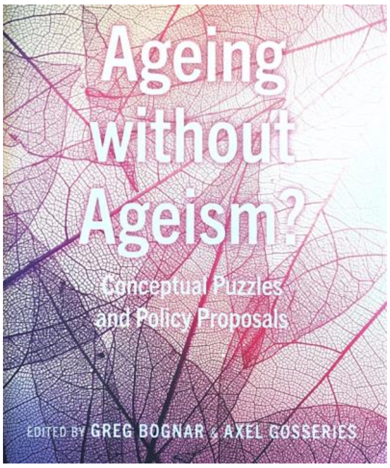

Differentiating Retirement Age to Compensate for Health and Longevity Inequality?

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The rise of average healthy life expectancy calls for an overall increase in retirement age.[2] However, many observers suggest that the latter should be differentiated across socio-demographic categories to achieve equality. The request stems from the observation that same-age older individuals differ a lot in terms of health and, what is more, that the differences systematically correlate with their socio-demographic background and also remaining longevity. Historically, in most retirement systems, a uniform age has been used to proxy for poor health and the subsequent loss of work capacity and the need for replacement earnings. But now comes this proposition to adopt a slightly more refined proxying strategy: using several retirement ages to match better the distribution of health status and work capacity across socio-demographic groups. Many observers and stakeholders call for the abolition of the uniform retirement age and its replacement by a *differentiated retirement age policy***.** At first sight, the proposal makes perfect sense. But we will show in this chapter that, in a world of systematic retirement age differentiation by socio-demographic group, there would still be a lot of

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[2] Pension economists regularly recommend indexing the retirement age on the population's life expectancy. Denmark and the Netherlands have enacted reforms that make these indexations automatic.

what health economists call Type-F errors (failure of treatment, i.e. no retirement for people in poor health) and Type-E errors (excessive treatment, i.e. people in good health going for retirement).

1. Introduction

The increase in life expectancy is arguably the most remarkable by-product of medical progress and economic growth. Since the end of the nineteenth century, advanced economies have been gaining roughly 2.4 years of longevity every decade (Oeppen et al., 2002). But this trend — in combination with lower fertility — translates into population ageing. And this has far-reaching economic and socio-political consequences. Different things could adjust to counterbalance the contraction of the working-age population and the rise of old-age dependency. They comprise higher female participation in the labour force (at least in the countries where it remains low), slightly longer hours of work, less unemployment, more flexible work arrangements[3] or even shorter initial education (Gosseries & Vandenberghe, 2016). But so far, the most common form of adjustment consists in raising the effective[4] age of effective retirement. Researchers at the OECD have shown that indexing retirement age on (rising) life expectancy could stabilise old-age dependency ratios, preventing dramatic tax increases to finance pay-as-you-go pensions, or a general reduction of the level of pensions (Oliveira Martins et al., 2005). And stricter retirement policies implemented since the mid-1990s have proved effective at increasing employment rates (Atalay, 2015), although from a historically low level (Costa,1998).

However, one concern often raised is whether such policies are fair, as older workers may differ significantly in their health status, residual work capacity and remaining life expectancy.[5] What is more — and this in a sense is good news for the advocates of retirement age differentiation — these differences are not distributed randomly but are systematically correlated with socio-demographic traits. And these are easy to observe (education, gender, income percentile)[6] and could thus be used as a basis for differentiation.

The question we ask more specifically in this chapter is: what would it take in terms of lowering (or raising) the retirement age to ensure that all socio-demographic groups can *expect* to retire in similar

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[3] To attract into paid employment people who otherwise stay completely out of the labour force.
[4] Which can be significantly lower than the legal age or retirement.
[5] There is strong evidence that ill-health at 50 is correlated with a shorter life span/early death, De Nardi et al. (2016) show that lifespan is 3.3 years shorter for those with bad health than for those with good health, while Pijoan-Mas et al. (2014) show the equivalent numbers are 5.6 for men and 4.7 for women at age 50.
[6] Economists would also argue that many of these are not that easy to « manipulate », minimizing the risk strategic behaviour to be allowed to retire earlier.

health[7], and by extension, can *expect* to live the same number of years in retirement? The overall normative perspective underpinning this exercise is egalitarian.[8] But note that when stressing the equality of *expected* outcomes, we hint at *ex-ante* egalitarianism (Diamond, 1967). While some of our results about people's health at the moment of their retirement signal the likely importance of *ex-post* egalitarianism (Fleurbeay et al., 2016; Ponthière, 2020).[9] The *ex-ante* perspective considers the average outcome (here health and, by extension, longevity) that someone can expect to attain at the moment she retires (given the socio-demographic group she belongs to), while the *ex-post* standpoint is that of her actual and realised health on the day she retires.[10] And there can be a significant discrepancy between the two. Statisticians invariably adopt an *ex-ante* perspective. For instance, they may have computed that you and your colleague should still be in perfect health at the age of 67 given the socio-economic category you belong to, but *ex-post*, when both of you reach that age, it turns out your respective health status diverges significantly.

