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When the Going Gets Tough, the Tough Get Going? Health and Self-employment in Europe *

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Abstract

We provide a comprehensive picture of the change in the health status for the self-employed aged 50 and upwards in Europe. We find that self-employed workers are in better physical health than employees at younger ages, due potentially to a selection effect. We also find a negative effect of self-employment status on objective health, leading to worse physical conditions at older ages, despite a catching-up of healthcare consumption after retirement. The examination of the evolution of the self-employed healthcare consumption enables us to distinguish two components: an intense health restoration effect and a regular one, corresponding to two distinct periods in their life. We interpreted the former effect as the increased probability of the self-employed to be hospitalized during their careers, meaning that the self-employed seek care later or for serious reasons only. The latter effect or the regular restoration effect meaning a greater number of medical visits for the self-employed after retirement which is potentially due to a reduction in the opportunity cost of the use of healthcare resources.

JEL Codes: I10, I12, J18

Keywords: *Self-employment, Health status, Health care consumption, SHARE survey*

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Introduction

In 2018, 14% of the labour force in Europe were working on their own account (EUROSTAT, 2020). The recent rise of self-employment (SE) in Europe (Bologna, 2018) could be considered as a success since employment policies aiming to support SE have been implemented over the last decade in many EU Member States at the national and regional levels (European Commission, 2010; OECD and European Union, 2019). Several studies have suggested that SE has significant positive impacts on economic growth, business dynamics and innovation, wage and salary employment, as well as on unemployment reduction, e.g. Carree and Thurik (2003); Goetz et al. (2012); Koellinger and Thurik (2009).

Yet, the development of SE as a feature of modern labour markets poses serious challenges to the health and social protection systems of the Member States. Self-employment today encompasses bogus and dependent forms that are basically a disguised substitute to wage employment (Semenza and Pichault, 2019; Williams and Lapeyre, 2017). For employers, this fake self-employment is a way of increasing flexibility and reducing labour costs (Burtch et al., 2018), notably by means of avoiding paying social insurance contributions (Fondeville et al., 2015; Thornquist, 2015). This trend thus threatens the sustainability of social protection systems and public healthcare insurance-based systems in Europe. It potentially reduces access to social protection for a growing number of workers since, even though the self-employed are entitled full statutory access to healthcare in all EU countries, compared to employed staff, they generally receive lower benefits (unemployment, sick leave, etc.), all the more a long time after the event of a disease (see Torp et al. (2019) for the case of cancer) and for shorter periods of time (Spasova et al., 2017).

Another important consequence of the rise in SE deals with the health consequences of this form of occupational activity (Ravesteijn et al., 2013). Several studies based on population health surveys regularly report a positive effect of being self-employed on health outcomes in cross-sectional settings (Algava et al., 2013; Stephan and Roesler, 2010; Toivonen, 1990). Herber et al. (2020) find that healthy individuals are over-represented among the self-employed aged 25-65 years. Rietveld et al. (2015) suggested that this effect is mainly due to a selection process of healthier individuals into SE ('barrier effect') rather than being a contextual effect ('benefits effect') based on alleged virtuous working conditions inherent to SE (the so called

'active jobs' hypothesis) (Gevaert et al., 2018). In addition, Rietveld et al. (2015) "present tentative evidence that, if anything, engaging in self-employment is bad for one's health." Should this latter assumption be true, public policies supporting SE could seriously be challenged with regard to the health costs they generate. This assumption also raises the question of the actual drivers of health behaviours among the self-employed since the observed lower volume of care consumption of this sub-population (Pfeifer, 2013; Stephan and Roesler, 2010) could be due to other factors than fewer health needs. The literature on SE is still relatively limited and, above all, several important questions concerning the health and health behaviour of the self-employed are still unaddressed. In fact, the main issue is to get a comprehensive picture of dynamic mechanisms at play over the life-cycle in the case of health and healthcare use. Recent studies focused on the working population of age 65 and under, using cross-section for Germany (Stephan and Roesler, 2010) and the U.S. (Yoon and Bernell, 2013), as well as panel data for the U.S. (Rietveld et al., 2015). Specific focus on current SE status instead of a life-cycle perspective may exacerbate the selection process ('barrier effect'), and does not shed light on long-term effects of SE on health and healthcare use in Europe.

One specific question regarding SE and retirement that emerges from two strands of the literature is that the self-employed visit the doctor less (Riphahn et al., 2003), which may be explained by the higher opportunity cost of time of the self-employed (Boaz and Muller, 1989). On the other hand, using data from SHARE (Survey of Health, Ageing and Retirement in Europe), Lucifora and Vigani (2018) found that the increase in health care use is consistent with the decrease in the opportunity cost of time faced by individuals at retirement. Since the latter result is not divided by individuals' employment status, it is still not clear if the self-employed catch-up medical care after retirement and, if so, how the care consumption level of the self-employed compares to the employed in retirement. This could contribute to counterbalance, in part, for the deficit in care consumption during their working life.

From a more technical perspective, two main limitations in the literature make it difficult to conclude that SE has a causal beneficial or detrimental effect on health and health behaviour. First, since self-selection into SE is potentially driven by health status, model estimates are potentially biased by reverse causality and omitted variables. Yoon and Bernell (2013) used the number of self-employed family members as an instrument to control for self-selection into

SE. However, it is likely that the exclusion restriction is not theoretically valid since health status and attitudes towards health are partly inherited from individuals' social and economic family background (Fadlon and Nielsen, 2019; Jusot et al., 2013). Alternative approaches are thus required to solve the SE and health complexity. Second, it is acknowledged that the self-employed have specific behavioral attitudes (Block et al., 2015) and personality traits (Caliendo et al., 2014).

This work contributes to the literature on the health and healthcare use of the self-employed in several ways. Using panel data from the SHARE survey between 2004 and 2015, we question the impact of the self-employed status on health with different econometric models i) using a life-course perspective going beyond the usual working-life period, for Europeans aged 50 and upwards and, ii) taking into account the selection process in self-employment. Although we do not observe personality traits or behavioural attitudes in the SHARE data, our panel models specification captures time-constant individual heterogeneity, such as motivation or perseverance.

Our results are in line with Rietveld et al. (2015) seminal work. Based on objective measures of health, they support the hypothesis that self-employed workers have better physical health than wage-earners, potentially due to a selection effect, while no effect on mental health is found, as in Yoon and Bernell (2013). Using first differences models, we also find a negative effect of self-employment status on objective health, leading to worse physical conditions of the self-employed at older ages. All in all, the so-called 'benefit effect' that the self-employed could derive from their work may actually play in the opposite direction to the one expected. Consequently, the self-employed should consume more healthcare than wage-workers as they age. On the contrary, we find that SE is still associated with less access to care during their working life, potentially due to attitudes towards care and less health insurance coverage of the self-employed in some countries. Regardless of health status and other omitted variables, we also find an increase in health care consumption of the self-employed at retirement, with a higher magnitude than for all other occupational categories without, however, compensating for the health capital mortgaged during their working life. The examination of the evolution of the self-employed healthcare consumption enables to distinguish two components: i) an intense restoration effect during the working life, assessed through the increased probability for

the self-employed of being hospitalized, meaning that the self-employed seek care later and/or for serious reasons only; ii) a regular restoration effect (or catch-up effect) after retirement, supported by a greater number of doctor visits for the self-employed than for the wage-earners, made possible by a drop in the opportunity cost of the use of healthcare resources.

1 Data

1.1 Source and Sample

We use the SHARE data, which gathers information on health and career of individuals aged 50 and over in Europe. SHARE is a multidisciplinary and cross-national cohort of individual data on health, socio-economic status and social and family relationships of more than 120,000 respondents aged 50 or over in 21 countries (Börsch-Supan et al., 2013). Eleven countries contributed to the 2004 SHARE baseline study (Israel took also part in SHARE waves 1, 2, 5 and 6). They are a balanced representation of the various regions in Europe, ranging from Scandinavia through Central Europe and Eastern countries to the Mediterranean. Further data were collected in 2006-07 during the second wave of SHARE in these countries, the Czech Republic, Poland, and Ireland.

SHARELIFE, the third wave of the project, was conducted in 2008-09 for the same population (apart from Ireland). This time, the respondents were interviewed about their life history. Different fields such as childhood health, education, job career, family life, housing, etc. were surveyed and provide useful information on initial conditions and life course. In 2010, Greece dropped out of the survey (as a consequence of the economic crisis) while Estonia, Slovenia, Hungary, and Portugal joined SHARE wave 4, which is the third regular panel wave of the survey following the SHARELIFE life history questionnaire. Luxembourg joined SHARE in wave 5 and Croatia joined the survey in wave 6. Notice that the Netherlands did not carry out wave 6. The data were collected using a computer assisted personal interviewing (CAPI) program, supplemented by a self-completion paper and pencil questionnaire.

The sample retained was made of baseline countries with at least five first regular panel waves (only four for the Netherlands). It was restricted to seven baseline countries, in northern (Denmark, Sweden), continental (Germany, France, Belgium, Austria, Switzerland) and south-

ern (Italy, Spain) regions of Europe. In order to have the maximum temporal depth, we restrict our attention to the countries that contributed to the 2004 baseline study (wave 1) and to the regular panel waves 2, 4, 5, and 6, and the retrospective wave (SHARELIFE). Only individuals who reported being at work for their first wave of observation in the panel were kept in the analysis, whether or not they retired in the following waves of observation. Finally, missing data were deleted. Our final sample was unbalanced and consisted of 48,670 observations made up of 20,969 individuals surveyed every two years since 2004.

