.000750]	[0.000478]
Female	0.841***		
	[0.0938]		
Years of Education	-0.0275*	-0.0372	-0.0216
	[0.0131]	[0.0201]	[0.0175]
Citizenship	-0.148	-0.983	0.141
	[0.321]	[0.649]	[0.398]
Childhood health was bad	0.447**	0.308	0.527**
	[0.140]	[0.234]	[0.180]
Was at hospital at least once as a child	0.174	0.157	0.191
	[0.164]	[0.278]	[0.208]
Childhood illness	0.294*	0.282	0.286
	[0.117]	[0.196]	[0.147]
Home equipped poorly	0.0121	-0.221	0.167
	[0.102]	[0.164]	[0.134]
Had few books as a child	0.421***	0.379*	0.446***
	[0.0927]	[0.150]	[0.120]
Parents smoke/drink/mental	0.0302	-0.0903	0.106
	[0.0856]	[0.135]	[0.111]

Depression	all	male	female
People per room			
>1.25 <2	-0.0006	0.278	-0.192
	[0.103]	[0.163]	[0.134]
People per room >2	0.154	0.282	0.0594
	[0.106]	[0.170]	[0.139]
Mother's Age	-0.00595	-0.0087	-0.00418
	[0.00320]	[0.00469]	[0.00432]
Father's Age	-0.00132	-0.00173	-0.00139
	[0.00303]	[0.00471]	[0.00397]
Mother Alive	0.131	-0.0438	0.22
	[0.118]	[0.198]	[0.151]
Father Alive	-0.229	-0.451	-0.117
	[0.161]	[0.303]	[0.196]
Married at first job	-0.0741	-0.284	0.0393
	[0.200]	[0.337]	[0.252]
Children at first job	0.199	0.626	-0.0702
	[0.250]	[0.427]	[0.309]
Age at 1st Job	-0.118	-0.116	-0.135
	[0.0909]	[0.141]	[0.122]
Age^2 at 1st Job	0.00223	0.00229	0.00263
	[0.00232]	[0.00355]	[0.00313]
Part-time 1st job	0.366	-1.586	0.617**
	[0.197]	[1.019]	[0.222]
First job industry[1]			
Manufacturing	-0.495	-0.636	-0.281
	[0.314]	[0.356]	[0.708]
Electricity	-0.349	-0.479	0.0457
	[0.410]	[0.467]	[0.878]
Construction	-0.384	-0.319	-0.588
	[0.334]	[0.364]	[0.853]

Depression	all	male	female
Wholesale	-0.606	-0.564	-0.493
	[0.321]	[0.375]	[0.709]
Hotels	-0.326	0.189	-0.402
	[0.389]	[0.540]	[0.752]
Transport	-0.111	-0.102	-0.235
	[0.358]	[0.392]	[0.831]
Financial intermediation	-0.308	-0.137	-0.317
	[0.384]	[0.482]	[0.763]
Real estate	-0.6	-0.301	-0.565
	[0.633]	[0.954]	[0.959]
Public admin	-0.343	-0.303	-0.305
	[0.344]	[0.399]	[0.740]
Education	-0.332	-0.243	-0.232
	[0.341]	[0.456]	[0.723]
Health	-0.561	-0.875	-0.397
	[0.341]	[0.596]	[0.720]
Other community	-0.431	-0.517	-0.304
	[0.321]	[0.395]	[0.707]
_cons	2.178	6.619	2.376
	[2.070]	[3.687]	[2.542]
N	4326	2250	2076
Pseudo R 2	0.0571	0.0406	0.0447
Margins	0.036	0.01	0.06*

Standard errors in parentheses

* p<0.05, ** p<0.01, ***p<0.001

Reference categories: 1. Mining and quarrying

4. Conclusion

In this paper I analyzed how health measures are related to life events, and in particular the occurrence of layoffs or plant closures. My findings suggest that males have a significantly higher likelihood of reporting poor or fair health if they experienced layoff, whereas females are more likely to suffer from depression if they experienced a plant closure. The limitation of this study is using subjective self-reported measures of health status. This suggests that future research should exploit objective health measures such as biomarkers, for example available in the datasets of the Health and Retirement Study. At the time of writing this paper such information was available in SHARE only for Germany, and therefore couldn't be used for the sample of all the SHARE countries.