The chapter tries to inform the policy debate. We compute realistic estimates of the degree of retirement age differentiation needed to compensate[11] for health differences at an older age. To that end, we make extensive use of European SHARE panel data documenting the health status of large numbers of individuals aged 50+ in more than 20 countries. We first quantify the health gradient ΔH across European countries, and within each of them across socio-demographic groups (i.e. gender, education) at typical retirement age. We then estimate the degree of retirement age differentiation Δa that would be needed to equalise *expected* health at the moment of retirement. We will expose in detail here below the way this is done, but here is the key idea. Consider that at a given uniform retirement age a, individuals belonging to two different socio-demographic groups display a sizeable health gradient ΔH. Consider at the same time that biological ageing invariably causes a decline of health at a rate say β. This almost trivial assumption has key implications in the context of this discussion. It means that advancing (or postponing) the age of retirement could be a way to compensate for same-age health differences across countries or socio-demographic groups, and thus equalise (expected)

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[7] Or, equivalently, can expect to work only as long as their health-driven work capacity stays above a certain threshold, which is the same for every group (Vandenberghe, 2020b).

[8] It can also be connected to the objective of "actual fairness" commonly used by pension specialists. Strictly speaking, actuarial fairness means that an individual's lifetime pension contributions and benefits should equate. But, in more utilitarian terms, some euros of accrued pension benefits have caused more disutility (due to more arduous jobs, for instance). And poor health at an older age means that people's ability to enjoy pension benefits may be significantly reduced. What is more , in its strict financial sense, there is no actual fairness if remaining life is considerably shorter for some individuals.

[9] *Ex-ante* vs *ex-post* should be understood here primarily in their temporal sense. The *ex-ante* term points at expectations or *predictions* before people retire, while the *ex-post* term logical refers to the *realisation* of health at that age.

[10] Fleurbaey et al. (2016) state "At the end of the day, what matters is what people achieved, not what they expected to achieve."

[11] Positively or negatively.

health and possibly longevity at the moment of retirement. We will see hereafter that one can relatively easily compute the retirement age differentiation as $\Delta a = \Delta H/\beta$.

Note that we discuss the relevance of an “automatically” and group-based differentiated retirement age policy that would aim at equalising expected health at the moment of retirement. By “automatically”, we mean that the right to retire at a certain age would be granted just on the condition of belonging to a particular category or socio-demographic group. There would be no need to undergo screening and be subjected to individualised checks, as is the case to get disability benefits.

Another critical point is that the retirement age differentiation exercise presented here assumes that work and retirement’s impacts on health are limited. Lowering or raising the retirement age (and thus varying the duration of careers) is supposed to have no significant effect on health (or longevity). We posit that the latter is primarily driven by age (our variable of differentiation and equalisation) and other factors (genetic background, childhood health and work circumstances correlated to age and education, etc.).[12] This may seem to be a strong assumption, but a relatively abundant economic literature backs it. Bassanini & Caroli (2015) review the many papers that have studied the impact of work on health and find very mixed evidence. As to the relationship between work/retirement and longevity, in their recent paper, Bozio et al. (2021) state that “if an impact of later retirement on mortality would be detectable, it would remain very small in magnitude”.

Our key results point at the need for a very high degree of differentiation to equalise expected health across countries, with a retirement age ranging from 52 in Poland (POL) to 79 in Switzerland (CHE). The degree of retirement differentiation is also significant across socio-economic groups within countries. For instance, tertiary-educated individuals should retire more than 10.6 years later than those with less than upper-secondary education attainment. But we also show that systematic retirement age differentiation would fail to match a significant portion of the *ex-post* distribution of health status. That is, in a world of systematic retirement age differentiation by socio-demographic group, there would still be a lot of what health economists call Type-F errors (failure of treatment, i.e. no retirement for people in poor health) and Type-E errors (excessive treatment, i.e. people in good health going for retirement). This raises the question of which policy is better. Should policy-makers go for “more elaborate” but still proxy-based retirement policies consisting of socio-demographic-group-based differentiated retirement age? Or should they stick to the historical norm of uniform retirement age, supplemented by disability benefits conditional on individual screening of health status?

