

INEQUALITIES IN RETIREMENT AGE AND LIFE EXPECTANCY

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Abstract. *In the countries of the world as well as in the European Union, the continuous growth in life expectancy at birth is accompanied by an increase in retirement age. Comparing these age limits to the expected lifespan for men and women, we find huge differences between the expected years spent alive after retirement. In this paper, we examine one aspect of sustainability of different European pension systems, concentrating mainly on life expectancy and retirement age. On a large sample, we analyse how the governments change the retirement age for men and women and how it relates to demographic factors such as ageing and fertility. Considering that the pension system is also a redistribution mechanism, sustainability can be seen as a trade-off between fairness and efficiency.*

Keywords: *life expectancy, retirement age, European pension systems*

1. Introduction

The increase in life expectancy poses a challenge to the pension systems of the world's countries, both developing and developed ones (see Gruber – Wise 1998, Garba – Mamman 2014 or Álvarez-García et al. 2020). As people live longer and longer, they spend more and more years in retirement, which puts a strain on the pension system and pension funds.

In European countries, life expectancy generally shows an upward trend, which has prompted political decision-makers to reevaluate the retirement age and the parameters of their pension systems. Many European countries have adjusted their retirement age to meet the challenges of an aging population. Governments have implemented reforms to gradually raise the retirement age. The tendency is to link the retirement age to life expectancy, sometimes adjusted to reflect changes in longevity (see, e.g., approaches to automatic adjustment in the work of Knell 2018).

European countries have a variety of pension systems and the sustainability of these systems varies. Some countries have well-funded and responsive pension systems, while others face more serious challenges. Scandinavian countries, for example, are often referred to as having a more sustainable pension system due to a combination of factors such as a flexible retirement age and strong social policy (a good overview of the Norwegian system can be found in e.g. Brinch et al. 2018 and

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Hernaes et al 2013, and on the lessons learned from the Swedish pension system see María del Carmen Boado-Penas, Poontavika Naka and Ole Settergren 2020).

Comparing all pension systems in the world is a particularly complex and almost impossible task. The sustainability of the pension system is influenced by countless factors, some of which we will now list. The question of how the state invests these payments is beyond the scope of this article. We also do not want to deal in detail with how contributions and payments compare in each country. We would like to focus primarily on the two main demographic factors such as life expectancy at birth and retirement age. Of course, many other demographic factors influence the sustainability of the pension system, such as employment, labour force participation, fertility rate, aging, child mortality, infant mortality and migration. In our article, we mainly focus on the mandatory state pension, where the state also plays a redistributive role. The sustainability of this system is greatly influenced, among the above mentioned factors, by life expectancy and the retirement age (see more details in Álvarez-García et al. 2020 or Saure – Zoabi 2011).

It is quite obvious that the state enforces redistribution aspects through the pension system as well (Stiglitz, 2000). Redistribution reduces income inequality, but worsens productivity and efficiency. If it were to operate on a completely voluntary basis, mainly poorer people would participate in it, which would lead to adverse selection. Therefore, the state always takes a strong role, and membership cannot be avoided.

Considering European and Asian countries, there are already relatively large differences in life expectancy between countries. It is also an interesting and well-known fact that women live longer than men. This difference is so significant that it can be seen there is currently no country on Earth where men live longer than women on average. In some countries by only half a year, in others by 12 years, but women live longer everywhere. In many countries, however, the regulations are such that women can retire earlier.

2. Literature review

Continuous growth in life expectancy at birth is accompanied by an increase in retirement age (Naumann 2014). Comparing these age limits to the expected lifespan for men and women, we find huge differences between the expected years spent alive after retirement (Riekhoff 2023). Considering that the pension system is also a redistribution mechanism, there is a trade-off between fairness and sustainability (Wahrendorf et. al. 2017). According to Preston (1975) there is a strong positive correlation between life expectancy at birth and aggregate income. This pattern shows that at low income levels, an increase in income significantly increases life expectancy.

