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Conference Paper

Pension generosity and mental wellbeing: The effect of eradicating poverty at old-age

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Pension generosity and mental wellbeing: The effect of eradicating poverty at old-age

[redacted]

First draft: 01 March 2016

Abstract

This paper exploits a unique shift in pension generosity to study the effect of eradicating old-age poverty on mental health. Based on a difference-in-differences set-up we show with two independent data sets from Ukraine that greater pension generosity improves subjective well-being and reduces the incidence of diagnosed depressions. Neither more available leisure time, nor higher consumption levels, nor enhanced physical health can explain the empirical mental health improvement. Instead, we suggest that the main channel for the mental health improvement is the reduced reliance on potentially stressful modes of income generation at old age, such as family household transfers, indebtedness and unpaid bills.

Keywords: pension reform, poverty, income generation, stress, mental health

JEL codes: H55, I10, I38

[redacted]

1. *Introduction*

Old-age and retirement are often associated with a significant drop in disposable income, even in the rich world with its relatively well-developed system of old-age support. Matters are worse in developing and emerging countries which already now are home to most of the world's people over the age of 60. Here, pension coverage and replacement rates tend to be low and old-age poverty is often endemic (Schwarz, 2003). Against this background, the recent evidence on stress and negative mental well-being effects of poverty (WHO 2003, Lund et al. 2010) suggest that many elderly in developing and emerging countries may suffer from adverse mental health conditions as their incomes fall.

At the same time, retirement seems to be correlated with declining mental health (Midanik et al. 1995; Drentea 2002), either because retirement is a stressful event (Carp 1967) or because it is associated with loss of social networks and meaningful tasks (Bradford 1979).

Poverty contributes to chronic stress as it removes the poor's ability to cope with uncertainty and shocks. Consequently, psychologists have linked poverty alleviation to reductions in clinical stress and depression (Patel and Kleinman 2003). Yet, studies of the relationship between poverty and mental well-being have primarily relied on cross sectional data from rich countries.

This paper exploits an exogenous change in the generosity of the unusually simple old-age pension system to assess the questions whether and how the generosity of old-age benefits affects the elderly's mental well-being. The study is staged in Ukraine where the receipt of an old-age pension is not conditional on actual retirement, hence, allowing us to disentangle the income effect from any direct retirement effect on mental health. The analysed pension reform increased the legal minimum pension exactly to the level of the minimum consumer basket (or poverty line) as defined by the Ukrainian government. Strictly, the pension rise eliminated absolute poverty among the elderly from one day to the other. If pre-

reform poverty induced stress among pensioners, the pension increase should have improved mental health among those eligible for a pension.

Mental health has become a top medical priority, not just in developed economies; recently, the WHO set up a Mental Health Action Plan to foster awareness and fight discrimination and stigma around the globe. A cross-country survey conducted by the WHO in 18 countries between 2000 and 2005 showed the massive extent of mental disorders, but also highlighted that four out of five individuals with severe mental disorder symptoms receive no medical treatment in less developed countries (WHO World Mental Health Survey Consortium 2004). Ukraine is an interesting case as it features the second highest depression rate globally, following the USA (WHO World Mental Health Survey Consortium 2004).

Our study contributes to the literature in two ways: First, we study a pension policy that affected the entire population of an emerging economy, rather than a selected sub-population, like lottery winners (Lindahl 2003; Imbens, Rubin and Sacerdote, 2001; Gardner and Oswald 2007). We circumvent the potential endogeneity of income and mental well-being by exploiting a truly exogenous change in pension generosity. This adds to the existing literature on the *causal* effect of income on happiness (e.g., Jonathan Gardner and Oswald 2007; Frijters, John P. Haisken-DeNew, and Shields 2004a; Frijters, Haisken-DeNew, and Shields 2004b; Frijters et al. 2006). The unanticipated change in benefits was administered in a pension environment with an unusually plain benefit formula (eligibility de-facto only based on age, no retirement testing, no actuarial adjustment for postponing retirement, almost flat benefit). We combine results from two independent data sets to investigate the effect of the pension rise on different dimensions of mental well-being. The focus on an emerging economy is important as pension systems there have been recently introduced or expanded (e.g, China, Chile, Brazil, South Africa), often in an explicit attempt to alleviate poverty.[1]

[1] For health effects of crumbling pension systems see Jensen and Richter (2004).

Helpfully, the pension rise in Ukraine *de-facto* eliminated old-age poverty as the national legal minimum pension was raised to the national poverty line (i.e. the consumption basket deemed necessary to have an appropriate life). Further, our quasi-experimental setup affects current *income* rather than accrued pension *wealth* as in the study by De Grip, Lindeboom and Montizaan (2011) on the effect of reductions in future pension wealth on mental disorders, hence, allowing a much more immediate evaluation of whether money can improve people's wellbeing. Second, as a major novelty to the literature our paper sheds some light on the actual channel through which income generates well-being. For this analysis, we assume that individuals maximize utility which contains two arguments—consumption and leisure—subject to a budget constraint. Assume the budget constraint comprises earned income (from all different income sources such as labour earnings, interest, social benefits, pensions) as well as borrowed money. A pension rise will relax the budget constraint on earned income, but the utility gain could stem from (combinations of) three sources. Individuals could increase their consumption, enjoy more leisure and/or reduce their reliance on borrowed money. If borrowing money at old age involves disutility, e.g., because it implies financial dependency on children or others, more earned income could increase utility by allowing reductions in borrowing. In fact, growing evidence suggests that financial debts involve significant psychological costs (Brown, Taylor and Wheatley Price 2005; Bridges and Disney 2010).

We find that greater pension generosity improves subjective well-being and reduces the incidence of diagnosed depressions. Neither more available leisure time, nor higher consumption levels, nor enhanced physical health can explain the empirical mental health improvement. Instead, we suggest that the main channel for the mental health improvement is the reduced reliance on potentially stressful modes of income generation at old age, such as family household transfers, indebtedness and unpaid bills.

The remainder of this paper is a follows: Section 2 describes the background of the pension reform and the exogenous benefit variation. Section 3 provides information on the data sets and the methodology. Section 4 reports the main results and robustness checks. Section 5 discusses possible channels through which a boost to pensioners' income can improve their mental health, before section 6 concludes.

2. Background

2.1 Ukraine

The deep transition recession of the early 1990s let average life satisfaction in Ukraine plummet by international standards. This was mirrored in a high incidence of mental disorders (World Health Organization) and falling life expectancy. While the crisis lasted a full decade, GDP growth resumed in the 2000s, with average y-o-y growth above seven percent (2000-2007). Figure 1 depicts macro trends in GDP per capita and poverty rates (measured as population living below the governmental subsistence level) indexed to the year 2003: While GDP per capita rose by 37 percent between 2003 and 2007, the dramatic improvements in the living conditions of the population may be best captured by the drop in the poverty rate by 80 percent. In 2007, the official poverty rate in Ukraine was ten percent. Hence, Ukraine had managed to almost eliminate poverty within few years' time. Over the same observation period, average life satisfaction of the Ukrainian population improved substantially, almost in line with GDP growth. Notably, life satisfaction of the pension eligible elderly rose almost 40 percent stronger than for the population average. This paper investigates the contribution of an unusual generous pension reform to this speedy improvement in life satisfaction and mental health among the elderly.