[12] And also, when considering differences across countries, macroeconomic variables like GDP/head or capital intensity.

In what follows, we present the SHARE data on health and explain how we can compute health-equalising differentiated retirement ages. We wrap up the chapter with a discussion of the possible policy implications of our results.

2 – Data and Analytical Framework

We use waves 1-2 and 4-7 (2004-2017) of the SHARE survey, a total of 238,363 individuals-waves.[13] All individuals in SHARE are 50 or older when interviewed for the first time. Data limitations of different sorts (missing values or variables, absence of repeated observations as the country participated only in one wave) explain that we retain only 20 out of the 29 participating countries in the analysis.[14]

SHARE contains a rich set of items about people's physical health status and their mental and cognitive health. Here we will rely only on the former. In Vandenberghe (2020a), we also consider mental health and cognition, but the results are qualitatively very similar to those reported here. Most health items are self-reported, and many are subjective because they correspond to how people perceive and self-assess their overall health status (Table 1). But SHARE questionnaires also explicitly refer to specific health conditions diagnosed by health professionals (heart attack, hypertension, cholesterol, stroke, diabetes, lung disease, cancer, and so on). SHARE interviewers also collect measurements like the maximum grip strength of respondents (Table 2).

In what follows, we will make extensive use of physical ill-health *indices*. These are computed as the first principal component[15] of available health items. Not surprisingly, an examination of the indices shows that the incidence of ill-health goes up with age. However, there are substantial differences across countries. For instance, at the age of 67, the ill-health index in Switzerland (CHE) at -.476 is much lower than in Estonia (EST), where it reaches .36.[16] There are also differences in the intensity of the ill-health/age gradient. In other words, both the level of ill-health and the ill-health/age relationship vary internationally.

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[13] In SHARE, most respondents are observed consecutively in several survey waves.

[14] Austria (AUT), Belgium (BEL), Switzerland (CHE), Czech Republic (CZE), Germany (DEU), Denmark (DNK), Spain (ESP), Estonia (EST), France (FRA), Greece (GRC), Croatia (HRV), Hungary (HUN), Israel (ISR), Italy (ITA), Luxembourg (LUX), the Netherlands (NLD), Poland (POL), Portugal (PRT), Slovenia (SVN), and Sweden (SWE).

[15] Principal component analysis is a technique for reducing data dimensionality, increasing interpretability while minimising information loss. The values for the principal component reported later have been standardised internationally. This means that a one-unit change of the index corresponds to one standard deviation of the international distribution of the health index.

[16] These numbers represent fractions of the international standard deviation of ill-health scores and can be considered sizeable health differences.

[Insert Tables 1, 2 about here]

We deploy a two-stage estimation using the SHARE data. Stage one aims at identifying, for each country *j*, the degree of retirement age differentiation around the age of 67[17] that would ensure people retire with a level of (expected) ill-health equal to the international average.[18] Suppose H^{67}_j represents the average ill-health index of respondents aged 67 in country *j* and H^{67} the average international health. In that case, there is an ill-health index gap in that country equal to the difference between these two terms. If β^{67}_j represents the marginal effect of a year of age on the ill-health index,[19] then one can estimate the age of retirement, ensuring equalisation of expected ill-health as

$$a_j = 67 - (H^{67}_j - H^{67})/\beta^{67}_j$$

Stage two proceeds along the same lines as stage one, but with the aim of identifying the health equalising differentiated retirement age inside each country *j*, for each socio-demographic group *k*. That intra-national differentiation occurs not around the age of 67 as in the formulas above but around the retirement age a_j applicable to the country's average citizen and computed at stage one.

Essential with such a setting are estimates of *i)* the ill-health index gaps across countries or socio-demographic groups within each country, and *ii)* of the *βs* (i.e. the impact of biological ageing on health). As to the latter's estimation, we resort to the panel dimension of SHARE data (SHARE consists of up to 6 waves, measuring individuals' ill-health every 2-3 years). In other words, the calculated *βs* only reflect the within-respondent deterioration of health over time. This eliminates many of the biases that may contaminate estimates based on cross-sectional data.

[17] Internationally, 67 is gradually becoming the new reference (OECD, 2019). This said, we lower that age to 61, 63 and 65 when doing robustness analysis in Vandenberghe (2021a), and results remain qualitatively very similar to those reported here.