1.2 Health Measures

Self-reported measures The SHARE data provide a wide array of health status variables. Respondents are asked to answer questions about how they perceive different aspects of their health. The subjective measures of health retained here cover various aspects of health: self-rated health (good or more vs. less than good), having at least two chronic diseases out of a list of ten, showing symptoms of depression from the Euro-D scale. The SHARE data also include questions about health behaviour regarding the respondent's health care consumption over the last 12 months. All these measures are self-reported. We retained two variables: the number of times she has seen a doctor, whether she has been hospitalized overnight. Note that the count variables (chronic diseases and number of doctor visits) were transformed into logarithms $log(x+1)$ because of the highly skewed distributions.

Objective measures The SHARE data also provide objective measures of health such as grip strength and cognitive functioning. Grip strength (GS) is an objective measure of the force applied by the hand to grip. This is a strong predictor of different health outcomes for ageing people. Low grip strength is associated with an increased risk of premature mortality, the development of disability, and an increased likelihood of complications after hospitalization (Bohannon, 2008). In SHARE, GS was measured using a handheld dynamometer under supervision by trained survey interviewers using a protocol for measuring GS in non-clinical settings. Two values were recorded for each hand. Extreme values and values not in compliance with the protocol were discarded. The value of GS was defined as the maximum GS measurement of both hands, or of one hand, if applicable. Cognitive functioning (CF) was measured using simple tasks carried out by individuals under the supervision of trained survey interviewers. A

first dimension related to episodic memory was assessed through a test of verbal learning and recall of ten common words. A second dimension related to the executive functioning of the individual was measured by means of a word fluency test score based on the task of naming as many animals as possible in 60 seconds. The test score is equal to the number of correct animals' names given. In this paper, we use the average value of the two scores. This cognitive aspect is particularly affected by ageing (Anderson and Craik, 2000; Prull et al., 2000; Souchay et al., 2000) and provides valuable information for screening and diagnosis of Alzheimer's disease (Rabin et al., 2009).

1.3 Self-employment status in Europe

Definition There is a large variety of both legal and statistical self-employment classifications in the EU Member States (Vermeylen et al., 2017). Self-employed status clusters heterogeneous activities, such as entrepreneur, freelancer, own-account worker, business owner, physician, lawyer, shopkeeper, and director. Given this diversity, the EU-LFS (Labor Force Survey) establishes four categories: i) the self-employed with employees, i.e. individuals who run their own business and employ at least one other individual; ii) the self-employed without employees. i.e. individuals who run their business and employ no other individuals; iii) individuals who work for a private or public company and earn compensation in the form of wages, salaries, fees, gratuities, performance-based earnings or likewise; iv) family workers, i.e. individuals who assist other family members to run a farm or a business and are not classified as employees.

The SHARE survey specifies the current job situation if the respondent answered that she/he is employed. We also have information on the last job situation. Self-employment status is defined as individuals who currently work for themselves, while fully retired individuals are asked whether they had previously worked as self-employed (i.e. last job situation). As the dataset is a cohort, employed or self-employed individuals at baseline could later become retired, unemployed, permanently sick or disabled or homemaker in the following waves.

Table 1 shows the proportion of the self-employed per country. This proportion varies from 10.9 in Denmark to 26.4 in Spain. For our total sample, the average proportion is 16.6.

Sociodemographic characteristics Self-employment is associated with sociodemographic characteristics which are, in turn, associated with health and health behavior (Lewin-Epstein and

Table 1: Share of self-employed (%)

Country	Wave 1	Wave 2	Wave 4	Wave 5	Wave 6	All
Austria	19.7	18.9	23.3	20.7	20.7	21.4
Belgium	16.0	16.2	14.2	13.0	14.2	14.3
Denmark	11.0	10.5	10.6	11.5	10.5	10.9
France	13.0	12.7	13.4	13.1	12.6	13.0
Germany	16.4	16.3	12.2	12.6	11.9	13.4
Italy	36.4	26.0	25.3	23.5	21.9	24.9
Sweden	12.9	11.9	13.1	13.2	13.9	13.1
Spain	30.6	27.6	26.6	26.6	24.1	26.3
Switzerland	25.7	22.5	21.6	19.9	19.3	21.0
Total	17.9	16.5	17.5	16.3	15.8	16.6

Yuchtman-Yaar, 1991), such as gender (Dolinsky and Caputo, 2003), age (Zissimopoulos and Karoly, 2007), education (Blanchflower, 2000; Lleras-Muney, 2005), perseverance (Beugelsdijk and Noorderhaven, 2005), and risk aversion (Ekelund et al., 2005). In our analysis, non-time varying characteristics were restricted to the respondent's date of birth, gender, and level of education (none, primary school, secondary school, university). Other individual characteristics constant in time (like motivation or perseverance) are eliminated in panel data models. Additional covariates included time varying variables dealing with two main drivers of health and healthcare utilization regardless the self-employed status: occupational status (retired or at work)[1], marital status (married and living as a couple, or registered partnership vs. other situations), social participation (whether or not the individual is a member of social activities), material resources (whether the household is able to make-ends-meet).

1.4 Descriptive Statistics

The self-employed are in better physical health, less depressed and consume less medical care. Table 2 provides descriptive statistics on the difference between self-employed individuals and the others, i.e. employed individuals. Though older, the self-employed are in better physical health (+ 2.6 points on the score of grip strength). They also report a lower level of depression (-0.14 points). They visit the doctor less. However, they have a slightly lower level of cognition and there is no significant difference between their subjective health, numbers of chronic diseases

[1]There are several ways to define retirement. Bonsang and Klein (2012) discuss the advantages and drawbacks of each definition. In many databases, a frequent question enquires whether the respondents are currently retired or not. The advantage of such a question is that the response is easy to collect, however the drawback is being subjective and comprehension may vary according to individuals. Another option is to define a retiree as soon as he receives pension benefits. However, the above option opens up the possibility for individuals to use alternative paths to retirement, for example via disability, unemployment insurance, or early retirement schemes. Here, we use, the definition proposed by Lazear (1986), i.e. an individual is defined as retired when the individual is out of the labor force.

Table 2: Self-employed Health and Socioeconomic attributes

	All	Self-employed		
		No	Yes	
	Mean	Mean	Mean	Difference
	(1)	(2)	(3)	(4)
Health attributes				
Grip strength	39.01	38.57	41.19	2.61***
Cognitive functioning	0.46	0.46	0.45	-0.02***
Subjective health	0.84	0.84	0.84	0.00
Depression	1.87	1.89	1.75	-0.14***
Ln(chronic diseases)	0.40	0.40	0.39	-0.00
Ln(nb doctor visits)	1.34	1.36	1.22	-0.14***
Hospital visits	0.10	0.10	0.09	-0.00
Socioeconomic attributes				
Retired	0.21	0.22	0.21	-0.01
Make-ends-meet with difficulty	0.21	0.20	0.25	0.05***
Married	0.76	0.76	0.78	0.02***
Social participation[a]	0.56	0.57	0.51	-0.05***
Age	58.44	58.18	59.77	1.59***
Female	0.49	0.51	0.37	-0.15***
Education				
None	0.02	0.02	0.02	0.00
Primary	0.22	0.21	0.26	0.05***
Secondary	0.37	0.38	0.33	-0.05***
Higher	0.39	0.39	0.39	-0.00
N	48,670	40,590	8,080	48,670
%	100	83.4	16.6	

Note: Columns (1) present the mean or proportion for the all sample. Columns (2) and (3) compute, respectively, the mean for individual who were self-employed (column (2)) and the mean for individual who were not self-employed (column (3)). Column (4) reports the test for equal means. ***Statistically significant at the 1% level; ** at the 5% level; * at the 10% level. [a] whether or not the individual is a member of any of the five activities (voluntary or charity work, training course, sport or social club, religious organisation, political or community organisation), disregarding which one. Source: SHARE.

and hospital stays and the ones of wage-earners. These first results confirm that there is a positive association between self-employment and health for grip strength, mental health and the number of doctor visits. Table 2 shows that the self-employed are more often men, older workers, more educated (from a primary school point of view) and married. Thus, there are several reasons to expect that the self-employed have a different health profile compared to that of wage-workers. However, does this difference remain when we take into account control variables (gender, education, etc.)? If so, this may be due to a selection process of healthier individuals in self-employment.

The self-employed may have specific attitudes and preferences. What remains unclear at this stage is whether the self-employed are healthier than salaried workers or do have specific preferences, including those regarding their own health. Hence, Ekelund et al. (2005) argue that risk aversion is a psychological factor which explains the choice to become self-employed. Beugelsdijk

and Noorderhaven (2005) empirically show that entrepreneurs are more individually oriented than the rest of the population. They are often characterised by an incentive structure based on individual responsibility and effort, and strong work ethics. We do not observe these kinds of characteristic in the SHARE data. However, individual characteristics which are constant over time (like motivation or perseverance) are taken into account in our first differences models. In addition, we cannot totally exclude that, to some extent, the health care consumption by self-employed may be determined by the magnitude of their health insurance coverage that could depend on national arrangements (Gruber and Poterba, 1994; Meer and Rosen, 2004). Finally, the low consumption of medical care could be due to their opportunity cost being made higher by a tight agenda (Hyytinen and Ruuskanen, 2007). The self-employed may not devote time to medical care since it is costlier in time and money compared to the wage earners. To test this assumption, we check the link between health and self-employment at retirement.