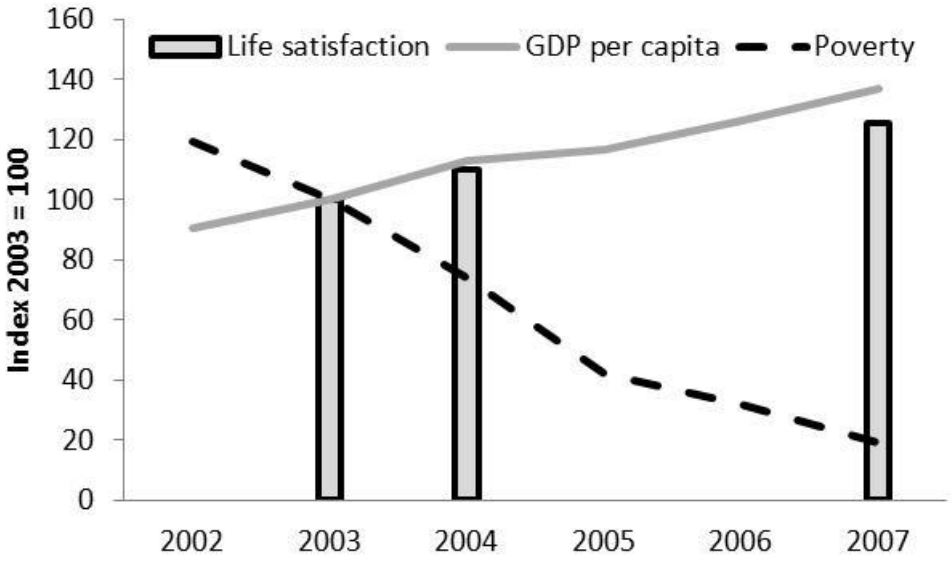

Fig. 1. *Indexed trend in life satisfaction, real GDP per capita and poverty (measured as population below subsistence minimum). Index = 100 for the year 2003.*
Source. Ukrstat and ULMS (for life satisfaction) 2002-7.

2.2 Pension system and reform

The Ukrainian old-age pension system of the early 2000s was unusually simple: With pension eligibility de-facto exclusively based on age, women qualified from age 55 and men from age 60.[2] The receipt of pension benefits was (and still is) not dependent on actual retirement from the workforce. Furthermore, pension benefits were almost uniform across the country due to narrowly binding benefit floors and caps (Danzer 2013). In effect, almost all Ukrainians received the same income supplement upon reaching pension age. This pension benefit was rather low in the early 2000s, just replacing 27% of average monthly earnings. As a consequence, individuals reported declines in satisfaction with life over retirement. Due to insufficient pensions, many elderly were forced to take up precarious jobs after having left their original jobs (Lipsitz 2005) or to rely on inter-household transfers.

[2] Pension eligibility is also conditional on women (men) having worked for 20 (25) years. As a consequence of the Soviet full-employment policy, more than 98% of men and women in our sample fulfil this rule upon reaching the pension age.

Yet, as a strategic 'voting gift' during the contested election campaign in September 2004, the Ukrainian president enacted a surprising rise in the legal minimum pension which became aligned to the minimum consumption basket defined by the government (basically, Ukraine's poverty line), now replacing 74% of monthly earnings (Figure 2). This policy change led to a de-fact eradication of absolute poverty among the elderly (if applied to the individual level). Despite having manipulated only the benefit floor, the rise was strong enough to shift the entire distribution of old-age benefits, with four out of five pensioners receiving exactly the legal minimum pension (Figure A-1 in the appendix). The truly exogenous policy was announced with immediate effect from September 2004 (for details, see Danzer 2013). It was financed by privatization revenues and did not lead to a simultaneous change in tax rates or social security contributions.

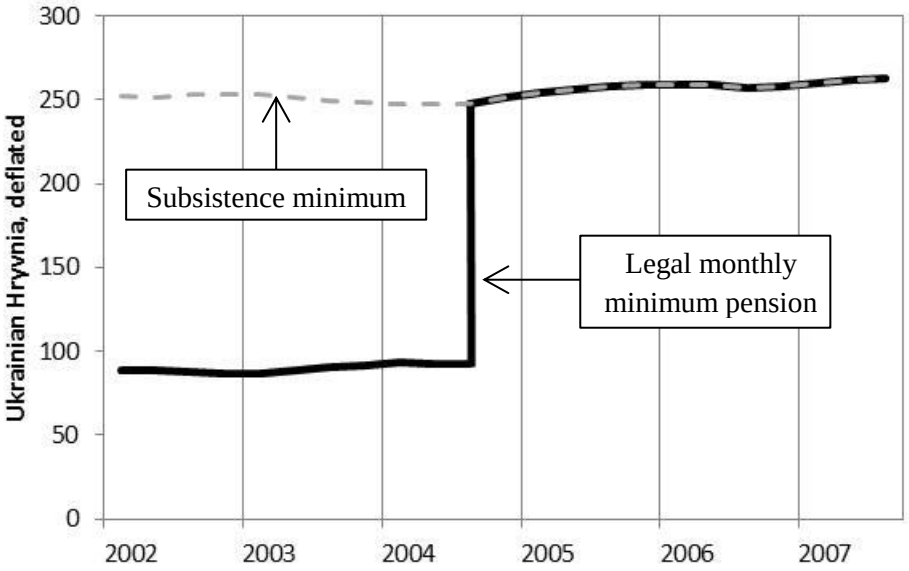

Fig. 2. *The Legal Monthly Minimum Pension over Time*

Note. The reported values are deflated 2002 Ukrainian Hryvnia (UAH). CPI correction based on four-monthly smoothed CPIs. *Source.* Cabinet of Ministers, Ukraine, own calculations.

3. Data and Methodology

3.1 Data

To examine the mental health effect of an exogenous change in benefit generosity, we use two separate data sets. First, we exploit three waves of the nationally representative Ukrainian Longitudinal Monitoring Survey (ULMS). This high quality panel data set has been collected by the Kiev International Institute of Sociology in collaboration with an international consortium in three years 2003, 2004 and 2007 (Lehmann, Muravyev and Zimmermann, 2012). The survey covers individuals aged 15 to 72 with an initial sample size of more than 8,000 respondents. As the vast majority of data collection took place in early summer (May to July), the panel comprises two waves prior to and one wave after the pension increase.[3]

Second, we complement these data with several cross sections (2003-2007) of the nationally representative Ukrainian Household Budget Survey (UHBS) by the State Statistics Committee of Ukraine. The data set collects annual information on 25,000 individuals in December. We use two years prior and three year after the pension rise. The UHBS includes a rich set of individual and household characteristics, information on employment, income, living space and, importantly, physical and mental health.