[18] From a normative standpoint equalising expected health (and indirectly longevity) across countries has limited intuitive appeal, compared to a similar equalisation across groups inside countries. Classical and contemporary political philosophers have focused on justice almost exclusively within countries (or similar politically integrated entities). Discussing the difference between global and more traditional theories of justice is beyond the scope of this chapter. We quantify what it takes to equalise health *inter*-nationally and separately *intra*-nationally (see stage 2 below). The reader who thinks that equalisation only makes sense *intra*-nationally should only consider stage 2 results: i.e. our estimates of what it takes to equalise expected health across gender and education categories.

[19] Note the presence of subscript *j* indicating that the marginal effect ageing can vary from country to country and the superscript *67* that it is calculated around the age of 67.

3 - Results

Health-equalising differentiated retirement ages

Key results appear in Figure 1 and Table 3. They display the rather significant degree of retirement age differentiation that would be required to equalise expected ill-health upon retirement. Focusing on cross-country differences, we see that Poland (POL) is the country where the age of retirement would have to be the lowest at 52.39. By contrast, it would have to be as high a 79.45 in Switzerland (CHE). By construction, these retirement age differences primarily reflect ill-health gaps among older people. And it is pretty interesting to note that the former — and presumably also the latter — essentially parallel GDP per capita differences. This result is confirmed by an analysis of the differentiated retirement ages. The higher GDP per head but also capital intensity[20], the higher the health-equalising retirement age (Vandenberghe, 2020a).

Also, within each country, additional differentiation of retirement age would be needed to account for the significant variations of health across socio-demographic groups. For instance, in Poland (POL), the retirement age should range from 43.97 to 60.67. And in Switzerland (CHE), we estimate that it should vary between 73.42 and 82.61.

The combination of between- and within-country ill-health differences among elderly individuals results in (ill-)health-equalising retirement ages ranging from 40 (Hungary (HUN), low-educated females) to 82.72 (Netherlands (NLD), highly educated males). Finally, we find that, on average across the EU, women should be allowed to retire 2.9 years earlier than men.[21]

[Insert Figure 1 and Table 3 about here]

The limit to retirement age differentiation based on ex-ante equalisation

In this section, we focus on what happens inside each country, and we examine and discuss the importance of what economists call the variance "within" socio-demographic groups. So far, inside each country, we have essentially looked at the "between" group variance in an attempt to differentiate retirement age. We have shown that ill-health varies significantly (in the statistical sense) between groups at any given age beyond 50. And we have used these differences (in combination with group-specific age/ill-health gradients) to compute differentiated retirement ages, ensuring equalisation of

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[20] Capital intensity is the amount of physical capital (machines, computers, roads or harbours) per worker. Alongside the well-known GDP per head, economists use it as a proxy of the degree of development and sophistication of an economy.

[21] The result that women should be allowed to retire earlier based on their health is somewhat surprising as women have a higher life expectancy. But our result accords with a recurrent result of the morbidity/mortality literature (Case & Praxon, 2005). Women have worse self-rated health and more hospitalisation episodes than men from early adolescence to old age but are less likely to die at each age.

expected ill-health across groups, contributing thus to the realisation of *ex-ante* equality across pensioners (Diamond, 1967).

But this amounts to focusing on the *average* characterising different socio-demographic groups, ignoring the potentially huge dispersion “within” each of them in terms of realised health, and thus the full magnitude of the *ex-post* distribution of conditions. From an ethical perspective, both *ex-ante* and *ex-post* egalitarianism are attractive (Fleurbeay et al., 2016), and it is beyond the scope of this chapter to rank them. But we would posit that *ex-post* egalitarians should be concerned to observe that systematic retirement age differentiation as modelled above is still synonymous with what Cornia & Paxson (2005) call Type-F and Type-E errors. The first type, “failure of treatment”, corresponds to individuals suffering from ill-health but who belong to the socio-economic group that, on average, fares relatively well and gets assigned a high retirement age. The second type of error — “excessive” treatment[22] — is just the symmetric case; that is, individuals whose health is expected to be relatively bad given the socio-economic group they belong to, and thus are allowed to retire early, but who are *de facto* in good shape.

Figure 2 illustrates, for some of the countries from our data set, how difficult it is to avoid Type-F and Type-E errors and thus to achieve *ex-post* equality. Both errors remain very frequent whatever the country considered. The dotted lines and curves correspond to highly educated women, while the solid ones to low-educated women. The vertical lines represent the average value of the ill-health index. And there is no doubt that highly educated females are, on average, in better health than their less-educated peers: their line is systematically more to the left. The curves depict the distribution of the ill-health index around the average. And there, the key message is that the distributions for highly- vs low-educated women overlap. This means that there are many highly educated females with a high ill-health index (higher than the average for low-educated females). These would be denied early retirement despite their ill health. Similarly, many low-educated women have a low ill-health index (lower than the average for highly educated women). This hints at the possibility of many low-educated women in relatively good condition who would (illegitimately) be granted the right to retire early due to inaccurate targeting.