2 Empirical Strategy

First we conduct pooled regressions, which ignore the grouped structure of the data over time, to measure the link between health indicators and self-employment status:

$$y_{it} = \beta_0 + \beta_1 SE_{it} + X'_{it}\beta_2 + X'_i\beta_3 + \gamma_t + \mu_c + \varepsilon_{it} \tag{1}$$

where y_{it} refers to alternative outcomes like health indicators (grip strength, subjective health, depression, cognitive functioning, chronic diseases) or health care consumption (the number of doctor visits, hospitalization); the vectors X_i and X_{it} include, respectively, time-constant (gender, year of birth, education, country) and time-varying (retirement, married, social participation, make-ends-meet with difficulty) individual characteristics; γ_t wave dummy (time fixed effect), μ_c country fixed effect, SE_{it} is a binary dummy about self-employment and ε_{it} is an error term. Standard errors are clustered at the individual level.

Second, we use panel data models focusing on individual trajectories over time. In order to do so, we conduct First Difference (FD) regressions:

$$y_{it} - y_{it-1} = \beta_1(SE_{it} - SE_{it-1}) + (X'_{it} - X'_{it-1})\beta_2 + \gamma_t + (\varepsilon_{it} - \varepsilon_{it-1}) \tag{2}$$

The first differences models enable to capture time-constant individual heterogeneity, such as motivation or perseverance.[2] Standard errors are clustered at the individual level.

Finally, we address the possibility of health state dependence estimating dynamic panel models with the help of Arellano-Bond estimators (Arellano and Bond, 1991):

$$y_{it} - y_{it-1} = \delta_1(y_{it-1} - y_{it-2}) + \delta_2(SE_{it} - SE_{it-1}) + (X'_{it} - X'_{it-1})\delta_3 + (\eta_{it} - \eta_{it-1}) \qquad (3)$$

As stated above, reversed causality may be an issue in the identification of a causal effect. In the Arellano-Bond estimation, first differences are taken to eliminate fixed effects in a dynamic model , i.e. which includes lags of the dependant variables as covariates (see equation 3). It is possible to account for potential endogeneity issues associated with the occupational status for health and health care use, where instruments are given via change in SE status in the previous periods, and to fix the issue related to the so-called Nickell bias (Nickell, 1981). According to Arellano and Bond (1991), lagged observations of endogenous variables are good candidates to be used as instruments. Then, the longer lags of the variables are used as instruments for differenced lags of potentially endogeneous variables. The GMM estimator of Arellano-Bond assumes that (i) the first-differenced errors are first-order serially correlated for the idiosyncratic errors and independent and identically distributed (i.i.d.), but (ii) there is no-order serial correlation at an order higher than 1. If this last assumption holds, then all the lagged values are valid instruments. We use the two-step (GMM2) estimation method to account for potential heteroscedasticity, and we carry out a series of test to ensure the stability of the model: Arellano-Bond test for AR(1) and AR(2) in first differences. We present the Arellano Bond estimations in Appendix

3 Results

3.1 Potential Self-selection into Self-employment

Following Rietveld et al. (2015), we explore whether individuals have a higher level of health capital when they become self-employed as a result of a selection effect. A simple test of this

[2]The FD could give us numerically the same results as fixed effect models if $T = 2$. Yet, the assumptions between fixed effect and FD regressions are not exactly the same. When we conduct FE models, we assume that the error terms are uncorrelated over time : $cov(\epsilon_{it}, \epsilon_{it-1}) = 0$, whereas this is not the case in FD models : $cov(\Delta\eta_{it}, \Delta\eta_{it-1}) = cov(\eta_{it} - \eta_{it-1}, \eta_{it-1} - \eta_{it-2}) = -var(\eta_{it-1})$.

Table 3: OLS Models - Health and Healthcare Outcomes

	GS	CF	Subj. Health	Depress.	Chronic Diseases	Hosp.	Nb doctor Visits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SE	5.839***	0.030*	0.204***	-0.833***	-0.087	-0.055	-0.811***
	(1.227)	(0.016)	(0.056)	(0.267)	(0.076)	(0.041)	(0.130)
SE × Age	-0.082***	-0.000*	-0.003***	0.014***	0.001	0.001	0.011***
	(0.021)	(0.000)	(0.001)	(0.004)	(0.001)	(0.001)	(0.002)
Age	-0.331***	-0.002***	0.000	-0.024***	0.015***	0.002***	0.007***
	(0.011)	(0.000)	(0.001)	(0.003)	(0.001)	(0.000)	(0.001)
Retired	-0.589***	-0.008***	-0.075***	0.150***	0.057***	0.032***	0.181***
	(0.111)	(0.002)	(0.006)	(0.029)	(0.008)	(0.005)	(0.013)
Female	-18.707***	0.028***	-0.004	0.696***	-0.066***	-0.008***	0.155***
	(0.094)	(0.001)	(0.004)	(0.022)	(0.006)	(0.003)	(0.010)
R^2	0.652	0.251	0.058	0.093	0.058	0.012	0.080
N	48,670	48,670	48,670	48,670	48,670	48,670	48,670

Note: ***Statistically significant at the 1% level; ** at the 5% level; * at the 10% level. Controls: education, married, social participation, make-ends-meet with difficulty, time fixed effects and country fixed effects. Robust standard errors are clustered at the individual level. Source: SHARE.

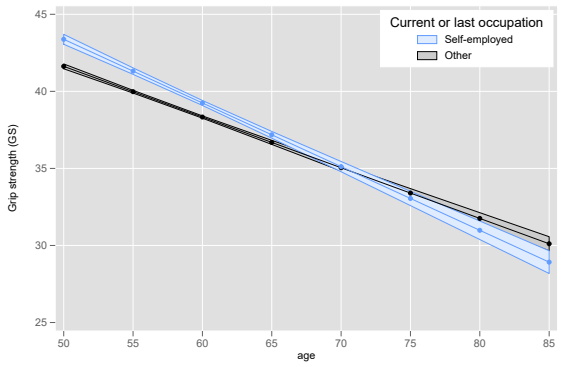
assumption compares health statuses between SE and salary workers for various age groups. Figure 1 shows the health evolution by age for self-employment (blue line) and other categories (dark line) with the help of data from the SHARE surveys used as pooled data. We show the marginal effect (and confidence intervals at 95%) at each age for equation (1), controlling by time constant individual characteristics (gender, age, education, country) and time varying individual characteristics. At younger ages, the self-employed have a higher level of grip strength compared to the others (see Figure 1a), as well as better cognitive functioning (Figure 1b) and subjective health (Figure 1c), and declare less frequently having chronic diseases (Figure 1d). However, the differences disappear and are even reversed at around 65 or 70 years of age. Conversely, the number of doctor visits (Figure 1e) and the probability of hospitalization (Figure 1f) are significantly less at younger ages for the self-employed compared to the others, but increase much more rapidly with age, in accordance with the expected deterioration in the health status with age (Hajek et al., 2018; Sirven and Rapp, 2017).

The net effect (estimation of Equation (1) with pooled data; see Table 3) indicates that being self-employed is associated with higher levels of grip strength (+5.8 points), significant at 1%. The results also show a positive and significant correlation of being self-employed with cognitive functioning and subjective health, a negative and significant correlation with depression and the number of doctor visits. Among the covariates considered in Equation 1, other than controls listed as a footnote of Table 3, we get, as expected, negative contributions

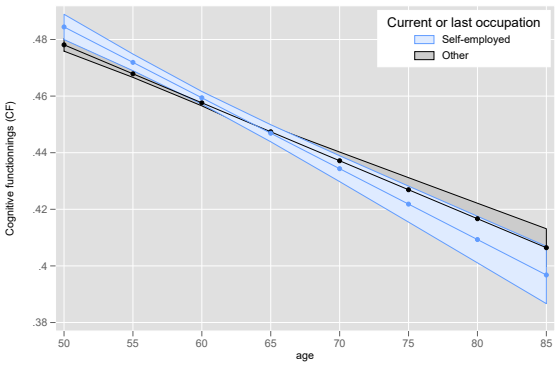
to health of being retired, female and aged. Interestingly, the negative effect of age is stronger for the self-employed on almost all the health measures, e.g. grip strength (-0.413 points for SE *versus* -0.331 per year of age), cognitive functioning, subjective health, depression and number of doctors visits, supporting a higher health deterioration for the self-employed (see Table A1 in Appendix for estimation of Equation (1) without the interaction effect between self-employed and age).