5. References

Blake, T. (1995): Economic Context and the Health Effects of Unemployment, Journal of Health and Social Behavior, 36 :3, p.. 213-230.

Browning, Martin, Anne Moller Dano, and Eskil Heinesen. "Job Displacement and Stress-related Health Outcomes." Health Economics 15, no. 10 (October 2006): 1061-1075. doi:10.1002/hec.1101.

Crimmins, Eileen, Jung Ki Kim, and Sarinnapha Vasunilashorn. "Biodemography: New Approaches to Understanding Trends and Diferences in Population Health and Mortality." Demography 47 Suppl (2010): S41-64.

Chandola, T., E. Brunner and M. Marmot (2005): "Chronic Stress at work and the Metabolic Syndrome: Prospective Study", British Medical Journal 332: 7540.

Gerdtham, Ulf-G, and Magnus Johannesson. "A Note on the Efect of Unemployment on Mortality." Journal of Health Economics 22, no. 3 (May 2003): 505-518. doi:10.1016/S0167-6296(03)00004-3.

Kessler, Ronald C., J. Blake Turner, and James S. House. 1987. "Intervening Processes in the Relationship between Unemployment and Health." Psychological Medicine 17:949-61.

McEwen, B. S. and E. Stellar (1993). "Stress and the individual. Mechanisms leading to disease." Arch Intern Med 153(18): 2093-2101

Moen, Phyllis. 1983. "Unemployment, Public Policy, and Families: Forecasts for the 1980s." Journal of Marriage and the Family 45:751-60.

Rosengren A, Hawken S, Ounpuu S, Sliwa K, Zubaid M, Almahmeed WA, et al. Association of psychosocial risk factors with risk of acute myocardial infarction in 11 119 cases and 13 648 controls from 52 countries (the INTERHEART study): case-control study. Lancet 2004; 364: 953-62.

Salm, M. (2009): "Does Job Loss Cause Ill Health", Health Economics, 18, pp. 1075-1089.

Schröder, Mathis. "Jobless Now, Sick Later? Investigating the Longterm Consequences of Involuntary Job Loss on Health." SHARELIFE - One Century of Life Histories in Europe 18, no.1 (March 2013): 5-15. doi:10.1016/j.alcr.2012.08.001.

Seeman, T. E., S. H. Burton, et al. (1997). "Price of Adaptation – Allostatic Load and Its Health Consequences: MacArthur Studies of Successful Aging." Archives of Internal Medicine 157.

Seeman, T. E., E. Crimmins, et al. (2004). "Cumulative biological risk and socio-economic diferences in mortality: MacArthur Studies of Successful Aging." Social Science & Medicine 58: 1985 - 1997.

Seeman, T. E., S. S. Merkin, et al. (2008). "Education, income and ethnic differences in cumulative biological risk profiles in a national sample of US adults: NHANES III (1988-1994)." Social Science & Medicine 66: 72-87.

Schnorpfeil P, Noll A, Schulze R, Ehlert U, Frey K, Fischer JE. (2003): "Allostatic load and work conditions" Social Science and Medicine, 57, pp.647-56.

Smith, James. "Healthy Bodies and Thick Wallets: The Dual Relation between Health and Wealth." The Journal of Economic Perspectives (1999).

Sterling, P. and J. Eyer (1988). Allostasis: A New Paradigm to Explain Arousal Pathology. Handbook of Life Stress, Cognition and Health. S. Fisher and J. Reason. New York, John Wiley & Sons: 629-649.

Sullivan, Daniel, and Till von Wachter. "Job Displacement and Mortality: An Analysis Using Administrative Data." The Quarterly Journal of Economics 124, no. 3 (August 1, 2009): 1265-1306. doi:10.1162/qjec.2009.124.3.1265.

Voydanof. Patricia. 1984. "Economic Distress and Families: Policy Issues." Journal of Family Issues 5:273-88.