One way to go beyond visual evidence on display in Figure 2 is to resort to variance decomposition techniques. These amounts to estimating the share of total country-level ill-health variance explained by the socio-demographic categories used above (gender, education). Results reported in full in Vandenberghe (2021a) show that such a share is small, often less than 5%, and never larger than 9%.

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[22] That some may probably consider as less problematic than type F errors. The underlying question — which is beyond the scope of this chapter — is whether more weight should be put on avoiding Type-F errors than on Type-E errors.

[Insert Figure 2 about here]

4. Discussion

This chapter aimed to explore the idea that retirement age should be differentiated across socio-demographic categories to better match older individuals' heterogeneous health, diverging capacity to stay in paid employment, and differences in terms of remaining longevity. Using European SHARE data on health, we have computed the degree of retirement age differentiation that would be required to equalise health at the moment of retirement. Such a policy would be a way of systematising earlier suggestions that pension reforms aimed at raising the retirement age should make an exception for workers with demanding occupations since health considerations may make it unreasonable to expect them to work longer. They also echo recent work on the fairness of retirement systems under unequal longevity (Ponthière, 2020). Health at an older age and remaining longevity are indeed highly correlated.

Our conclusions are as follows.

First, European older populations vary significantly in their health around the typical retirement ages. This is true *across* countries (with tentative evidence that higher GDP per capita translates into better health) and *within* countries, between socio-demographic groups with lower-educated elderly individuals being systematically less healthy than their same-age more educated peers (something that might also be related to income differences).

Second, equalisation can be achieved both across countries and within each country but requires extensive retirement age differentiation. To equalise expected health for the different socio-demographic groups forming their populations, most European countries would have to admit more than 10 years of difference between those groups with the worst and best health status.

Third, there are limitations to what can be achieved by resorting to a differentiated retirement age policy to achieve *ex-ante* health and longevity equality. SHARE data clearly show that such a policy would still be prone to *ex-post* inequalities, due to extensive Type-F errors (failure of treatment, that is, retirement rights not granted to people in poor health) and Type-E errors (excessive treatment, that is, rights granted to people in good health). The importance to be given to these errors, taken together, is a matter of ethical perspective.[23] People who only care about *ex-ante* equality would probably consider that not much should be done about the residual "within" group differences, thus about these

[23] And so is also the relative importance to be given to Type-F vs. Type-E errors. In the context of retirement, most observers would probably consider that granting early retirement to someone who is still in good health (Type-E error) is less of a problem than denying that right to someone who is in poor health (Type-F error). But, again, that discussion goes beyond the scope of this paper.

Type-F and Type-E errors. And they would likely embrace the differentiated retirement policy simulated here. But the *ex-post* point of view seems to be difficult to ignore completely. Remember that it consists of paying attention to these important but unaccounted “within” socio-economic group variations of health status. Retirement age differentiation would, almost inevitably, be based solely on “between” group statistical (thus *ex-ante* estimated) differences, and ignore the rest. But as we have shown above, allowing retirement age to differ across 6 groups (3 educational attainment levels for each gender) would account for at most 9% of country-level health variance. If what matters socially is equalising each individual’s health upon retirement — i.e. *ex-post* equalisation — then the gains from abandoning a uniform retirement age policy as a proxy for realised health and longevity appear limited.

Of course, other policies than differentiated retirement age can be implemented. And some of our results are supportive of this option. For instance, the sheer magnitude of *ex-post* health status differences across individuals may justify upstream public-health or related policies designed to combat health inequality, already at the early stages of life. Also, the importance of the unaccounted interindividual health inequalities within our retirement groups probably calls for a less *ex-ante* approach and a more individualised and *ex-post* treatment of health differences. Would it be feasible? Probably not as part of a retirement policy. But maybe it could be done via *disability insurance*, or more precisely, the screening procedure that determines the eligibility of individuals to disability benefits.

Contrary to the statisticians telling retirement policy-makers what could be done exploiting *ex-ante* health differences across socio-demographic groups, the doctors in charge of the screening are (at least potentially) assessing each individual’s *realised* health. And this probably puts them in a position to achieve what theorists call *ex-post* equality. In many countries, disability benefits are closely linked to old-age pension systems. And their role is to provide, on a case-by-case basis, “retirement” opportunities to people who suffer from ill-health but aren’t yet eligible for proper retirement money. And it is also expected that workers who receive disability benefits subsequently shift to the old-age pension system once they reach the official retirement age.