So the research questions based on the literature are as follows. Is there still scope for raising the retirement age in certain countries in terms of sustainability and fairness? How big is the difference between life expectancy after retirement of men and women in each income group?

3. Methodology

Our goal is to compare the retirement age and life expectancy for women and men in countries with different levels of development. Development is measured by GDP per capita at purchasing power parity (PPP). European countries do not show great variability in terms of retirement age, therefore countries outside the European Union and some South-Asian countries were also included in the analysis. The full list of countries is shown

below in Table 2. The 52 countries were grouped into 4 quartiles based on income per capita (see Table 3). The first quartile contains the most developed states of the European Union and some rich microstates. The second quartile also includes stable EU member states. The following table shows which variables were used during the analysis. The abbreviations used later can be found in the left column of Table 1.

Table 1. List of variables

Abbreviations of variables	Description of variables
Country	Name of the country
Code	Code of the country
fullfem	Retirement age with full benefits, female
fullmale	Retirement age with full benefits, male
dfullmf	The difference in retirement age between female and male
lifefem	Life expectancy at birth, female
lifemale	Life expectancy at birth, male
lifetot	Life expectancy at birth, total
difflife	Life expectancy difference between female and male
GDPPC	GDP per capita (constant 2015 US\$) 2021
Quartile	Quartiles are based on GDP per capita
dlifefullfem	The difference between life expectancy and retirement age, female
dlifefullmale	The difference between life expectancy and retirement age, male

The following table (Table 2) actually contains the entire database that we used during the investigation. This table summarizes the mandatory retirement age and life expectancy at birth for women and men for each country. In addition, the table also includes total life expectancy and GDP per capita.

Table 2. List of countries

Country	Code	Fullfem	fullmale	lifefem	lifemale	lifetot	GDPPC
Albania	ALB	61,3	65	79,173	74,087	76,463	4857,112
Andorra	AND	..	..	..	..	..	36616,1
Armenia	ARM	63	63	77,35	66,554	72,043	4522,319
Austria	AUT	60	65	83,8	78,8	81,23902	45238,39
Azerbaijan	AZE	63	65	73,287	65,646	69,366	5345,441
Belarus	BLR	58	63	77,697	67,298	72,37068	6457,752
Belgium	BEL	65	65	84,4	79,5	81,89024	42971,06
Bosnia H.	BIH	65	65	77,53	73,108	75,3	5947,821
Bulgaria	BGR	61,8	64,4	75,1	68,1	71,51463	8641,819
Croatia	HRV	63	65	79,6	73,4	76,42439	15396,11
Cyprus	CYP	65	65	83,204	79,209	81,203	28329,32
Czechia	CZE	62,2	64,2	80,6	74,3	77,37317	20085,46
Denmark	DNK	67	67	83,3	79,6	81,40488	58359,58