Figure 2 shows the health status by age for those who have never, occasionally and always been self-employed (respectively dark, blue and green lines). We used here the longitudinal dimension of SHARE to differentiate the situations of workers from the self-employed to the wage-earners through the consideration of the time devoted to self-employment. We also used retrospective life-history data from the SHARELIFE survey in a similar perspective over the life-cycle (Figure 3). We present the marginal effect at each age for equation (1), controlling by time varying individual characteristics in each Figure and, also regarding Figure 2, by time constant individual characteristics (gender, age, education, country). In Figures 2 and 3, the workers who were sometimes self-employed constitute an intermediate class between, respectively, those who constantly and those who never worked as self-employed, rendering the results shown in Figure 1 consistent. Due to fewer observations, 95% confidence intervals associated with parameters of occasional self-employed workers are wider than those for the self-employed and wage-earners. This implies that we cannot exclude that the various health outcome measures regarding the partial temporary self-employed are the same as those for the permanent self-employed and the permanent wage-earners. We observe the same downturn as in Figure 1 in both self-assessed measures of health status (grip strength in Figures 2a and 3a; cognitive functioning in Figures 2b and 3b) and hetero-assessed ones (subjective health in Figures 2c and 3c; chronic diseases in Figures 2d and 3d), in spite of a sharper increase in healthcare consumption (doctor visits in Figures 2e and 3e; hospitalizations in Figures 2f and 3f).

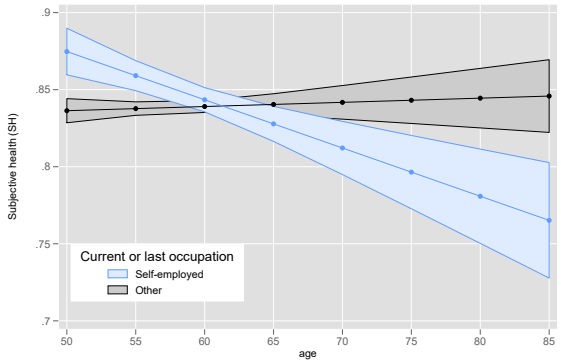
Overall, our results show that the self-employed are in better health than the wage-earners, especially at younger ages. Like a large number of outcomes, unrestricted to health (Kalwij and Vermeulen, 2008; Rietveld et al., 2015; Yoon and Bernell, 2013), but concerning also well-being in a much more general way (Andersson, 2008; Benz and Frey, 2008; Fuchs-Schündeln,