This raises the question of which policy is best suited to account for health and related longevity inequalities. Should policy-makers go for *i)* a more elaborate but still proxy-based retirement policy with several retirement ages? Or should they stick to what has been the historical norm, that is, *ii)* a uniform retirement age, supplemented by disability benefits conditional on individualised but time-consuming[24], possibly stigmatising and also error-prone assessment of health status?

[24] And thus costly.

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Table 1 - Health items: subjective health

	Poor general health	Self-perceived bad health[a]	Long-term illness	Limits[b]	Limits[c]	Limits[d]
AUT	2.90	2.90	0.46	2.44	0.11	0.22
BEL	2.92	2.92	0.45	2.44	0.17	0.25
CHE	2.62	2.62	0.34	2.64	0.06	0.10
CZE	3.26	3.26	0.52	2.35	0.14	0.24
DEU	3.17	3.17	0.59	2.37	0.13	0.18
DNK	2.47	2.47	0.49	2.58	0.10	0.17
ESP	3.18	3.18	0.45	2.66	0.12	0.23
EST	3.75	3.75	0.70	2.23	0.22	0.33
FRA	3.08	3.08	0.43	2.51	0.12	0.17
GRC	2.83	2.83	0.31	2.75	0.06	0.18
HRV	3.24	3.24	0.58	2.37	0.15	0.24
HUN	3.59	3.59	0.66	2.32	0.17	0.40
ISR	2.95	2.95	0.49	2.57	0.17	0.40
ITA	3.11	3.11	0.36	2.58	0.10	0.17
LUX	2.97	2.97	0.46	2.45	0.11	0.18
NLD	2.85	2.85	0.46	2.35	0.07	0.16
POL	3.59	3.59	0.64	2.28	0.23	0.31
PRT	3.66	3.66	0.52	2.34	0.27	0.33
SVN	3.22	3.22	0.47	2.42	0.15	0.21
SWE	2.65	2.65	0.52	2.50	0.10	0.15