Country	Code	Fullfem	fullmale	lifefem	lifemale	lifetot	GDPPC
Estonia	EST	65	65	81,3	72,4	76,74146	21707,24
Faroe Islands	FRO			85,7	81,4	83,49756	56689,35
Finland	FIN	64,3	64,3	84,7	79,3	81,93415	46259,2
France	FRA	67	67	85,5	79,3	82,32439	38045,9
Georgia	GEO	60	65	76,681	66,803	71,694	4931,733
Germany	DEU	65,9	65,9	83,38	78,54	80,90098	42726,49
Greece	GRC	67	67	83	77,5	80,18293	18907,85
Greenland	GRL			72,72	69,65	71,14756	48514,53
Hungary	HUN	65	65	78	71,1	74,46585	15533,61
Iceland	ISL	67	67	84,5	81,8	83,11707	53825,26
Ireland	IRL	66	66	84,1	80,2	82,10244	88966,67
Italy	ITA	67	67	85,1	80,6	82,79512	31600,71
Kazakhstan	KAZ	60,5	63	74,03	66,33	70,23	11298,36
Kosovo	XKX	65	65	79,553	74,151	76,806	4429,976
Kyrgyz Republ.	KGZ	58	63	76,1	67,9	71,9	1151,097
Latvia	LVA	64,3	64,3	78,2	68,6	73,28293	16609,08
Lithuania	LTU	63,7	64,3	79	69,9	74,33902	18233,63
Luxembourg	LUX	65	65	84,9	80,7	82,74878	107792,2
Moldova	MDA	60	63	73,547	64,443	68,846	3661,303
Montenegro	MNE	62,3	66	77	70,8	73,82439	7390,305
Netherlands	NLD	66,6	66,6	83,1	79,9	81,46098	48301,53
North Macedonia	MKD	62	64	76,77	72,41	74,53683	5365,476
Norway	NOR	67	67	84,7	81,7	83,16341	77805,01
Poland	POL	60	65	79,7	71,7	75,60244	15850,29
Portugal	PRT	66,6	66,6	84,3	78	81,07317	20835,11
Romania	ROU	61,9	65	76,7	69,4	72,96098	11617,99
Russian Fed.	RUS	56,5	61,5	74,77	64,21	69,36122	10301,67
San Marino	SMR	66	66	..	..	..	45269,47
Serbia	SRB	63,3	65	75,64	69,96	72,73073	7113,575
Slovak Republ.	SVK	62	63	78,3	71,3	74,71463	18513,09
Slovenia	SVN	65	65	84	77,9	80,87561	24744,84
Spain	ESP	67	67	86,2	80,3	83,17805	26125,87
Sweden	SWE	62	62	85	81,4	83,1561	54422,92
Switzerland	CHE	64	65	85,9	81,9	83,85122	87339,76
Tajikistan	TJK	58	63	73,734	69,568	71,594	1281,961
Turkiye	TUR	58	60	79,121	73,04	76,032	13341,56

Country	Code	Fullfem	fullmale	lifefem	lifemale	lifetot	GDPPC
Ukraine	UKR	60	60	74,36	65,16	69,6478	2452,983
UK	GBR	66	66	82,8	78,7	80,7	45334,16
Uzbekistan	UZB	55	60	73,39	68,334	70,862	3356,033

Source of data: World Development Indicators (WDI 2023)

The countries were arranged in descending order based on GDP per capita and divided into four equal parts, resulting in four quartiles. We also displayed the countries in descending order within the quartiles (see Table 3).

Table 3. List of countries in the four quartiles*

Q1	Q2	Q3	Q4
Luxembourg	Austria	Slovak Republic	Belarus
Ireland	Belgium	Lithuania	Bosnia and H.
Switzerland	Germany	Latvia	North Macedonia
Norway	France	Poland	Azerbaijan
Denmark	Andorra	Hungary	Georgia
Faroe Islands	Italy	Croatia	Albania
Sweden	Cyprus	Turkiye	Armenia
Iceland	Spain	Romania	Kosovo
Greenland	Slovenia	Kazakhstan	Moldova
Netherlands	Estonia	Russian Fed.	Uzbekistan
Finland	Portugal	Bulgaria	Ukraine
United Kingdom	Czechia	Montenegro	Tajikistan
San Marino	Greece	Serbia	Kyrgyz Republic

Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

The following table (Table 4) provides the main descriptive statistics for the entire sample. So we can see the average, the minimum and maximum value and the range for the main variables. It can be seen from the sample element number (N) that there are only a few missing values.

Table 4. Descriptive statistics of variables

	N	Range	Minimum	Maximum	Mean
fullfem	49	12,00	55,00	67,00	63,1469
fullmale	49	7,00	60,00	67,00	64,6347
lifefem	50	13,48	72,72	86,20	80,0107
lifemale	50	17,69	64,21	81,90	73,9180
lifetot	50	15,01	68,85	83,85	76,8995
lifediff	50	8,10	2,70	10,80	6,0927
GDPPC	52	106641,09	1151,10	107792,19	27700,3082
Valid N	48				

Source of data: World Development Indicators (WDI 2023)

The following table (Table 5) presents the main variables by quartile. From this we can learn that in the first quartile there is only a very small difference between the mandatory retirement age for women and men. However, as income decreases in the further quartiles, women can retire earlier than men. This difference is already significant in the poorest quartile. Compared to this, the difference in life expectancy at birth also increases as we move downwards, but in favour of women. In the last two columns of the table, we calculated how many years men and women live on average after retirement. Based on the above, with the decrease in income, the number of years spent as a pensioner is increasing among women and men. Below the median income, men live only five years after retirement and women 15 years. It directly follows that there is no scope for raising the retirement age in the poorer Eastern European and South Asian countries.