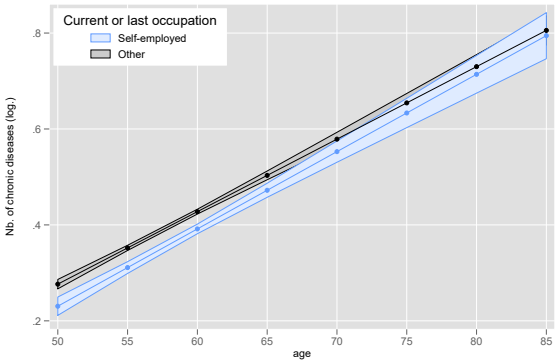
(a) Grip strength



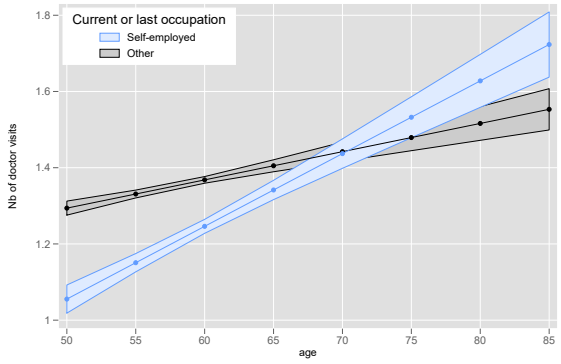
(b) Cognitive functioning



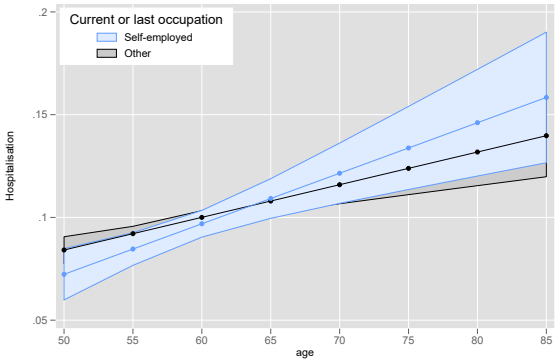
(c) Subjective health



(d) Chronic diseases



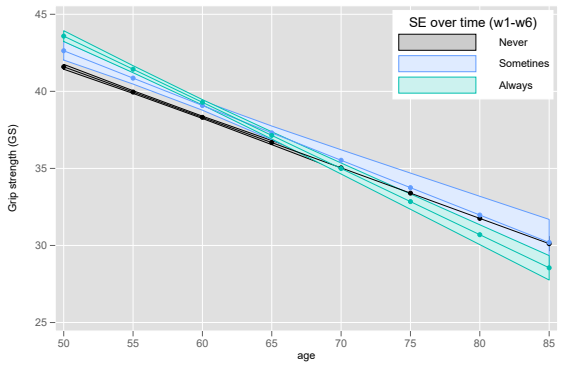
(e) Number of doctor visits



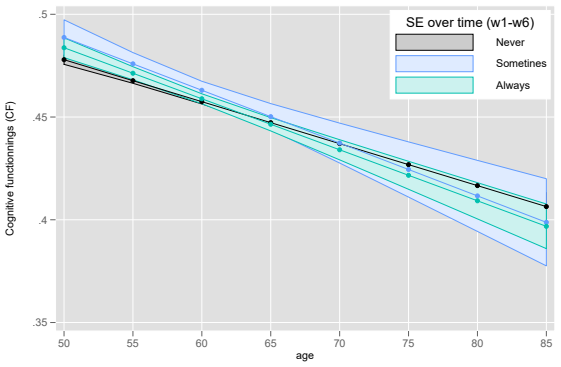
(f) Hospitalization

Figure 1: Self-employment Health per Age

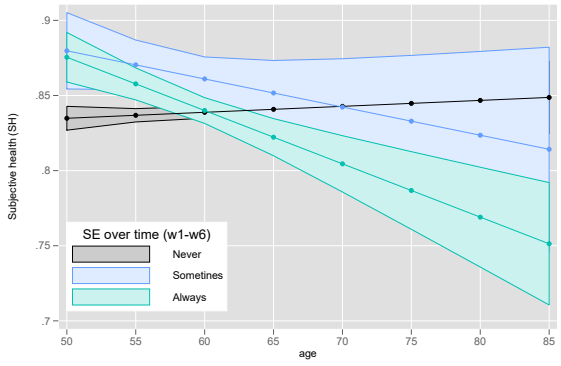
Note: Confidence Intervals at 95%



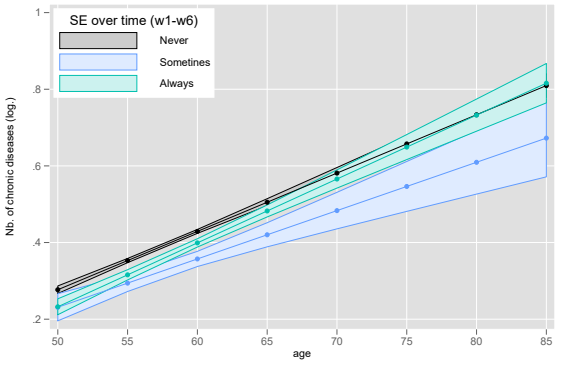
(a) Grip strength



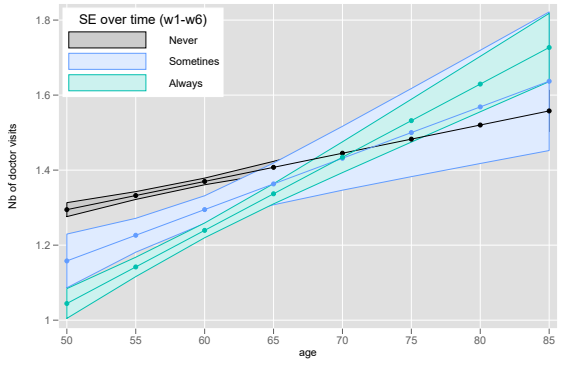
(b) Cognitive functioning



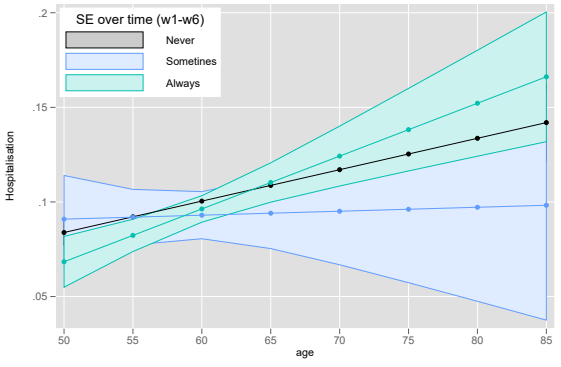
(c) Subjective health



(d) Chronic diseases

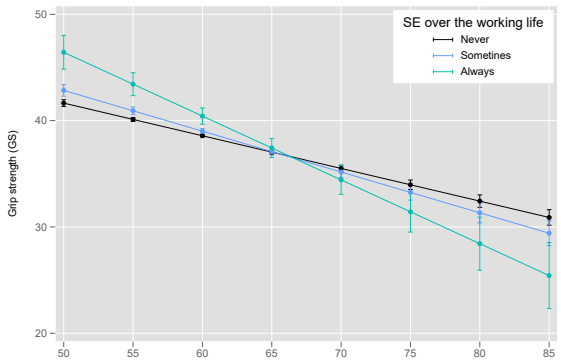


(e) Number of doctor visits

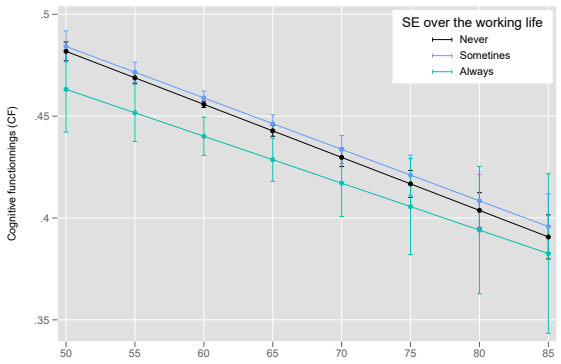


(f) Hospitalization

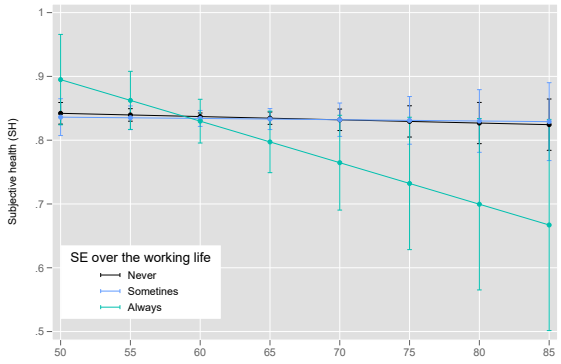
Figure 2: Self-employed Health per Age (distinguishing the time devoted to self-employment)
Note: Confidence Intervals at 95%



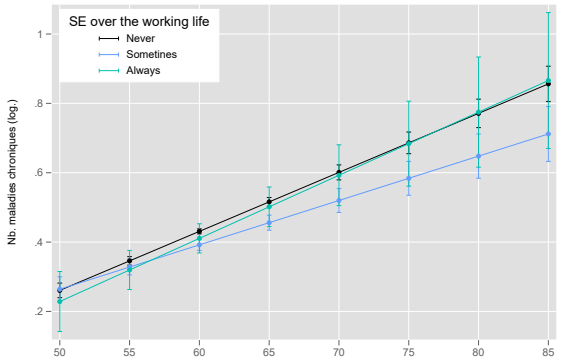
(a) Grip strength



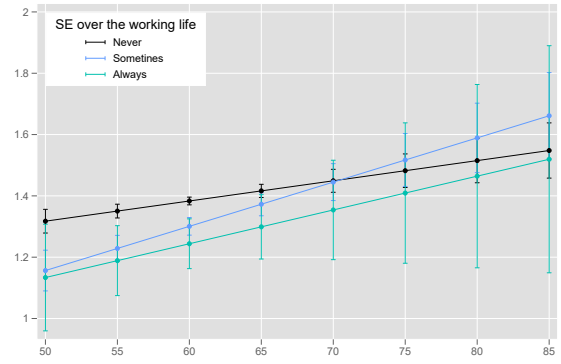
(b) Cognitive functioning



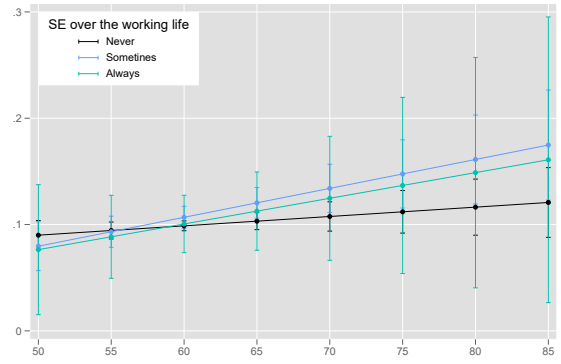
(c) Subjective health



(d) Chronic diseases



(e) Number of doctor visits



(f) Hospitalization

Figure 3: Self-employed Health per Age (distinguishing the time devoted to self-employment) SHARELIFE
Note: Confidence Intervals at 95%

2009) or earnings more particularly (Hamilton, 2000), one can legitimately question whether this result refers to a potential advantage of the self-employed from their occupation (what Rietveld et al. (2015) called the 'benefit effect'). This could be due to a self-selection mechanism whereby healthier people would adhere to self-employment, because of the higher demands from their occupation (the 'barrier effect' according to the same authors). We also found that self-employed experience similar or worse physical conditions at older ages. The use of panel models is required to test whether the change in health status difference between SE and salary workers over the years of age is essentially due to a selection effect, or a result of a faster depreciation of their health capital over time.

Our results also indicate striking differences in healthcare consumption, even after we controlled for various health measures. The initially low consumption of medical care during working life could be supported by a higher opportunity cost, explaining why the self-employed do not devote the time to medical care required by their health status. Thus, the larger increase in the healthcare consumption of the self-employed compared to the wage-earners is however not sufficient to make the numbers of doctor visits significantly differ between these two populations. From a life-cycle perspective, the trend is less clear, and may be due to the specific effect for the self-employed at retirement. To test this assumption, we shall check the link between health and self-employment at retirement (see Tables A2 and 5).

3.2 Greater Erosion of Health Capital over Time

The use of alternative estimation strategies based on panel data model estimations leads to negative overall contributions of self-employment to the objective physical health outcome (grip strength) suggesting a greater erosion of self-employed health capital over time. In the details, the estimation of the first differences model (see Table 4) shows that becoming self-employed or leaving the status of self-employed has a negative and statistically significant impact (equal to -0.532 point in the short run) on grip strength. We also find a positive impact of self-employment on the probability to be hospitalized, this probability increases by 3.4 percentage points. These effects are robust to Arellano Bond estimations (see Table A3), although the effect of SE on grip strength is less precise in this case ($p<0.1$). However, we do not find any comparable impact of being self-employed on cognitive functioning, subjective health, depression, chronic

diseases and the number of doctor visits (see Table 4). Contrary to grip strength, the subjective health is self-reported and may be either assessed differently by the self-employed and the wage-earners although based on the same health status (because of differential item functioning) or manipulated by the surveys respondents (Black et al., 2017; Lindeboom and Kerkhofs, 2009). The question is to know whether the response bias regarding this self-assessed health outcome is consistent and greater for the self-employed than for the wage-earners. In this respect, the absence of impact from SE status on subjective health and cognitive functioning would be due to the fact that the self-employed underestimate their actual health status compared to the wage-earners.

First differences models also indicate that, besides the occupational status (self-employed *versus* others) contribution to grip strength, switching to retirement is negatively correlated to grip strength. The self-selection process could have led people in the labor force to consider their health status before deciding to endorse self-employed occupations.[3] The switch by wage-earners, who first decided to retire, towards self-employment has been documented by a large number of contributions (see for instance Biehl et al. (2014); Moore and Mueller (2002); van Solinge (2014); Zissimopoulos and Karoly (2007)). Naturally, people may have moved to or from self-employment for reasons related to health issues (Zissimopoulos and Karoly, 2007), just as they could also have decided to retire for health reasons (Bound, 1991; Jones et al., 2010; McGarry, 2004), for instance after having experienced an adverse health event preventing them to continue to deal with the physical and mental job demands required by their self-employed occupation (Fuchs, 1982; Parker and Rougier, 2007; van den Bogaard et al., 2016) or because of the expected advantages of the health insurance scheme for the wage-earners compared to the one of self-employed (Holtz-Eakin et al., 1996; Moore and Mueller, 2002).

3.3 Higher Opportunity Cost of Healthcare

We check whether there is a higher opportunity cost in healthcare access and/or use for the self-employed. To test this hypothesis, we look at the interaction term between retirement and self-employment for our health outcomes and our two health consumption indicators (doctor visits and hospitalizations, see Table A2). The effect of self-employment on grip strength is

[3]One can question the potential endogeneity of the retirement decision with this health outcome in Equation (2).

Table 4: First Differences Models - Health and Healthcare Outcomes

	D.GS	D.CF	D.Subj. Health	D.Depress.	D.Chronic Diseases	D.Hosp.	D.Nb doctor Visits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
D.SE	-0.532**	-0.002	-0.010	0.105	-0.017	0.034**	0.008
	(0.253)	(0.004)	(0.014)	(0.079)	(0.015)	(0.014)	(0.036)
D.Retired	-0.551***	-0.004**	-0.019***	-0.005	0.015**	0.011	0.089***
	(0.102)	(0.002)	(0.007)	(0.033)	(0.007)	(0.007)	(0.015)
R^2	0.021	0.007	0.009	0.005	0.008	0.001	0.009
N	25,832	25,832	25,832	25,832	25,832	25,832	25,832

Note: ***Statistically significant at the 1% level; ** at the 5% level; * at the 10% level. Controls: married, social participation, make-ends-meet with difficulty, time fixed effects. Robust standard errors are clustered at the individual level. Source: SHARE.