The sample for the main analysis includes individuals around the age threshold for pension eligibility: women aged 52-58 and men aged 57-63.[4] Individuals who lack information on some of the demographic, work status or household variables are removed from the sample. The main dependent variables in the analysis are the ordinal measure of self-reported life satisfaction, satisfaction with health, and a dummy indicating recent health problems (in the ULMS) as well as dummies for seven mental or somatic health conditions

[3] Table D2 in the Appendix shows that the two data sets UHBS and ULMS compare well according to demographic characteristics of the respondents.
[4] The results are robust to the use of other age ranges around the pension age threshold.

which have been diagnosed by a physician (depression, heart disease, hypertension, bronchitis, osteoporosis, arthritis, diabetes; in the UHBS). Life satisfaction is an easily implementable survey instrument suitable for assessing general mental health (Headey et al. 1993) or clinical depression in particular (Gargiulo and Stokes 2009)

Among the independent variables, the main interest rests on the indicator of pension eligibility, which is based exclusively on the age criterion. Important control variables include individual characteristics (gender, birth year dummies, 5-year age splines, marital status, years of schooling), household characteristics (household size, the presence of children up to age seventeen, income generated from all other non-pension eligible household members and living space) as well as settlement type (city, town or village) and region fixed effects.[5]

3.2 Identification

The identification strategy closely follows Danzer (2013) who assesses the elderly's labor supply responses to the pension increase in a difference-in-differences set-up:

$$y_{it} = \beta_0 + P_{it}\beta_1 + d_{it}\beta_2 + (P_{it} \times d_{it})\beta_3 + X_{it}\beta' + u_{it} \qquad (1)$$

where *y* indicates life satisfaction or health outcomes, *P* indicates pension eligibility, *d* indicates a dummy for the post-treatment period (the year 2007 for ULMS and 2005-2006 for UHBS) and *X* indicates individual, household and regional covariates. The coefficient of interest is $\beta_3$which should be positive if income had a positive impact on life satisfaction and mental health.

The ULMS panel allows eliminating time-invariant unobservable characteristics by estimating the following fixed effects regression

[5] Alternative age specifications (linear, quadratic) yield very similar results.

$$y_{it} = \beta_0 + P_{it}\beta_1 + d_{it}\beta_2 + (P_{it} \times d_{it})\beta_3 + X_{it}\beta' + a_i + u_{it} \quad (2)$$

To yield more general estimates of the mental health reaction to income changes than the policy-specific estimates of equations (1) and (2), we estimate the income elasticity of wellbeing (equation (3)). Therefore we compute the total personal income of an individual and instrument it with the appropriate *(P × d)* interaction in the first stage equation (4).

$$y_{it} = \beta_0 + \log inc_{it}\beta_1 + X_{it}\beta' + u_{it} \quad (3)$$

$$\log inc_{it} = \gamma_0 + P_{it}\gamma_1 + d_{it}\gamma_2 + (P_{it} \times d_{it})\gamma_3 + X_{it}\gamma' + \varepsilon_{it} \quad (4)$$

The instrument is relevant as suggested by the large first stage t-statistic (>11) and F-statistic (124). In order to be a valid instrument, the "pension aged × post" interaction can influence life satisfaction only though its effect on income. It is quite implausible that, conditional on covariates, the purely financial change in pension generosity should have a non-monetary effect on individual well-being *only* on those in pension age. We will address the only plausible threat to our instrument below.

4. Results

4.1 Life satisfaction

In the years before the pension reform, mental wellbeing dropped significantly when individuals reached official pension age, equal to 0.2 well-being points or five percent of the well-being scale (Figure 3; left). This gap disappears entirely with the payment of higher pension benefits following the year 2004. The simple visualization of raw differences in Figure 3 illustrates this main result while also confirming the secular trend in life satisfaction described earlier. The same conclusion can be drawn once we focus on the incidence of diagnosed depression (as a more objective measure of mental health). While the depression

rate among the pension eligible was more than twice as large compared to the not-yet eligible before the pension reform (Figure 3; right), this gap shrunk significantly after the reform.

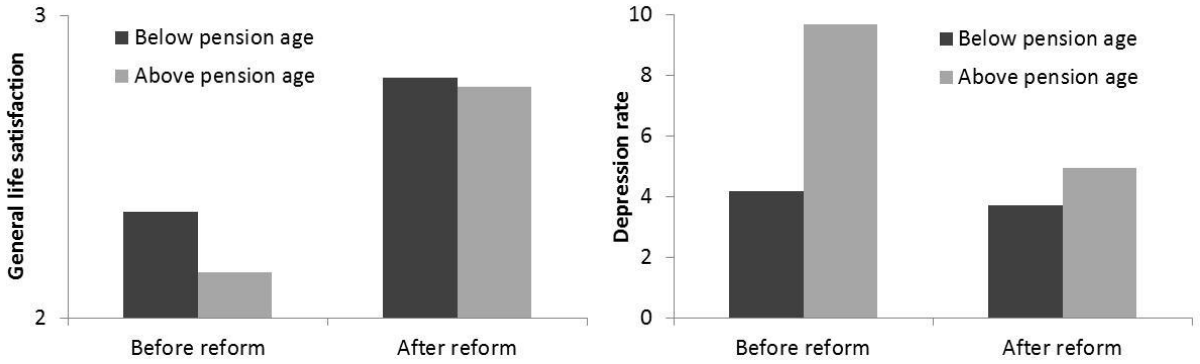

Fig. 3. *General life satisfaction and depression by age and reform period*
Note. General life satisfaction is measured on a scale from 1 to 5. The period before the reform comprises the survey years 2003 and 2004. The life satisfaction drop at official pension age is about the same in both of these years.
Source. ULMS (life satisfaction) and UHBS (depression) 2002-7.

Table 1 shows estimation results for the effect of the pension reform on life satisfaction. The estimated treatment effect of equation (1) in Table 1 (0.227 in life satisfaction units; column 1) is remarkably close to the raw difference-in-differences estimate in life satisfaction in Figure 3 ([2.35 – 2.15] – [2.79 – 2.77] = 0.18). This suggests that the inclusion of detailed individual, household and place of residence controls hardly affects the estimate of interest, hence supporting the identifying assumption that older individuals were allocated to treatment and control group as good as randomly.[6] The remaining correlates of life satisfaction in column (1) are in line with expectations: The entry into pension age is associated with a drop in life satisfaction (which, however, becomes insignificant after controlling for birth cohort and age group effects), while men, better educated individuals and respondents from richer households score higher in terms of life satisfaction. The prevalence of a chronic disease is associated with a significant drop in life satisfaction of about one fifth

[6] More than 60% of the difference between the estimation with and without controls stems from the inclusion of the covariats gender, age and settlement type. Adding household size to the estimation explains 84% of the gap.

of a standard deviation. In effect, the life satisfaction gain from the pension rise is in the same order of magnitude to offset the well-being drop from chronic diseases. Note, that the estimated effect is probably conservative since the sudden pension rise also changed the prospective pension benefits of those below pension age. Hence, forward looking agents theoretically gain greater freedom to choose their optimal retirement date.

Also included in Table 1 are results for the FE and 2SLS estimations of equations (2) and (3). The treatment effect does not change once we account for time-invariant unobserved heterogeneity (such as, for instance, the way different respondents assess their subjective well-being) in the fixed-effects estimation. The remaining columns of the table use the treatment interaction as instrument in the first stage (column 3) to produce 2SLS estimates of the life satisfaction effect of log income (column 4). The estimated causal effect of income on life-satisfaction is sizeable: A ten percent increase in personal income leads to an improvement of subjective well-being by 12 percent of a standard deviation. Hence, income affects life satisfaction almost twice as strongly as assumed by a simple FE estimation with endogenously determined income (column 5).