Source: SHARE 2004-2017

a:US scale

b:Limited in activities because of health

c:Number of limitations with activities of daily living

d:Limitations with instrumental activities of daily living

Table 2 - Health items: objective conditions

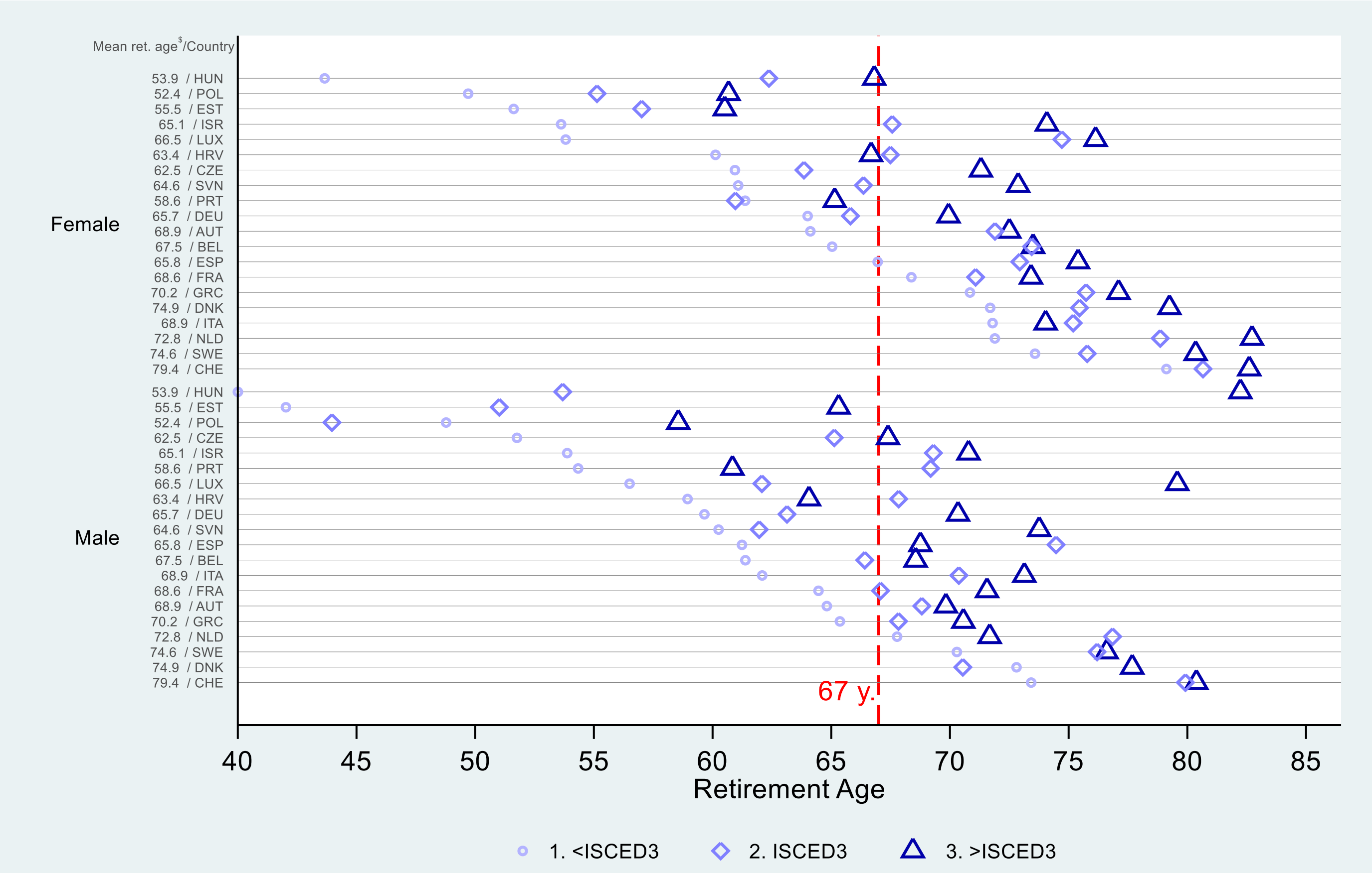
	Hart attack	Hypertension	Cholesterol	Stroke	Diabetes	Lung disease	Cancer	Ulcer	Parkinson[a]	Cataract	Hip fracture	Mobility[b]	Max. of grip strength measure
AUT	0.10	0.39	0.22	0.04	0.12	0.06	0.04	0.04	0.01	0.07	0.01	1.24	35.15
BEL	0.09	0.33	0.31	0.03	0.10	0.06	0.05	0.06	0.01	0.05	0.02	1.28	35.88
CHE	0.06	0.28	0.15	0.02	0.07	0.04	0.04	0.02	0.00	0.06	0.01	0.64	35.72
CZE	0.12	0.49	0.25	0.04	0.17	0.07	0.05	0.05	0.01	0.08	0.02	1.38	34.91
DEU	0.10	0.41	0.19	0.03	0.13	0.07	0.07	0.03	0.01	0.07	0.01	1.19	36.78
DNK	0.08	0.32	0.23	0.03	0.07	0.07	0.05	0.03	0.01	0.06	0.01	0.82	37.78
ESP	0.08	0.36	0.28	0.02	0.15	0.05	0.04	0.03	0.01	0.07	0.01	1.30	30.51
EST	0.16	0.47	0.20	0.04	0.12	0.06	0.05	0.08	0.01	0.08	0.01	1.73	34.42
FRA	0.10	0.31	0.24	0.02	0.11	0.05	0.05	0.03	0.01	0.05	0.01	1.15	34.24
GRC	0.09	0.38	0.28	0.02	0.11	0.04	0.02	0.07	0.00	0.05	0.02	1.38	33.32
HRV	0.12	0.46	0.21	0.04	0.13	0.04	0.06	0.05	0.01	0.05	0.01	1.81	35.19
HUN	0.18	0.55	0.21	0.06	0.17	0.06	0.05	0.08	0.01	0.04	0.03	2.00	32.83
ISR	0.13	0.40	0.36	0.03	0.22	0.04	0.05	0.05	0.01	0.09	0.01	1.29	30.26
ITA	0.08	0.39	0.23	0.02	0.11	0.05	0.03	0.03	0.00	0.05	0.01	1.22	33.11
LUX	0.09	0.33	0.33	0.02	0.11	0.07	0.07	0.06	0.01	0.07	0.02	1.21	35.26
NLD	0.09	0.27	0.18	0.03	0.09	0.07	0.05	0.02	0.00	0.05	0.01	0.89	36.68
POL	0.16	0.44	0.23	0.04	0.14	0.05	0.04	0.06	0.01	0.06	0.01	1.90	34.24
PRT	0.10	0.46	0.41	0.04	0.19	0.06	0.06	0.08	0.00	0.08	0.02	1.94	30.34
SVN	0.10	0.44	0.26	0.03	0.13	0.05	0.05	0.06	0.00	0.06	0.02	1.53	35.36
SWE	0.10	0.36	0.17	0.03	0.10	0.04	0.06	0.02	0.01	0.08	0.02	0.88	36.25