Table 5: First Differences Models - Healthcare Outcomes - Intense versus Regular Restoration Effects

	D.Hospitalization			D.Doctor visits		
D.SE	0.034**	0.035**	0.035**	0.008	-0.000	0.003
	(0.014)	(0.014)	(0.014)	(0.036)	(0.036)	(0.035)
D.Retired	0.011	0.012	0.008	0.089***	0.074***	0.060***
	(0.007)	(0.008)	(0.007)	(0.015)	(0.016)	(0.016)
D.(SE × Retired)		-0.008	-0.011		0.078**	0.068**
		(0.015)	(0.015)		(0.035)	(0.033)
D.(Health Outcomes)			✓			✓
R^2	0.001	0.001	0.023	0.009	0.010	0.072
N	25,832	25,832	25,832	25,832	25,832	25,832

Note: ***Statistically significant at the 1% level; ** at the 5% level; * at the 10% level. Controls: married, social participation, make-ends-meet with difficulty, time fixed effects. Robust standard errors are clustered at the individual level. D.(Health Outcomes): first differences for each health outcomes (GS, CF, subjective health, depression, chronic diseases). Source: SHARE.

robust (-0.488 points).[4] The effect of retirement on the number of doctor visits seems to be stronger for people who change their status, between the self-employed and the employed. There is an additional effect due to retirement specific to self-employed, as a consequence of a change in the opportunity cost at retirement. After having postponed during their working life the health care they may have needed, the retired self-employed could then devote time to a regular health restoration effect combining the screening of health problems arising with age, and the follow-up with the primary care physician of chronic diseases diagnosed once retired.

We do not find the same effect regarding hospitalizations at the time of retirement for which the interaction term is not statistically significant whereas, interestingly, we find a positive effect between self-employment and hospitalisations, i.e. whether people have a hospital overnight over the last 12 months (see Table 5). This effect is robust to Arellano Bond estimations (see Table A4). Table A3 in Appendix shows the results of the Arellano-Bond estimations without the interaction term between self-employment and retirement.

Thus, the idea of a rise in hospital care consumption due to a sudden drop in the oppor-

[4]This effect is also robust to Arellano Bond estimations (see Table A4). The effect is significant at 10.5%.

Table 6: First Differences Models by Educational Level - Healthcare Outcomes - Intense versus Regular Restoration Effects

	D.Hospitalization			D.Doctor visits		
High educated individuals						
D.SE	0.035*	0.034*	0.035*	-0.025	-0.041	-0.036
	(0.019)	(0.019)	(0.019)	(0.056)	(0.057)	(0.053)
D.Retired	-0.003	-0.005	-0.007	0.088***	0.059**	0.051**
	(0.011)	(0.012)	(0.012)	(0.024)	(0.026)	(0.025)
D.(SE × Retired)		0.009	0.001		0.154***	0.129**
		(0.025)	(0.026)		(0.058)	(0.055)
D.(Health Outcomes)			✓			✓
R^2 0.001	0.001	0.024	0.012	0.012	0.074	
N	10,260	10,260	10,260	10,260	10,260	10,260
Less educated individuals						
D.SE	0.033*	0.035*	0.035*	0.031	0.027	0.030
	(0.020)	(0.020)	(0.020)	(0.046)	(0.047)	(0.046)
D.Retired	0.019**	0.022**	0.017*	0.089***	0.083***	0.066***
	(0.009)	(0.010)	(0.010)	(0.019)	(0.021)	(0.020)
D.(SE × Retired)		-0.018	-0.018		0.035	0.033
		(0.019)	(0.019)		(0.043)	(0.042)
D.(Health Outcomes)			✓			✓
R^2	0.002	0.002	0.025	0.009	0.009	0.072
N	15,572	15,572	15,572	15,572	15,572	15,572

Note: ***Statistically significant at the 1% level; ** at the 5% level; * at the 10% level. Controls: married, social participation, make-ends-meet with difficulty, time fixed effects. Robust standard errors are clustered at the individual level. D.(Health Outcomes): first differences for each health outcomes (GS, CF, subjective health, depression, chronic diseases). Source: SHARE.

tunity cost of care is not plausible, because the self-employed may have already used this care during their working lives, when they had serious health problems exceeding the skills or the resources of their primary care physicians. Interestingly, this health restoration effect during the working life can be explained by late care use, when the self-employed consumed inpatient care exclusively on serious diseases with no choice but hospitalization.

3.4 Heterogeneity of Effects between Educational Levels

Our results probably differ with the type of work. We approximate the skill levels of the work through the education level. We divide the population into two groups: high educated individuals (higher education) and less-educated (i.e. have none, primary or secondary education). The results of our estimations are shown in Table 6. The effect is virtually the same for high educated and less-educated individuals regarding the impact of self-employment on hospitalization during the career. The probability increases by 3.5 percentage points in the two groups (significant at 10%).[5] However, the regular restoration effect is stronger for high educated individuals, whereas it is non-significant for the less-educated. This may be explained by a

[5]There may be a lack of power, due to the sample division.

difference in health coverage between the two groups, or by a difference in opportunity cost, which is higher for the high educated individuals, who have higher earnings.

4 Conclusion

Using SHARE data in cross-sectional, longitudinal, and life-time perspectives, we found that self-employed workers in Europe are, on average, in better health than employees at younger ages. We also find evidence of a stronger depreciation of health capital over time for the self-employed, leading to weaker physical conditions at older ages, despite an increase in healthcare consumption after retirement. Our findings concur with previous research which establishes a selection effect in self-employment for healthier workers, the so-called barrier effect. Our findings also support the assumption that "if anything, engaging in self-employment is bad for one's health" (Rietveld et al., 2015).

We argue that the pejorative evolution of self-employed health status over time is to be found elsewhere than in time-invariant determinants, such as personality traits or the features of social protection systems. One cause could be a higher care opportunity cost, as self-employment requires more working hours, which, in turn, leads to neglecting health during working life, and a catch-up effect when self-employed workers retire. In support of this assumption, we found two distinct components of healthcare consumption associated with two distinct periods of the self-employed lives. First, an intense health restoration effect during their working life, i.e. a more frequent consumption of hospital stays, i.e. acute care for health needs that cannot be postponed or ignored. Second, a regular restoration effect, due to a decrease in the opportunity of care costs after retirement. Overall, the assumption of a greater opportunity of care costs during their working life has led the self-employed to mortgage their health capital.

This research questions the recent public policies supporting the development of self-employment based on its alleged beneficial effects on health. Further research is needed to replicate and expand this work beyond the specific population of older people in Europe. The last decades are witness to the uberization of society with the development of bogus or dependent forms of self-employment. This situation could place younger generations of self-employed workers in an even more precarious health and economic situation compared to the older generations.

References

Algava, É., C. Cavalin, and S. Célérier (2013): "The Remarkably Good Health of the Self-employed," *Travail et Emploi*, 55–70.

Anderson, N. D. and F. I. Craik (2000): "Memory in the aging brain," *The Oxford handbook of memory*, 411–425.

Andersson, P. (2008): "Happiness and health: Well-being among the self-employed," *The Journal of Socio-Economics*, 37, 213–236.

Arellano, M. and S. Bond (1991): "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *The Review of Economic Studies*, 58, 277–297.

Benz, M. and B. S. Frey (2008): "Being Independent Is a Great Thing: Subjective Evaluations of Self-Employment and Hierarchy," *Economica*, 75, 362–383.

Beugelsdijk, S. and N. Noorderhaven (2005): "Personality Characteristics of Self-Employed; An Empirical Study," *Small Business Economics*, 24, 159–167.

Biehl, A. M., T. Gurley-Calvez, and B. Hill (2014): "Self-employment of older Americans: do recessions matter?" *Small Business Economics*, 42, 297–309.

Black, N., D. W. Johnston, M. A. Shields, and A. Suziedelyte (2017): "Who provides inconsistent reports of their health status? The importance of age, cognitive ability and socioeconomic status," *Social Science & Medicine (1982)*, 191, 9–18.

Blanchflower, D. G. (2000): "Self-employment in OECD countries," *Labour Economics*, 7, 471–505.

Block, J., P. Sandner, and F. Spiegel (2015): "How Do Risk Attitudes Differ within the Group of Entrepreneurs? The Role of Motivation and Procedural Utility," *Journal of Small Business Management*, 53, 183–206.

Boaz, R. F. and C. F. Muller (1989): "Does having more time after retirement change the demand for physician services?" *Medical Care*, 27, 1–15.

Bohannon, R. W. (2008): "Hand-grip dynamometry predicts future outcomes in aging adults," *Journal of Geriatric Physical Therapy*, 31, 3–10.

Bologna, S. (2018): *The Rise of the European Self-Employed Workforce*, Milan-Udine: Mimesis International.

Bonsang, E. and T. J. Klein (2012): "Retirement and subjective well-being," *Journal of Economic Behavior & Organization*, 83, 311–329.

Börsch-Supan, A., M. Brandt, C. Hunkler, T. Kneip, J. Korbmacher, F. Malter, B. Schaan, S. Stuck, S. Zuber, and SHARE Central Coordination Team (2013): "Data Resource Profile: the Survey of Health, Ageing and Retirement in Europe (SHARE)," *International Journal of Epidemiology*, 42, 992–1001.

Bound, J. (1991): "Self-Reported Versus Objective Measures of Health in Retirement Models," *The Journal of Human Resources*, 26, 106–138.

Burtch, G., S. Carnahan, and B. N. Greenwood (2018): "Can You Gig It? An Empirical Examination of the Gig Economy and Entrepreneurial Activity," *Management Science*, 64, 5497–5520.