Table 1: Pension reform and life satisfaction

	(1) Life satisfaction	(2) Life satisfaction	(3) Log personal income	(4) Life satisfaction	(5) Life satisfaction
	OLS	FE	First stage	FE-2SLS	FE
Pension aged × post	0.190**	0.206**	0.156***		
	(0.076)	(0.093)	(0.014)		
Log personal income				1.401**	0.694***
				(0.634)	(0.103)
Pension aged	-0.081	-0.144	-0.724***	0.798**	0.364***
	(0.076)	(0.110)	(0.018)	(0.403)	(0.121)
Post	0.071	0.063	0.573***	-0.714*	-0.249***
	(0.068)	(0.082)	(0.012)	(0.421)	(0.083)
Male	0.075**		0.191***		
	(0.036)		(0.009)		
Age cat 3	0.240***	-0.759***	0.049***	-0.385	-0.624***
	(0.086)	(0.225)	(0.013)	(0.308)	(0.222)
Age cat 4	0.433***	-0.402**	0.111***	-0.128	-0.337**
	(0.128)	(0.177)	(0.022)	(0.250)	(0.167)
Age cat 5	0.552***	-0.205	0.156***	-0.008	-0.159
	(0.158)	(0.134)	(0.026)	(0.185)	(0.127)
Years of schooling	0.044***	0.064**	0.057***	-0.025	0.019
	(0.005)	(0.032)	(0.001)	(0.051)	(0.032)
Married	0.044	0.011	-0.016**	0.068	0.039
	(0.036)	(0.078)	(0.007)	(0.083)	(0.078)
Chronic	-0.216***	-0.181***	0.002	-0.172***	-0.176***
	(0.026)	(0.037)	(0.005)	(0.037)	(0.037)
Log income	0.127***	0.053**	0.012***	0.026	0.038*
(other HH members)	(0.017)	(0.021)	(0.003)	(0.024)	(0.021)
Corresponding $\widehat{\beta_3}$ in life satisfaction units	0.227**	0.247**			
	(0.092)	(0.112)			
Observations	4,927	4,927	4,927	4,927	4,927
R-squared	0.155	0.091	0.891	0.089	0.104
F-test			124.0		

Note. Life satisfaction is normalized with mean zero and standard deviation of one. All regressions control for birth year fixed effects, household size, the presence of children up to age 17 in the household, settlement type dummies and region (oblast) fixed effects. Robust standard errors clustered at individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. *Source*. ULMS 2003-7.

Very similar conclusions can be drawn when examining the effect of the policy change on diagnosed mental health problems (depression or chronic stress) in our second data set, the UHBS. According to Table 2, the incidence of chronic mental disorders fell by one seventh of a standard deviation due to the pension rise. Interestingly, no comparable effect can be established for a set of normalized chronic physical health conditions (with estimates being very close to zero; columns (2) to (7)). This is in line with further evidence from the ULMS, which shows no effect of pension income on chronic diseases, but some positive effects on subjective health measures (Table A-1 in Appendix).[7] It seems like money improved well-being in general and mental health (through lower stress) in particular, as suggested by the literature on the poverty-mental health nexus. Physical health is not the channel through which the improvement of pensioners' well-being operates.[8]

[7] We run OLS and fixed-effects regression similar to equations (1) and (2) with four health measures as outcome variables: a dummy indicating subjectively reported bad health, self-assessed health status (normalized version of a variable with scale 1-4), a dummy for whether the respondent reports a health problem during the past three months, and a dummy for whether a person suffered from one out of seven chronic somatic diseases. The original questions read: "Have you in the last three months had any health problems?" (Answer options yes/no) and "Do you have any kind of chronic illness?" (Multiple answers allowed: heart disease, illness of the lungs, liver disease, kidney disease, gastrointestinal disease, spinal problems, other chronic illnesses).

[8] Regressions similar to the ones in Table 1, columns (1) and (2) which control for the chronic and health problem dummies as well as self-assessed health reduce the treatment effect by no more than 6%.

Table 2: The effect of the pension rise on diagnosed health conditions

	(1) Depression or chronic stress	(2) Heart disease	(3) Hyper-tension	(4) Bronchitis	(5) Osteo-porosis	(6) Arthritis	(7) Diabetes	(8) Doctor visit past 12 months
Pension aged × post	-0.159**	-0.035	-0.001	0.001	-0.052	-0.009	0.087	0.008
	(0.074)	(0.064)	(0.068)	(0.072)	(0.079)	(0.072)	(0.081)	(0.028)
Pension aged	0.048	0.121*	0.104	0.013	-0.051	0.100	-0.048	-0.015
	(0.066)	(0.063)	(0.066)	(0.076)	(0.079)	(0.073)	(0.081)	(0.029)
Post	0.055	0.019	0.083*	-0.066	0.002	0.043	-0.085	-0.010
	(0.036)	(0.043)	(0.047)	(0.047)	(0.051)	(0.049)	(0.053)	(0.019)
Female	0.063	0.009	0.285***	-0.134**	0.108*	-0.007	-0.000	0.097***
	(0.050)	(0.048)	(0.051)	(0.061)	(0.057)	(0.056)	(0.058)	(0.023)
Married	-0.062**	-0.011	-0.021	-0.046	0.044	-0.046	0.077***	0.005
	(0.029)	(0.027)	(0.029)	(0.031)	(0.028)	(0.031)	(0.027)	(0.012)
Years of schooling	0.004	-0.003	-0.006	-0.009	0.019**	0.010	-0.013	0.012***
	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.004)
Retired	0.087***	0.169***	0.173***	0.022	0.031	0.012	0.133***	-0.042***
	(0.028)	(0.029)	(0.033)	(0.030)	(0.030)	(0.032)	(0.035)	(0.012)
Doctor visit past 12 months	0.049***	0.450***	0.510***	0.189***	0.163***	0.295***	0.209***	
	(0.018)	(0.018)	(0.020)	(0.021)	(0.019)	(0.021)	(0.019)	
Observations	11,076	11,076	11,076	11,076	11,076	11,076	11,076	11,076
R-squared	0.014	0.063	0.088	0.016	0.017	0.029	0.016	0.104

Note: Dependent variables except for column (8) are normalized with mean zero and standard deviation of one. Dependent variable of column (8) is a dummy indicating whether an individual visited a doctor at least once in the past year. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Source: UHBS 2003-7.

4.2 Robustness

Having established the positive effect of the pension rise on life satisfaction, we turn to a caveat of our analysis: Is the wellbeing improvement a consequence of additional income or of additional leisure? The rise in Ukrainian pension generosity intensified the retreat from the labour force among the elderly, although the income semi-elasticities of retirement were overall modest (+0.1 to +0.2 according to Danzer 2013). Still, if pensioners became happier simply because they could now afford to retire, the effect of income could be disputed and our instrument might be invalid. We address this concern in three steps: First, we re-run our original estimations of Table 1, now controlling for retirement status or the log of annual working hours (plus one). The significant and positive OLS and FE estimates of the treatment effect are not affected by this modification (Table 3). At the same time, the coefficient on retirement status is negative and that on working hours is positive and highly significant, suggesting that Ukrainians are actually satisfied with working and with longer working hours. In short, more leisure does not improve the well-being of Ukrainian pensioners. This result unambiguously suggests that retirement is not considered a relief from work stress, but rather seen as loss of identity or social networks. Second, we run horserace regressions of life satisfaction with income and working hours and again find that working hours are wrongly signed to justify a leisure story. If anything the increased retirement as a consequence of the pension rise works against the income effect on life satisfaction. Third, we exploit a peculiar finding by Danzer (2013) who finds that pensioners with more than 13 years of schooling did not change their retirement behaviour as a consequence of the pension rise. For the better educated with their relative high earnings the change in pension benefits makes a comparatively small contribution to overall incomes. As a consequence, the entire retirement effect is concentrated among those with at most 13 years of education. Hence, we split our sample in two educational groups and construct a triple differences estimator to assess whether these two groups exhibit different changes in life satisfaction after the pension rise.