Table 5. Means in the four quartiles

Quartile	fullfem	fullmale	dffullmf	lifefem	lifemale	lifetot	difflife	GDPPC	dlifefullfem	dlifefullmale
1	65,54	65,63	0,09	83,45	79,69	81,52	3,76	62990,74	18,81	14,93
2	65,23	65,81	0,58	83,73	78,03	80,81	5,70	30610,33	18,51	12,22
3	61,72	63,96	2,25	77,32	69,83	73,50	7,49	13064,70	15,60	5,87
4	60,64	63,38	2,75	76,09	68,88	72,42	7,21	4135,46	15,45	5,50
Total	63,15	64,63	1,49	80,01	73,92	76,90	6,09	27700,31	16,96	9,24

Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

If we only focus on these two variables (the difference between life expectancy and retirement age of male and female), we can see that there is a huge difference between the richest and the poorest countries in this respect (Table 6, Figure 1. and Figure 2.). In Sweden, men live almost 20 years, in Austria, women live more than 23 years after retirement.

Table 6. Differences in the four quartiles

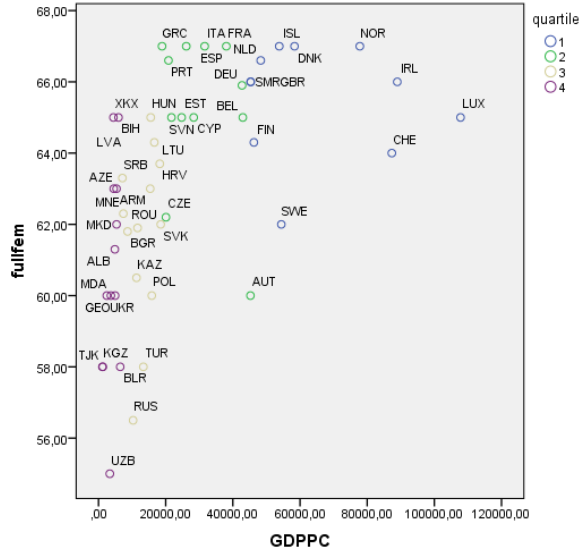
Quartile		dlifefullmale	dlifefullfem
1	Mean	14,9300	18,8100
	Minimum	12,60	16,30
	Maximum	19,40	23,00
2	Mean	12,2208	18,5070
	Minimum	7,40	16,00
	Maximum	14,50	23,80
3	Mean	5,8723	15,6047
	Minimum	2,71	12,34
	Maximum	13,04	21,12
4	Mean	5,4971	15,4517
	Minimum	,65	10,29
	Maximum	9,15	19,70
Total	Mean	9,2448	16,9566
	Minimum	,65	10,29
	Maximum	19,40	23,80

Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

As income increases, the mandatory retirement age for men and women also seems to increase (see Figure 1 and Figure 2). These curves are similar to the Preston curve (1975) as the retirement age is somewhat adapted to life expectancy. Inequality between men and women is observed mainly in poorer countries.