Caliendo, M., F. Fossen, and A. S. Kritikos (2014): "Personality characteristics and the decisions to become and stay self-employed," *Small Business Economics*, 42, 787–814.

Carree, M. A. and A. R. Thurik (2003): "The Impact of Entrepreneurship on Economic Growth," in *Handbook of Entrepreneurship Research: An Interdisciplinary Survey and Introduction*, Boston, MA, International Handbook Series on Entrepreneurship, 437–471.

Dolinsky, A. L. and R. K. Caputo (2003): "Health and female self-employment," *Journal of Small Business Management*, 41, 233–241.

Ekelund, J., E. Johansson, M.-R. Järvelin, and D. Lichtermann (2005): "Self-employment and risk aversion—evidence from psychological test data," *Labour Economics*, 12, 649–659.

European Commission (2010): "Self-employment in Europe," Tech. rep., European Commission, Brussels.

EUROSTAT (2020): "Self-employed persons," .

Fadlon, I. and T. H. Nielsen (2019): "Family Health Behaviors," *American Economic Review*, 109, 3162–3191.

Fondeville, N., E. Ozdemir, O. Lelkes, T. Ward, and E. Zolyomi (2015): "Recent changes in self-employment and entrepreneurship across the EU," Tech. Rep. 6/2015, European Commission, Brussels.

Fuchs, V. R. (1982): "Self-Employment and Labor Force Participation of Older Males," *The Journal of Human Resources*, 17, 339–357.

Fuchs-Schündeln, N. (2009): "On preferences for being self-employed," *Journal of Economic Behavior & Organization*, 71, 162–171.

Gevaert, J., D. D. Moortel, M. Wilkens, and C. Vanroelen (2018): "What's up with the self-employed? A cross-national perspective on the self-employed's work-related mental well-being," *SSM - Population Health*, 4, 317–326.

Goetz, S. J., D. A. Fleming, and A. Rupasingha (2012): "The Economic Impacts of Self-Employment," *Journal of Agricultural and Applied Economics*, 44, 315–321.

Gruber, J. and J. Poterba (1994): "Tax Incentives and the Decision to Purchase Health Insurance: Evidence from the Self-Employed," *The Quarterly Journal of Economics*, 109, 701–733.

Hajek, A., J.-O. Bock, K.-U. Saum, H. Matschinger, H. Brenner, B. Holleczek, W. E. Haefeli, D. Heider, and H.-H. König (2018): "Frailty and healthcare costs-longitudinal results of a prospective cohort study," *Age and Ageing*, 47, 233–241.

Hamilton, B. H. (2000): "Does Entrepreneurship Pay? An Empirical Analysis of the Returns to Self-Employment," *Journal of Political Economy*, 108, 604–631.

Herber, G.-C., M. Schipper, M. Koopmanschap, K. Proper, F. van der Lucht, H. Boshuizen, J. Polder, and E. Uiters (2020): "Health expenditure of employees versus self-employed individuals; a 5 year study," *Health Economics*.

Holtz-Eakin, D., J. R. Penrod, and H. S. Rosen (1996): "Health insurance and the supply of entrepreneurs," *Journal of Public Economics*, 62, 209–235.

Hyytinen, A. and O.-P. Ruuskanen (2007): "Time Use of the Self-Employed," *Kyklos*, 60, 105–122.

Jones, A. M., N. Rice, and J. Roberts (2010): "Sick of work or too sick to work? Evidence on self-reported health shocks and early retirement from the BHPS," *Economic Modelling*, 27, 866–880.

Jusot, F., S. Tubeuf, and A. Trannoy (2013): "Circumstances and efforts: how important is their correlation for the measurement of inequality of opportunity in health?" *Health Economics*, 22, 1470–1495, place: England.

Kalwij, A. and F. Vermeulen (2008): "Health and labour force participation of older people in Europe: what do objective health indicators add to the analysis?" *Health Economics*, 17, 619–638.

Koellinger, P. and R. Thurik (2009): "Entrepreneurship and the Business Cycle," SSRN Scholarly Paper ID 1403867, Social Science Research Network, Rochester, NY.

Lazear, E. P. (1986): "Chapter 5 Retirement from the labor force," in *Handbook of Labor Economics*, Elsevier, vol. 1, 305–355.

Lewin-Epstein, N. and E. Yuchtman-Yaar (1991): "Health risks of self-employment," *Work and Occupations*, 18, 291–312.

Lindeboom, M. and M. Kerkhofs (2009): "Health and work of the elderly: subjective health measures, reporting errors and endogeneity in the relationship between health and work," *Journal of Applied Econometrics*, 24, 1024–1046.

Lleras-Muney, A. (2005): "The Relationship between Education and Adult Mortality in the United States," *The Review of Economic Studies*, 72, 189–221.

Lucifora, C. and D. Vigani (2018): "Health care utilization at retirement: The role of the opportunity cost of time," *Health Economics*, 27, 2030–2050.

McGarry, K. (2004): "Health and Retirement: Do Changes in Health Affect Retirement Expectations?" *The Journal of Human Resources*, 39, 624–648.

Meer, J. and H. S. Rosen (2004): "Insurance and the utilization of medical services," *Social Science & Medicine (1982)*, 58, 1623–1632.

Moore, C. S. and R. E. Mueller (2002): "The transition from paid to self-employment in Canada: the importance of push factors," *Applied Economics*, 34, 791–801.

Nickell, S. (1981): "Biases in Dynamic Models with Fixed Effects," *Econometrica*, 49, 1417–1426, publisher: [Wiley, Econometric Society].

OECD and European Union (2019): *The Missing Entrepreneurs 2019 : Policies for Inclusive Entrepreneurship*, Paris, oecd ed.

Parker, S. C. and J. C. Rougier (2007): "The retirement behaviour of the self-employed in Britain," *Applied Economics*, 39.

Pfeifer, C. (2013): "Cyclical absenteeism among private sector, public sector and self-employed workers," *Health Economics*, 22, 366–370.

Prull, M. W., J. D. Gabrieli, and S. A. Bunge (2000): "Age-related changes in memory: A cognitive neuroscience perspective." .

Rabin, L. A., N. Paré, A. J. Saykin, M. J. Brown, H. A. Wishart, L. A. Flashman, and R. B. Santulli (2009): "Differential memory test sensitivity for diagnosing amnestic mild cognitive impairment and predicting conversion to Alzheimer's disease," *Aging, Neuropsychology, and Cognition*, 16, 357–376.

Ravesteijn, B., H. van Kippersluis, and E. van Doorslaer (2013): "The contribution of occupation to health inequality," *Research on economic inequality*, 21, 311–332.

Rietveld, C. A., H. van Kippersluis, and A. R. Thurik (2015): "Self-employment and Health: Barriers or Benefits?" *Health economics*, 24, 1302–1313.

Riphahn, R. T., A. Wambach, and A. Million (2003): "Incentive effects in the demand for health care: a bivariate panel count data estimation," *Journal of Applied Econometrics*, 18, 387–405.

Semenza, R. and F. Pichault (2019): *The challenges of Self-Employment in Europe. Status, Social Protection and Collective Representation.*

Sirven, N. and T. Rapp (2017): "The cost of frailty in France," *The European journal of health economics: HEPAC: health economics in prevention and care*, 18, 243–253.

Souchay, C., M. Isingrini, and L. Espagnet (2000): "Aging, episodic memory feeling-of-knowing, and frontal functioning." *Neuropsychology*, 14, 299.

Spasova, S., D. Bouget, D. Ghailani, and B. Vanhercke (2017): "Access to social protection for people working on non-standard contracts and as self-employed in Europe," Tech. rep., European Commission, Brussels.

Stephan, U. and U. Roesler (2010): "Health of entrepreneurs versus employees in a national representative sample," *Journal of Occupational and Organizational Psychology*, 83, 717–738.

Thornquist, A. (2015): "False Self-Employment and Other Precarious Forms of Employment in the Grey Area of the Labour Market," *International Journal of Comparative Labour Law and Industrial Relations*, 31, 411.

Toivonen, T. (1990): "The New Rise of Self-Employment and Industrial Structure," in *Organization Theory and Class Analysis*, Berlin, 315–341.

Torp, S., A. Paraponaris, E. Van Hoof, M.-L. Lindbohm, S. J. Tamminga, C. Alleaume, N. Van Campenhout, L. Sharp, and A. G. E. M. de Boer (2019): "Work-Related Outcomes in Self-Employed Cancer Survivors: A European Multi-country Study," *Journal of Occupational Rehabilitation*, 29, 361–374.

van den Bogaard, L., K. Henkens, and M. Kalmijn (2016): "Retirement as a Relief? The Role of Physical Job Demands and Psychological Job Stress for Effects of Retirement on Self-Rated Health," *European Sociological Review*, 32, 295–306.

van Solinge, H. (2014): "Who opts for self-employment after retirement? A longitudinal study in the Netherlands," *European Journal of Ageing*, 11, 261–272.