The last two columns of Table 3 clearly show that this is not the case: Both groups experience higher well-being after the reform and the effects are not significantly different from each other. Hence, the rise in life satisfaction cannot be explained by increased leisure.

As second robustness check, we test whether the 'Orange Revolution', which took place following the election in December 2004, could explain the estimated well-being effect. The 'Orange Revolution' erupted over claims of election fraud on the side of the Russian-backed presidential incumbent. Consequently, the 'Revolution' which had supposedly overthrown the political establishment could have lifted the wellbeing of Ukrainians. Three counterarguments suggest that this claim is not justified: First, it is unlikely that a political revolution benefits the mental well-being of pensioners only—while those slightly younger do not experience the respective ups in mental health. Second, the 'Orange Revolution' has been described as a struggle of the Ukrainian-speaking West of the country against the Russian-speaking East.[9] This can hardly be reconciled with the empirical finding that the treatment effect of higher pensions led to greater satisfaction with life in both East and West. Third, we also find that the well-being effect still persists in 2007, almost three years after the 'Orange Revolution' and at times, when the political system in Ukraine underwent a political reversal.

Finally, we show two falsification exercises which rule out the possibility that similar results are obtained at "artificial pension ages" as well as alternative "artificial reform dates" (Table 4). We define the artificial pension age at 45 for women and 50 for men and re-estimate equations (1) and (2) with a sample comprising six years around these thresholds. The falsification treatment effect is basically zero and insignificant in both OLS and FE estimations. Also, assuming a discontinuous pension rise between 2003 and 2004 and repeating our estimation with a sample of only these two years yields insignificant treatment effects very close to zero. Hence, our estimates do clearly not reflect secular trends.

[9] Results available on request.

Table 3: The role of income vs. leisure for life satisfaction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable				***Life satisfaction***				
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
Pension aged × post	0.194**	0.212**	0.192**	0.211**				
	(0.076)	(0.093)	(0.075)	(0.093)				
Retired (0/1)	-0.264***	-0.172***						
	(0.033)	(0.056)						
Log(1+annual working hrs)			0.036***	0.023***	0.035***	0.018**		
			(0.004)	(0.008)	(0.004)	(0.008)		
Log personal income					0.224***	0.671***		
					(0.068)	(0.103)		
Pension aged × post × below 14 years of schooling							0.186**	0.194**
							(0.077)	(0.094)
Pension aged × post × above 14 years of schooling							0.196*	0.264**
							(0.101)	(0.117)
Pension aged	-0.023	-0.098	-0.020	-0.099	0.196**	0.387***	-0.077	-0.145
	(0.077)	(0.111)	(0.077)	(0.111)	(0.081)	(0.121)	(0.077)	(0.110)
Post	0.073	0.063	0.075	0.064	0.053	-0.229***	0.069	0.063
	(0.067)	(0.082)	(0.067)	(0.082)	(0.063)	(0.084)	(0.068)	(0.082)
Observations	4,927	4,927	4,927	4,927	4,927	4,927	4,927	4,927
R-squared	0.166	0.094	0.167	0.094	0.168	0.105	0.154	0.090

Note. Life satisfaction is normalized with mean zero and standard deviation of one. All regressions control for birth year fixed effects, household size, the presence of children up to age 17 in the household, settlement type dummies and region (oblast) fixed effects. Robust standard errors clustered at individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source. ULMS 2003-7.

Table 4: Falsification exercises: Pension reform and life satisfaction

	(1) Life satisfaction	(2) Life satisfaction	(3) Life satisfaction	(4) Life satisfaction
Control experiment	Artificial pension age (w: 45, m: 50)	Artificial pension age (w: 45, m: 50)	Artificial reform date (January 2004)	Artificial reform date (January 2004)
Sample	±6 years around artificial pension age	±6 years around artificial pension age	Original sample for years 2003 + 2004	Original sample for years 2003 + 2004
	OLS	FE	OLS	FE
Pension aged × post	0.005	0.003	-0.018	-0.040
	(0.067)	(0.087)	(0.061)	(0.070)
Pension aged	0.036	0.075	-0.045	-0.208
	(0.074)	(0.098)	(0.095)	(0.305)
Post	0.277***	0.285***	0.162***	0.214***
	(0.055)	(0.066)	(0.054)	(0.062)
Male	0.072		0.066	
	(0.060)		(0.042)	
Age cat 2	0.025	0.053		
	(0.072)	(0.090)		
Age cat 3	0.150	0.161	-0.224	-0.014
	(0.121)	(0.158)	(0.257)	(0.148)
Age cat 4	0.415**	0.634***	0.022	0.665***
	(0.169)	(0.206)	(0.226)	(0.237)
Age cat 5			0.037	0.535*
			(0.179)	(0.287)
Years of schooling	0.076***	-0.010	0.042***	0.062**
	(0.008)	(0.055)	(0.006)	(0.030)
Married	0.100**	0.133	0.021	0.016
	(0.044)	(0.093)	(0.043)	(0.105)
Chronic	-0.187***	-0.179***	-0.234***	-0.191***
	(0.029)	(0.043)	(0.031)	(0.050)
Log income	0.097***	0.041***	0.123***	0.056*
(other HH members)	(0.013)	(0.015)	(0.022)	(0.033)
Observations	4,261	4,261	3,100	3,100
R-squared	0.163	0.110	0.133	0.084

Note. Life satisfaction is normalized with mean zero and standard deviation of one. All regressions control for birth year fixed effects, household size, the presence of children up to age 17 in the household, settlement type dummies and region (oblast) fixed effects. Robust standard errors clustered at individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. *Source*. ULMS 2003-7.