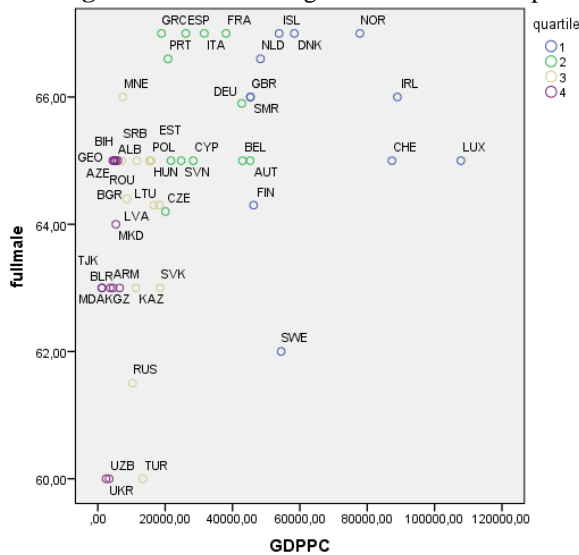
Figure 1. Retirement age for women and GDP per capita



Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

Figure 2. Retirement age for men and GDP per capita

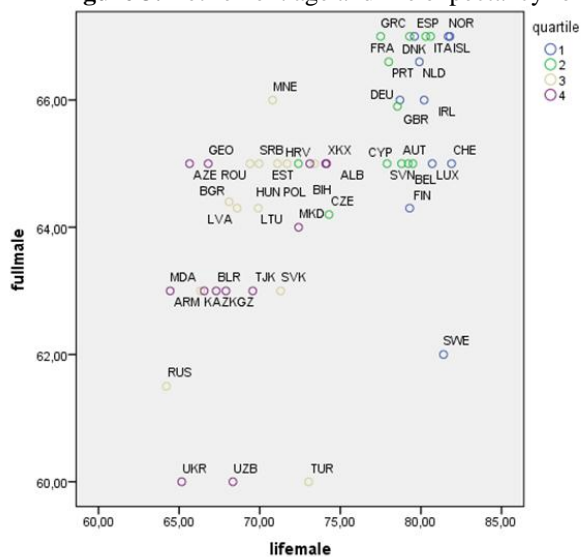


Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

A positive correlation can be observed between men's life expectancy and retirement age (Figure 3). However, there are outliers, in Sweden and Turkey the retirement age is relatively low compared to life expectancy.

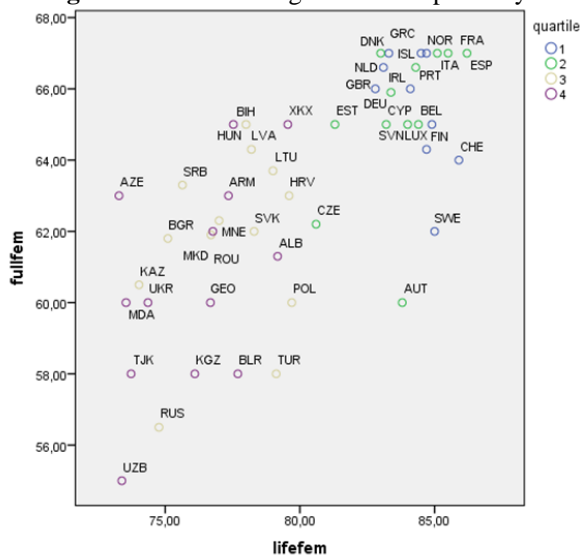
Figure 3. Retirement age and life expectancy for men



Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

Figure 4. Retirement age and life expectancy for women

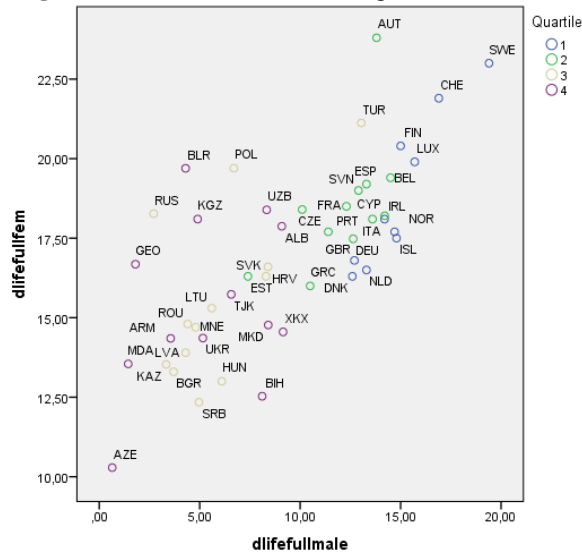


Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

We can observe outliers in the case of women as well (see Figure 4). Sweden, Austria and the Czech Republic keep the mandatory retirement age for women relatively low.