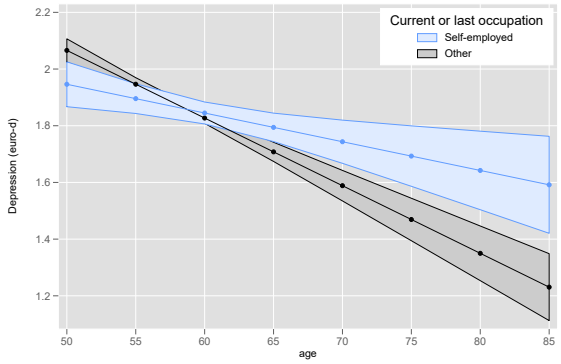
Vermeylen, G., M. Wilkens, I. Biletta, and A. Fromm (2017): "Exploring self-employment in the European Union," Tech. rep., Publications Office of the European Unio.

Williams, C. and F. Lapeyre (2017): "Dependent self-employment: Trends, challenges and policy responses in the EU," Working paper.

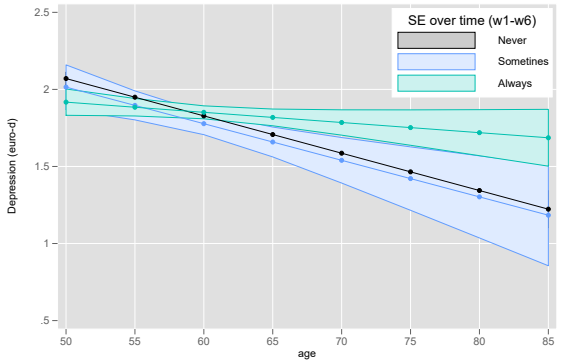
Yoon, J. and S. L. Bernell (2013): "The effect of self-employment on health, access to care, and health behavior," *Health*, 05, 2116–2127.

Zissimopoulos, J. M. and L. A. Karoly (2007): "Transitions to self-employment at older ages: The role of wealth, health, health insurance and other factors," *Labour Economics*, 14, 269–295.

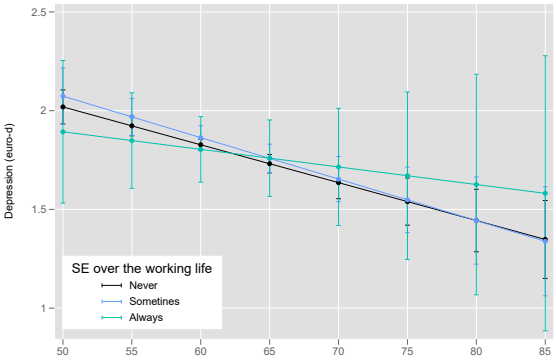
A Appendix



(a) SE health per age



(b) SE health per age (distinguishing the time devoted to self-employment)



(c) SHARELIFE

Figure A1: Depression

Note: Confidence Intervals at 95%

Table A1: OLS Models - Health and Healthcare Outcomes

	GS	CF	Subj. Health	Depress.	Chronic Diseases	Hosp.	Nb doctor Visits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SE	0.974***	0.002	0.006	0.011	-0.037***	-0.004	-0.130***
	(0.128)	(0.002)	(0.006)	(0.028)	(0.008)	(0.004)	(0.013)
Retired	-0.538***	-0.008***	-0.073***	0.141***	0.056***	0.032***	0.174***
	(0.110)	(0.002)	(0.006)	(0.029)	(0.008)	(0.005)	(0.013)
Female	-18.708***	0.028***	-0.004	0.697***	-0.066***	-0.008***	0.155***
	(0.094)	(0.001)	(0.004)	(0.022)	(0.006)	(0.003)	(0.010)
Age	-0.350***	-0.002***	-0.001	-0.021***	0.015***	0.002***	0.010***
	(0.010)	(0.000)	(0.000)	(0.002)	(0.001)	(0.000)	(0.001)
R^2	0.652	0.251	0.058	0.093	0.058	0.012	0.080
N	48,670	48,670	48,670	48,670	48,670	48,670	48,670

Note: ***Statistically significant at the 1% level; ** at the 5% level; * at the 10% level. Controls: education, married, social participation, make-ends-meet with difficulty, time fixed effects and country fixed effects. Robust standard errors are clustered at the individual level. Source: SHARE.

Table A2: First Differences Models - Health and Healthcare Outcomes

	D.GS	D.CF	D.Subj. Health	D.Depress.	D.Chronic Diseases	D.Hosp.	D.Nb doctor Visits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
D.SE	-0.488*	-0.002	-0.009	0.088	-0.017	0.035**	-0.001
	(0.255)	(0.004)	(0.014)	(0.079)	(0.015)	(0.014)	(0.036)
D.(SE × Retired)	-0.432*	-0.001	-0.017	0.185**	0.003	-0.008	0.077**
	(0.241)	(0.004)	(0.016)	(0.076)	(0.016)	(0.015)	(0.035)
D.Retired	-0.469***	-0.004**	-0.016**	-0.040	0.014*	0.012	0.074***
	(0.110)	(0.002)	(0.008)	(0.035)	(0.008)	(0.008)	(0.016)
R^2	0.021	0.007	0.009	0.005	0.008	0.001	0.010
N	25,832	25,832	25,832	25,832	25,832	25,832	25,832

Note: ***Statistically significant at the 1% level; ** at the 5% level; * at the 10% level. Controls: married, social participation, make-ends-meet with difficulty, time fixed effects. Robust standard errors are clustered at the individual level. Source: SHARE.

Table A3: Dynamic model (IV) - Arellano Bond estimations

	GS	CF	Subj. Health	Depress.	Chronic Diseases	Hosp.	Nb doctor Visits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SE	-0.740*	-0.006	-0.038*	0.258**	-0.015	0.056***	-0.020
	(0.387)	(0.005)	(0.021)	(0.122)	(0.025)	(0.021)	(0.057)
R	-0.500***	0.000	-0.005	-0.003	0.021**	0.001	0.097***
	(0.151)	(0.002)	(0.010)	(0.048)	(0.010)	(0.010)	(0.023)
L.GS	0.210***						
	(0.028)						
L.CF		0.038*					
		(0.021)					
L.SH			0.094***				
			(0.024)				
L.Dep.				0.092***			
				(0.020)			
L.CD					0.148***		
					(0.022)		
L.Hops.						0.067***	
						(0.016)	
L.NbDoc							0.137***
							(0.018)
N	11,883	11,883	11,883	11,883	11,883	11,883	11,883
Arellano-Bond test for zero autocorrelation in first-differenced errors[a]:							
Order 1							
(p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Order 2							
(p-value)	0.2651	0.1068	0.8661	0.1909	0.9358	0.2802	0.4616

Note: ***Statistically significant at the 1% level; ** at the 5% level; * at the 10% level. Controls: country fixed effect, education, married, social capital, make-ends-meet with difficulty. [a] When the idiosyncratic errors are independently and identically distributed (i.i.d.), the first-differences errors are first-order serially correlated. Our results show strong evidence against the null hypothesis of zero autocorrelation in the first-differenced errors at order 1. However, serial correlation in the first-differenced errors at an order higher than 1 implies that the moment conditions used by the Arellano-Bond estimator are not valid. Our results show no significant evidence of serial correlation in the first-differenced errors at order 2. Number of instruments : 14. We use lags from one on back y_{t-1} to create the GMM-type instruments described by Arellano-Bond, we use the first difference of all the exogenous variables as standard instruments and 2 lags for SE. Source: SHARE.

Table A4: Dynamic model (IV) - Arellano Bound Estimations

	GS	CF	Subj. Health	Depress.	Chronic Diseases	Hosp.	Nb doctor Visits
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SE	-0.636	-0.007	-0.036*	0.229*	-0.020	0.054**	-0.046
	(0.394)	(0.006)	(0.022)	(0.123)	(0.025)	(0.021)	(0.057)
SE × R	-0.528	0.002	-0.020	0.118	0.028	0.010	0.151***
	(0.355)	(0.005)	(0.023)	(0.106)	(0.024)	(0.022)	(0.055)
R	-0.407**	0.000	-0.002	-0.023	0.015	-0.001	0.070***
	(0.160)	(0.002)	(0.011)	(0.052)	(0.011)	(0.011)	(0.024)
L.GS	0.209***						
	(0.028)						
L.CF		0.038*					
		(0.021)					
L.SH			0.094***				
			(0.024)				
L.Dep.				0.092***			
				(0.020)			
L.CD					0.148***		
					(0.022)		
L.Hosp.						0.067***	
						(0.016)	
L.NbDoc							0.137***
							(0.018)
N	11,883	11,883	11,883	11,883	11,883	11,883	11,883
Arellano-Bond test for zero autocorrelation in first-differenced errors[a]:							
Order 1							
(p-value)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Order 2							
(p-value)	0.2806	0.1045	0.8766	0.1919	0.9248	0.2804	0.5356

Note: ***Statistically significant at the 1% level; ** at the 5% level; * at the 10% level. Controls: country fixed effect, education, married, social capital, make-ends-meet with difficulty. [a] When the idiosyncratic errors are independently and identically distributed (i.i.d.), the first-differenced errors are first-order serially correlated. Our results show strong evidence against the null hypothesis of zero autocorrelation in the first-differenced errors at order 1. However, serial correlation in the first-differenced errors at an order higher than 1 implies that the moment conditions used by the Arellano-Bond estimator are not valid. Our results show no significant evidence of serial correlation in the first-differenced errors at order 2. Number of instruments : 20. We use lags from one on back y_{t-1} to create the GMM-type instruments described by Arellano-Bond, we use the first difference of all the exogenous variables as standard instruments and 2 lags for SE. Source: SHARE.