5. The production function of mental health

In order to assess the factors leading to mental stress relief we assess a stylized short-run production function for mental health. The formulation is short-run because we restrict ourselves to factors which can change or be adjusted as response to the pension rise; hence,

we exclude most factors which would normally contribute to good health, like genetics, health behaviour, environmental factors, or changes in health care provision. In fact, our mental health production function is closely related to a utility function which represents individuals' choices between leisure and a basket of goods and service. This utility function $U = arg(C,L)$ is maximized under the budget constraint: $Y = f(labour\ income, old\ age\ pensions, debt\ and\ transfers)$. Since pensions are not means tested, there exists no substitution effect for increasing generosity of old-age pensions, as laid out in greater detail in Danzer (2013). The third route to income generation—debt (or, conversely, savings for bequest or for a rainy day (Hurd 1987; 1989))—is based on the insight that the end of life is uncertain. While most of the literature has focused on bequests, debt at old age is quantitatively and qualitatively non-negligible: For instance, among elderly US households (age of household head 55+), 56% have at least some household debt (Copeland 2004). There is recent evidence that debt adds to poor financial well-being and to depression. For instance, Dentrea (2000) shows that credit card debt is associated with poorer well-being among US households. Similarly, Miech and Shanahan (2000) find that self-reported economic strain (defined as having difficulties in paying bills) are associated with depressive symptoms and actually lead to an increase of mental health problems at old age. In emerging economies, the elderly have often worked on comparatively low earnings, making it difficult for them to sustain a decent standard of living in times of rapid economic growth. At the same time, formal credit institutions are underdeveloped and do not serve the elderly for life cycle reasons. As a consequence, the elderly often rely on familial support and transfers from younger generations (Evans and Harkness 2008).[10] Informal loans from family or friends rely on collateralization with social rather than physical capital (Karaivanov and Kessler 2013), and this can make them potentially stressful sources of subsistence. If indebtedness is associated with mental stress,

[10] In some societies, transfers from children to parents may also be part of an implicit intergenerational contract.

informal debt could potentially involve even greater mental stress due to the social capital at risk in case of default.

While we have already discussed the role of greater leisure above (finding that more leisure does not make people happier), we analyse in the following the two remaining candidate factors for the mental health effect of pension generosity—consumption (devoted to different areas) and income generation (from different sources). Owing to the lack of several convincing exclusion restrictions, this analysis is naturally descriptive. We ask: How did consumption and income generation change as the reform took place? Since incomes are pooled and consumption goods shared within the household, we use household-level data for the following dependent variables: the log of total expenditures, the log of consumer good expenditures and the log of non-consumer good expenditures as measures of consumption; the log household income as absolute and the 'income gap to the median working age income' as relative income measures; finally, the log of private transfers received by the household, the log value of property sales, the log of outstanding credit and a dummy indicator for the presence of unpaid bills as measures of potentially stressful income generation.

While household incomes have risen at the time of the pension reform, no changes to consumer behaviour can be found (Table 5).[11] Interestingly, owing to the benefit increase pensioner households have narrowed the income gap to the working age population. Such an improved relative economic standing in society might be a contributing factor to better mental health, since individuals care about relative incomes (Luttmer 2005; Clark and Senik 2010). However, more pronounced seem the drastic changes to the income generation pattern of pensioner households. After the pension rise the dependency on inter-household transfers, credit and unpaid bills was reduced significantly. These results suggest that income generation can be stressful—and that relief from indebtedness can improve mental health.

[11] We also find no effect on relevant sub-categories such as expenditures on food or health care.

Table 5: Correlates of the reform:
Changes in consumption, leisure and income generation

	(1) Log(total exp)	(2) Log(exp consumer goods)	(3) Log(exp non-cons goods)	(4) Log(household income)	(5) Income gap to p50 of working age income
Pension aged × post	-0.014	-0.023	0.019	0.052**	-0.166***
	(0.017)	(0.017)	(0.104)	(0.024)	(0.017)
Pension aged	0.028	0.023	0.320*	-0.151***	0.692***
	(0.017)	(0.015)	(0.161)	(0.028)	(0.020)
Post	0.271***	0.330**	0.239**	0.377***	-0.092***
	(0.037)	(0.038)	(0.096)	(0.21)	(0.015)
Observations	13,355	13,355	13,355	4,927	4,927
R-squared	0.596	0.575	0.261	0.853	0.529

	(6) Log(hh transfers)	(7) Log(property sales)	(8) Log(credit)	(9) Unpaid bills (0/1)
Pension aged × post	-0.268**	-0.016	-0.383**	-0.042**
	(0.121)	(0.034)	(0.185)	(0.020)
Pension aged	-0.322***	0.021	0.084	-0.026
	(0.13)	(0.022)	(0.147)	(0.031)
Post	0.490***	-0.082**	-0.781***	-0.040
	(0.117)	(0.039)	(0.158)	(0.026)
Observations	13,355	13,355	13,355	4,927
R-squared	0.066	0.017	0.101	0.065

Note: All regressions control for gender, age categories, birth year fixed effects, education, marital status, chronic disease, household size, number of pensioners, number of working age adults, settlement type dummies and region (oblast) fixed effects. Robust standard errors clustered at individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. *Source*. ULMS 2003-7 (columns 4, 5, 9); UHBS 2003-2007 (columns 1-3, 6-8).

6. *Conclusions*

In this paper we have exploited a unique shift in the generosity of the Ukrainian pension system to study the effect of eradicating old-age poverty on mental health. Based on a difference-in-differences set-up we show with two independent data sets that greater pension generosity improves subjective well-being and the incidence of diagnosed depressions. Greater leisure, more consumption and enhanced physical health are ruled out as potential channels of the mental health improvement. Instead, evidence suggests that the reduction of potentially stressful modes of income generation, such as family household transfers, indebtedness and unpaid bills, may be most relevant for the relief in mental health.

The results of this paper are relevant for public policy since it sheds light on previously neglected mental health implications of social transfers. Specifically, many developing and emerging countries use pensions as general anti-poverty policy instruments. Yet, apart from the immediate labour market impact of these policies, very little evidence exists regarding these policies. This is even more relevant as population ageing (including both the relatively greater number of older people as well as their longer live span) is also acute in the developing and emerging world (Lloyd-Sherlock 2000). Although the treatment of mental conditions is still relatively low in those countries, the fiscal costs for treating mental health conditions are supposed to rise sharply (WHO World Mental Health Survey Consortium 2004). This said, governments should pay attention to potential mental health implications when designing transfer schemes.

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References

Beekman, Aartjan T.F. , Dorly J.H Deeg, Theo van Tilburg, Jan H. Smit, Chris Hooijer, Willem van Tilburg (1995). Major and minor depression in later life: a study of prevalence and risk factors, Journal of Affective Disorders, Vol. 36, No. 1–2: 65-75.

Bonsang, Eric, Tobias J. Klein (2012). Retirement and subjective well-being, Journal of Economic Behavior & Organization, Vol. 83, No. 3: 311-329.

Bradford, Leland P. (1979). Can You Survive Your Retirement? Harvard Business Review, Vol. 57, No. 4: 103-109.

Carp, F.M (1967). Retirement Crisis.Science, Vol. 157: 102-3.

Clark, Andrew E., Claudia Senik (2010). Who Compares to Whom? The Anatomy of Income Comparisons in Europe. Economic Journal, Vol. 120, No. 544: 573-594.

Coe, Norma B., Gema Zamarro (2011). Retirement effects on health in Europe, Journal of Health Economics, Vol. 30, No. 1: 77-86.

Danzer, Alexander M. (2013): Benefit Generosity and the Income Effect on Labour Supply: Quasi-Experimental Evidence. Economic Journal, 2013, Vol. 123, 571: 1059-1084.

de Grip, Andries, Maarten Lindeboom and Raymond Montizaan (2012), Shattered Dreams: The Effects of Changing the Pension System Late in the Game, The Economic Journal, Vol. 122: 1-25.

Drentea, Patricia (2000). Age, Debt and Anxiety. Journal of Health and Social Behavior, Vol. 41, No. 4: 437-450.

Drentea, Patricia (2002). Retirement and Mental Health J Aging Health May, Vol. 14: 167-194.