Source: SHARE 2004-2017

a:dementia, senility

b:arm function and fine motor limitations

Figure 1- Differentiated retirement ages equalising (expected) ill-health, across and within countries



Source: SHARE 2004-2017
ISCED3=upper secondary degree [International Standard Classification of Education]
$: Stage-one estimates of retirement ages equalizing exp. ill-health [men & women pooled]

Table 3 - Differentiated retirement ages equalising ill-health [int. ref=67]. Between and within-country differentiation

	Diff. ret	Gap to int. ref. (67)-	Diff. ret. F	Diff. ret. F	Male			Female			F–M gap	ISCED gap	Ret. max	Ret min	Max - Min
					<ISCED3	ISCED3	>ISCED3	<ISCED3	ISCED3	>ISCED3					
AUT	68.92	1.92	67.82	69.50	64.11	71.90	72.50	64.81	68.81	69.83	-1.69	-6.70	72.50	64.11	8.38
BEL	67.49	0.49	65.45	70.66	65.03	73.44	73.50	61.38	66.41	68.55	-5.21	-7.82	73.50	61.38	12.12
CHE	79.45	12.45	77.91	80.79	79.11	80.66	82.61	73.42	79.92	80.38	-2.89	-5.23	82.61	73.42	9.19
CZE	62.50	-4.50	61.42	65.36	60.94	63.85	71.30	51.75	65.12	67.39	-3.94	-13.00	71.30	51.75	19.55
DEU	65.71	-1.29	64.38	66.58	64.00	65.81	69.94	59.65	63.13	70.34	-2.21	-8.31	70.34	59.65	10.69
DNK	74.87	7.87	73.67	75.46	71.69	75.46	79.24	72.80	70.54	77.68	-1.79	-6.22	79.24	70.54	8.70
ESP	65.78	-1.22	68.15	71.76	66.95	72.94	75.40	61.23	74.47	68.75	-3.61	-7.98	75.40	61.23	14.16
EST	55.52	-11.48	52.78	56.38	51.62	57.01	60.51	42.02	51.02	65.31	-3.60	-16.09	65.31	42.02	23.29
FRA	68.57	1.57	67.70	70.95	68.37	71.08	73.41	64.46	67.08	71.56	-3.26	-6.07	73.41	64.46	8.96
GRC	70.22	3.22	67.92	74.56	70.84	75.73	77.10	65.36	67.83	70.56	-6.64	-5.73	77.10	65.36	11.74
HRV	63.42	-3.58	63.61	64.76	60.12	67.49	66.68	58.94	67.84	64.06	-1.15	-5.84	67.84	58.94	8.90
HUN	53.93	-13.07	58.64	57.61	43.66	62.37	66.81	40.00	53.69	82.23	1.03	-32.69	82.23	40.00	42.23
ISR	65.11	-1.89	64.65	65.09	53.61	67.57	74.08	53.87	69.30	70.78	-0.44	-18.69	74.08	53.61	20.47
ITA	68.89	1.89	68.53	73.67	71.79	75.19	74.03	62.08	70.37	73.13	-5.14	-6.64	75.19	62.08	13.10
LUX	66.46	-0.54	66.05	68.22	53.81	74.71	76.13	56.50	62.08	79.57	-2.17	-22.70	79.57	53.81	25.76
NLD	72.79	5.79	72.10	77.82	71.89	78.86	82.72	67.77	76.85	71.67	-5.73	-7.37	82.72	67.77	14.96
POL	52.39	-14.61	50.43	55.17	49.70	55.13	60.67	48.77	43.97	58.56	-4.74	-10.38	60.67	43.97	16.71
PRT	58.62	-8.38	61.45	62.49	61.37	60.96	65.14	54.33	69.18	60.84	-1.04	-5.14	69.18	54.33	14.85
SVN	64.57	-2.43	65.32	66.77	61.07	66.36	72.87	60.25	61.96	73.76	-1.44	-12.65	73.76	60.25	13.51
SWE	74.62	7.62	74.36	76.57	73.58	75.78	80.35	70.29	76.20	76.60	-2.21	-6.54	80.35	70.29	10.06
Int ref.	67														

Source: SHARE 2004-2017

Figure 2 – The difficulty to differentiate *ex-post* (importance of type-E and type-F errors). The case of low- v.s. highly educated females aged 55-65 in Germany (DEU), France (FRA), Belgium (BEL) and Poland (POL).