Figure 5. Years after retirement age alive for men and women

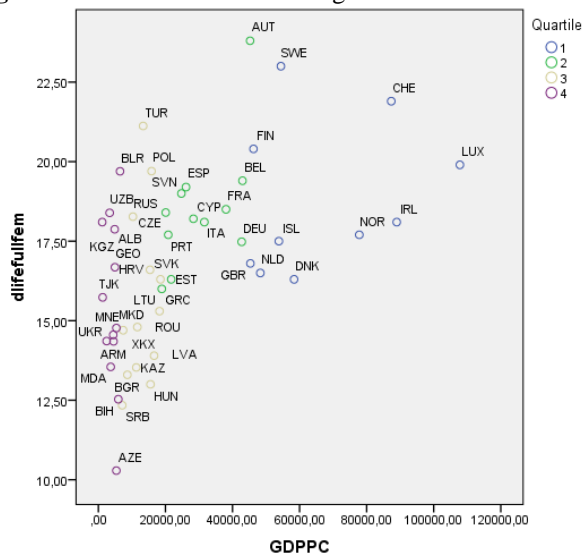


Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

Based on the Figure 5 above, having a look at the scales in the X and Y axes, women clearly live more years after retirement than men, the difference is particularly large in poorer countries.

Figure 6. Years after retirement age alive for men and GDP per capita

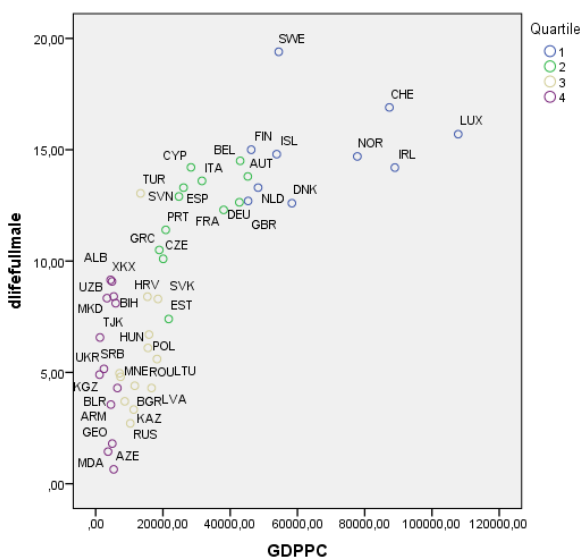


Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

In Figures 6 and 7, we followed an approach similar to the Preston curve, with the difference that the vertical axis does not show life expectancy, but the number of years after retirement. A similar pattern can be observed as the Preston curve especially for women. As income increases, the number of years of retirement increases strongly, and further income growth no longer means a significant increase in the number of years after retirement. So the sustainability problem is more serious in poorer countries, because it would not be fair to raise the retirement age, especially for men.

Figure 7. Years after retirement age alive for women and GDP per capita



Source of data: World Development Indicators (WDI 2023)

*The quartiles are based on GDP per capita

4. Conclusions

The results of the article can be briefly summarized as follows. In Eastern European and Asian countries, there is much less scope for raising the retirement age. In poorer countries, the relative situation of men is much worse (compared to richer countries or women). The figures of the paper point out that it would not be fair, especially for poor countries, to raise the retirement age for the sake of sustainability, because then the retirement age would be very close to or exceed life expectancy. In richer countries, the retirement age can and probably should be raised for the sake of a sustainable pension system. There is a trade-off between a fair and a sustainable pension system (in terms of retirement age).

The analysis clearly shows that there is a positive relationship between retirement age and life expectancy. While life expectancy is an endogenous variable that also reflects people's health status, the retirement age is an exogenous factor that is only a matter of political decision as to whether it adapts to life expectancy. As income increases, life expectancy increases faster than the retirement age, so the average number of years of retirement is higher in richer countries.

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