Frijters, Paul, Ingo Geishecker, John P. Haisken-DeNew, and Michael A. Shields (2006). Can the Large Swings in Russian Life Satisfaction Be Explained by Ups and Downs in Real Incomes? Scandinavian Journal of Economics, Vol. 108, No. 3: 433–58.

Frijters, Paul, John P. Haisken-DeNew, and Michael A. Shields (2005). The causal effect of income on health: Evidence from German reunification. Journal of Health Economics, Vol. 24: 997-1017.

Frijters, Paul, John P. Haisken-DeNew, and Michael A. Shields (2004a). Investigating the Patterns and Determinants of Life Satisfaction in Germany following Reunification. Journal of Human Resources, Vol. 39, No. 3: 649–74.

Frijters, Paul, John P. Haisken-DeNew, and Michael A. Shields (2004b). Money Does Matter! Evidence from Increasing Real Income and Life Satisfaction in East Germany Following Reunification. American Economic Review, Vol. 94, No. 3: 730–40.

Gardner, Jonathan, and Andrew J. Oswald (2007). Money and Mental Wellbeing: A Longitudinal Study of Medium-Sized Lottery Wins. Journal of Health Economics, Vol. 26, No. 1: 49–60.

Hernaes, Erik, Simen Markussen, John Piggott, Ola L. Vestad (2013). Does retirement age impact mortality?, Journal of Health Economics, Vol. 32, No. 3: 586-598.

Jensen, Robert T. and Kaspar Richter (2004). The health implications of social security failure: evidence from the Russian pension crisis. Journal of Public Economics, Vol. 88, No. 1–2: 209-236.

Johnston, David W., Wang-Sheng Lee (2009). Retiring to the good life? The short-term effects of retirement on health, Economics Letters, Vol. 103, No. 1: 8-11.

Karaivanov, Alexander and Anke S. Kessler (2013). A Friend in Need is a Friend Indeed. Theory and Evidence on the (Dis)Advantages of Informal Loans. SFU Econ Discussion Paper #13-03.

Latif, Ehsan (2011). The impact of retirement on psychological well-being in Canada, The Journal of Socio-Economics, Vol. 40, No. 4: 373-380.

Lipsitz, L. (2005). The Elderly People of Post-Soviet Ukraine: Medical, Social, and Economic Challenges. Journal of the American Geriatrics Society, Vol. 53, No. 12: 2216–20.

Luttmer, Erzo F. P. (2005). Neighbors as Negatives: Relative Earnings and Well-Being. Quarterly Journal of Economics, Vol. 120, No. 3: 963-1002.

Lehmann, Hartmut, Alexander Muravyev and Klaus F. Zimmermann (2012). The Ukrainian longitudinal monitoring survey: towards a better understanding of labor markets in transition. IZA Journal of Labor & Development, 1: 9.

Lindahl, M. (2005). Estimating the effect of income on health and mortality: using lottery prizes as an exogenous source of variation in income. Journal of Human Resources, Vol. 40, No. 1: 144–168.

Lloyd-Sherlock, Peter (2000). Population ageing in developed and developing regions: implications for health policy. Social Science & Medicine, Vol. 51, No. 6: 887-895.

Lund, C. et al. (2010). Poverty and common mental disorders in low and middle income countries: a systematic review. Soc. Sci. Med. Vol. 71, No. 3: 517–528.

Lund, Crick, Mary De Silva, Sophie Plagerson, Sara Cooper, Dan Chisholm, Jishnu Das, Martin Knapp, Vikram Patel (2011). Poverty and mental disorders: breaking the cycle in low-income and middle-income countries. The Lancet, Vol. 378, No. 9801: 1502-1514.

Midanik, Lorraine T., Krikor Soghikian, Laura J. Ransom, and Irene S. Tekawa (1995). The Effect of Retirement on Mental Health and Health Behaviors: The Kaiser Permanente Retirement Study J of Gerontology B Psychol Sci Soc Sci, Vol. 50B, No. 1: S59-S61.

Miech, Richard A. and Michael J. Shanahan (2000). Socioeconomic Status and Depression over the Life Course. Journal of Health and Social Behavior, Vol. 41, No. 2: 162-176.

Newmann, Joy Perkins (1989) Aging and depression. Psychology and Aging, Vol. 4, No. 2: 150-165.

Rohwedder, Susann, and Robert J. Willis (2010). Mental Retirement. Journal of Economic Perspectives, Vol. 24, No. 1: 119-38.

Schwarz, Anita M. (2003). Old Age Security and Social Pensions. Washington DC: The World Bank.

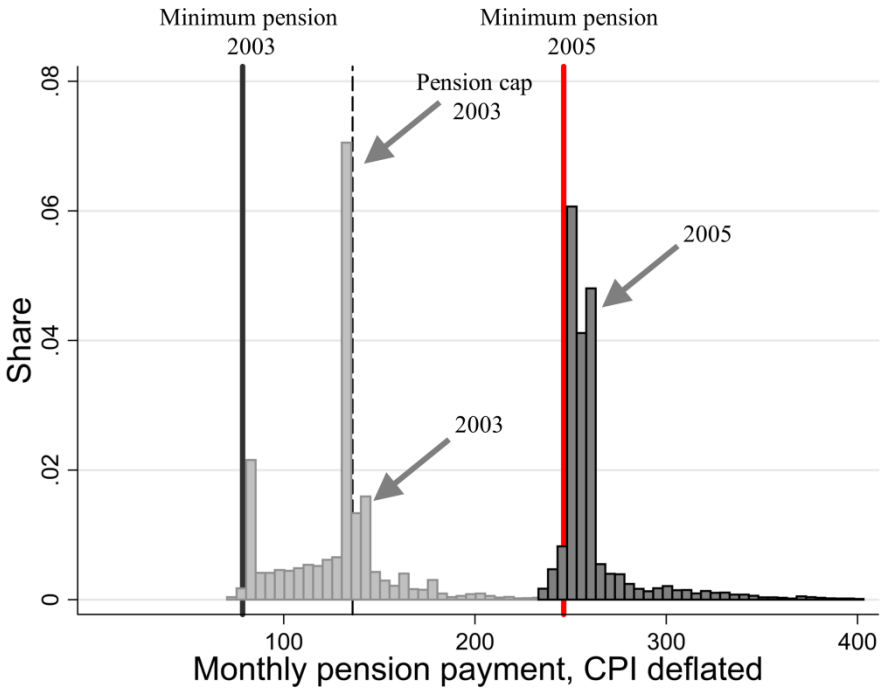
Wise, David A. (ed.) Developments in the Economics of Aging, A National Bureau of Economic Research Conference Report. Chicago and London: University of Chicago Press, 2009. Early Retirement, Social Security and Well-Being in Germany, Axel Börsch-Supan, Hendrik Jürges, in Developments in the Economics of Aging (2009), University of Chicago Press (p. 173 - 199)

WHO (2003). World health report 2003: shaping the Future.

WHO World Mental Health Survey Consortium (2004).“Prevalence, Severity, and Unmet Need for Treatment of Mental Disorders in the World Health Organization World Mental Health Surveys. The Journal of the American Medical Association, Vol. 291, No. 21: 2581-2590.

Appendix

Figure A-1: Pension benefits before and after the pension rise



Source: Danzer (2013)

Figure A-1: Average life satisfaction around pension age

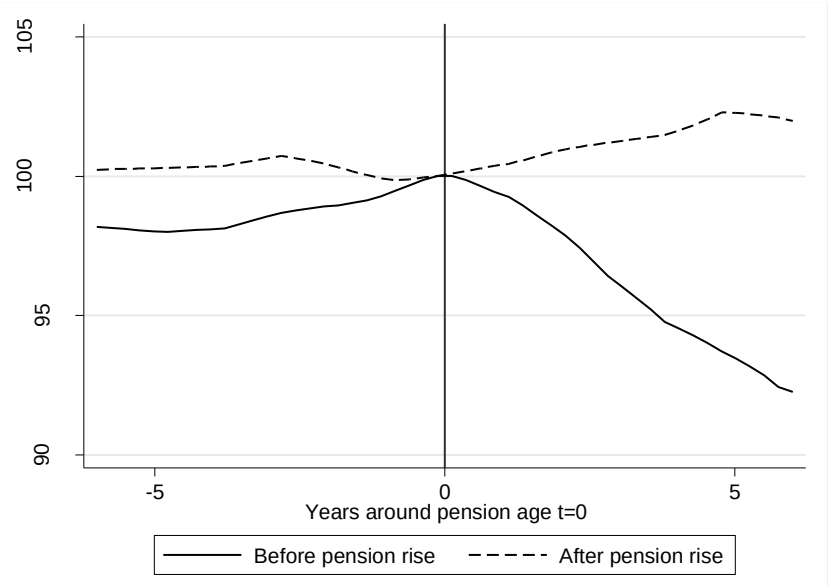


Table A-1: The effect of the pension rise on composite health measures

	(1) Subjective bad health (0/1)	(2) Subjective bad health (0/1)	(3) Subjective health (1-4)	(4) Subjective health (1-4)	(5) Health problem (0/1)	(6) Health problem (0/1)	(7) Chronic disease (0/1)	(8) Chronic disease (0/1)
	OLS	FE	OLS	FE	OLS	FE	OLS	FE
Pension aged × post	-0.044	-0.134**	0.061	0.248**	-0.065	-0.128*	0.038	0.000
	(0.045)	(0.067)	(0.080)	(0.111)	(0.047)	(0.070)	(0.053)	(0.071)
Pension aged	-0.034	0.074	0.070	-0.127	0.061	0.161**	-0.030	0.077
	(0.041)	(0.071)	(0.074)	(0.118)	(0.047)	(0.074)	(0.051)	(0.075)
Post	0.080*	0.157**	-0.136*	-0.288***	0.138***	0.249***	0.015	0.066
	(0.047)	(0.067)	(0.082)	(0.111)	(0.048)	(0.070)	(0.054)	(0.071)
Male	-0.142***		0.288***		-0.147***		-0.150***	
	(0.019)		(0.033)		(0.018)		(0.021)	
Observations	4,882	4,882	4,882	4,882	4,908	4,908	4,927	4,927
R-squared	0.204	0.071	0.245	0.092	0.199	0.081	0.063	0.025

Note: Subjective health is normalized with mean zero and standard deviation of one. Robust standard errors clustered at individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: ULMS 2003-7.

Table A-1: Treatment effect in two-year comparisons

	(1) Life satisfaction	(2) Life satisfaction
Survey years	2003 + 2007	2004 + 2007
Pension aged × post	0.135**	0.163***
	(0.061)	(0.062)
Pension aged	-0.105	-0.090
	(0.082)	(0.085)
Post	0.371***	0.142***
	(0.053)	(0.053)
Female	0.048	0.075*
	(0.040)	(0.043)
Age cat 3	-0.028	0.167
	(0.074)	(0.125)
Age cat 4	-0.010	0.135
	(0.093)	(0.085)
Age cat 5	-0.023	0.108
	(0.110)	(0.075)
Years of schooling	0.041***	0.048***
	(0.006)	(0.006)
Married	0.096**	0.033
	(0.042)	(0.042)
Chronic	-0.195***	-0.210***
	(0.030)	(0.032)
Log income (other HH members)	0.105***	0.131***
	(0.017)	(0.021)
Observations	2,878	2,766
R-squared	0.178	0.134

Note. Life satisfaction is normalized with mean zero and standard deviation of one. Robust standard errors clustered at individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source. ULMS 2003-7.

Table A-2: Pension age and the incidence of clinically diagnosed depression

	(1) Depression	(2) Depression	(3) Depression	(4) Depression
Pension aged × post	-0.131**	-0.132**	-0.132**	-0.192**
	(0.062)	(0.062)	(0.062)	(0.089)
Pension aged	0.121**	0.099*	0.098*	0.065
	(0.060)	(0.060)	(0.060)	(0.053)
Post	0.041	0.037	0.038	0.079*
	(0.037)	(0.036)	(0.037)	(0.045)
Female	0.062*	0.063*	0.061*	0.135**
	(0.036)	(0.036)	(0.037)	(0.062)
Married	-0.074*	-0.082**	-0.083**	-0.083**
	(0.040)	(0.041)	(0.041)	(0.041)
Years of schooling	0.018*	0.020**	0.020**	0.020**
	(0.010)	(0.010)	(0.010)	(0.010)
Working		-0.107***	-0.103***	-0.102***
		(0.037)	(0.037)	(0.037)
Chronic health conditions	No	No	Yes	Yes
Birth year cohort	No	No	No	Yes
Observations	6,309	6,309	6,309	6,309
R-squared	0.016	0.018	0.019	0.022

Note: Dependent variables are normalized with mean zero and standard deviation of one.
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: UHBS 2003-6.

Table A-3: Treatment effect on income and income gap measures

Dependent variable	(1) Log individual income	(2) Log household income	(3) Income gap to median working age income	(4) Life satisfaction	(5) Life satisfaction
Pension aged × post	0.147***	0.052**	-0.166***	0.247**	0.261**
	(0.017)	(0.024)	(0.017)	(0.114)	(0.111)
Pension aged	-0.673***	-0.151***	0.692***	-0.171	-0.188
	(0.020)	(0.028)	(0.020)	(0.157)	(0.131)
Post	0.555***	0.377***	-0.092***	0.076	-0.279**
	(0.015)	(0.021)	(0.015)	(0.099)	(0.112)
Income gap				-0.002	
				(0.124)	
Log median working age income					0.766***
					(0.122)
Years of schooling	0.064***	0.031***	-0.053***	0.077**	0.069*
	(0.006)	(0.008)	(0.006)	(0.039)	(0.038)
Married	-0.041***	-0.051**	-0.024*	0.013	0.063
	(0.014)	(0.020)	(0.014)	(0.094)	(0.094)
Chronic	-0.006	-0.014	-0.009	-0.217***	-0.205***
	(0.007)	(0.009)	(0.007)	(0.044)	(0.044)
Log income (other HH members)	0.020***	0.347***	0.019***	0.064**	0.034
	(0.004)	(0.005)	(0.004)	(0.025)	(0.025)
Observations	4,927	4,927	4,927	4,927	4,927
R-squared	0.877	0.853	0.529	0.091	0.103

Note. Life satisfaction is normalized with mean zero and standard deviation of one. Robust standard errors clustered at individual level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source. ULMS 2003-7.