AGE AT RETIREMENT IN THE EUROPEAN UNION. HOW FAIR IS IT?

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Abstract

In most of the European Union countries, the retirement age is about 65 years for both genders; though the diversity among them is significant. Besides any statutory regulations, several other factors influence the retirement behaviours and typically shorten the real exit time of people from the labour market. Additionally, a balancing mechanism which links retirement age with life expectancy at birth has been introduced in many countries. We argue that this link can be misleading. Life expectancy at birth is affected by the mortality rates throughout the entire human life span, and thus it may not represent the mortality of the senior people correctly. Also, it may give a distorted picture of peoples' real working capabilities near their retirement age. For that, we propose that the retirement age must be linked with the health level of a population by the time of retirement instead with the life expectancy at birth. Also, modal age at death could be an alternative measure of longevity. Thus, we applied the first exit time theory and calculated the health levels during effective exit and retirement ages. Results indicate the existence of significant disparities among the European countries regarding the pension system and the health of pensioners. These differences show that the bureaucratic regulation of pension systems cannot be effective unless further adjustments are made considering the health levels of the workers in order to achieve the desired convergence between European countries.

Key words: retirement age, effective exit age, exit time theory, pensions' health disparities.

JEL Code: I1, J10, J26

Introduction

The pension system in Europe encompasses three pillars. The first one grounds on the financing of pensioners by the current workers. Some countries 'have switched part of their social security pension provision into statutory funded pension schemes', this being the second pillar. The third one describes the private social security programs (Eichhorst et al., 2011). Over the last 20 years the pension system has been continuously reformed in most of the European Union's Member States. Several rules and parameters have been substantially modified including pension age, benefits and financing resources. The general idea is to control future pension expenditure trends. However, there is a widespread discussion for the current and future trends of the pension system, as well as its viability and fairness (Carone et al. 2016).

For several European countries any reformations of the pension system are controlled by automatic mechanisms which account for components of demographic pressure, i.e. for longevity and age dependency ratio (Carone et al. 2016). Thus, in some of them, the retirement age is linked to life expectancy at birth (for example in Italy, Finland and Portugal; European Commission, 2017).

However, such a direct relationship is ambiguous. Life expectancy at birth, is indeed a longevity measure (a mean duration of life) of a hypothetical cohort of people if a period age pattern of mortality is observed throughout their entire life (Preston et al., 2001). Nonetheless, life expectancy at birth is affected by the mortality levels during infancy, childhood, puberty and young-middle adult life (Horiuchi et al., 2013), not to mention that it is subject to other factors, such as cohort effects (see Bongaarts & Feeney, 2003). Consequently, the capacity of life expectancy at birth to describe the real longevity status of the senior people is questionable.

Additionally, if life expectancy at birth differs significantly between two populations, or within the same population between two time points, this does not necessarily mean that mortality rates differ in the same magnitude, or even in the same direction at all ages (Arriaga 1984). This fact obviously refers to senior people too. Thus, the mechanism prerequisites for the automatic adjustment of retirement age become questionable and the temporal trends of longevity cannot be directly related to pension age, unless a decomposition of these trends by age is carried out and the developments in the older people are taken into consideration.

Moreover, people near retirement age may not have the same working physical and mental capabilities: their health could differ significantly for several reasons, including the different prevalence of the diseases and environmental, cultural, political and socio-economic reasons (WHO, 2109). Thus, the health status of a population must be an essential way to check for consistencies and inconsistencies in the pension systems of the EU Member States.

In this paper we the propose an alternative longevity measure instead of life expectancy at birth and we discuss the existing health differences among the EU countries in order to evaluate the current pension system in relationship to the real working capabilities of retiring people and explore the diversity between these countries. We calculate the health level of these populations by gender based on First Exit Time Theory. Details are given in the following paragraphs.

1 Modal age at death and the health status of a population

1.1 Modal age at death

Life expectancy at birth is directly related to a life table's death curve, which is bimodal. The first mode corresponds to infant mortality and the second one to the old age heap of deaths. Currently, infant mortality rates are low in almost all European countries, meaning that the first mode of the curve declined. As a result, the old age mortality, i.e. the relevant death heap, became an essential factor for the regulation of longevity or the developments in mortality transition (see Zafeiris and Kostaki, 2019).

If the adequacy of life expectancy at birth to describe longevity shifts or differences is doubtful - as it was discussed in the introductory section of this paper - it is necessary to take into consideration alternative measurements. Life expectancy at age 65 might be one, although it tends to underestimate old-age mortality shifts (see Horiuchi et al., 2013). Instead, a widely used indicator is the "Modal Age at Death", which represents the age where the maximum number of deaths occur (see Zafeiris & Kostaki, 2019). This indicator, unlike life expectancy at birth, is directly related to the old age survival and it is not affected by the mortality patterns in younger ages. Thus, if the problem is an assessment of longevity, which will be linked with the time of retirement of senior people, it seems that Modal age at death must replace life expectancy at birth.

1.2 The First Exit Time Theory and its applicability in the estimation of the health level of a population.

Even if human health follows a stochastic and thus totally unpredictable path for each individual, such a process can be modelled by applying the stochastic analysis theory. In this approach, a first exit time model is created, which in its typical form encompasses a parent stochastic process and a boundary, barrier or threshold indicating a stopping condition for the process under consideration (see Lee and Whitmore, 2006). In the mortality approach, this barrier is denoted by death. When a person is alive, his health level is above this barrier. Death comes when an individual's health falls below this barrier and the person exits from the population. Then, the problem for a population is how to calculate its health levels throughout human life span based on this information.

Jansen and Skiadas (1995) were of the first who used dynamic modelling and stochastic simulations in order to estimate the Health State Function of a population. Later, this approach was further developed and elaborated (Skiadas and Skiadas 2010; 2014; 2018a, 2018b where the mathematical calculations and proves). First, a life table is constructed and a death probability density function g(x) is calculated as:

$$g(t) = (1+(c-1)(bt)^c)/\sqrt{2\sigma^2\pi t^3}\,e^{-\frac{(1-(bt)^c)^2}{2\sigma^2 t}}$$

where t is the age and all the other letters correspond to parameters. Afterwards, a simple model for the calculation of the health state by age [H(t)] is applied. This model is of the form:

H(t)=1-(bt)^c

Thus, if the original health level of a population is 1, this level is decreasing by (bt)^c in each age. By taking into consideration the retirement ages, one can easily compare the gender or the by country differences in the health of the pensioners.

However, another thing must be taken into consideration before the analysis. Besides the statutory retirement age in every one of the EU Member States, several other factors (like early retirement schemes and incentive policies) influence the retirement behaviours of people and, as a result, the real exit time of people from the labour market is shorter in most countries. This exit time is called 'effective exit age' by the European Commission (2018) and will be used afterwards for the evaluation of the health differences at retirement.

2 Data

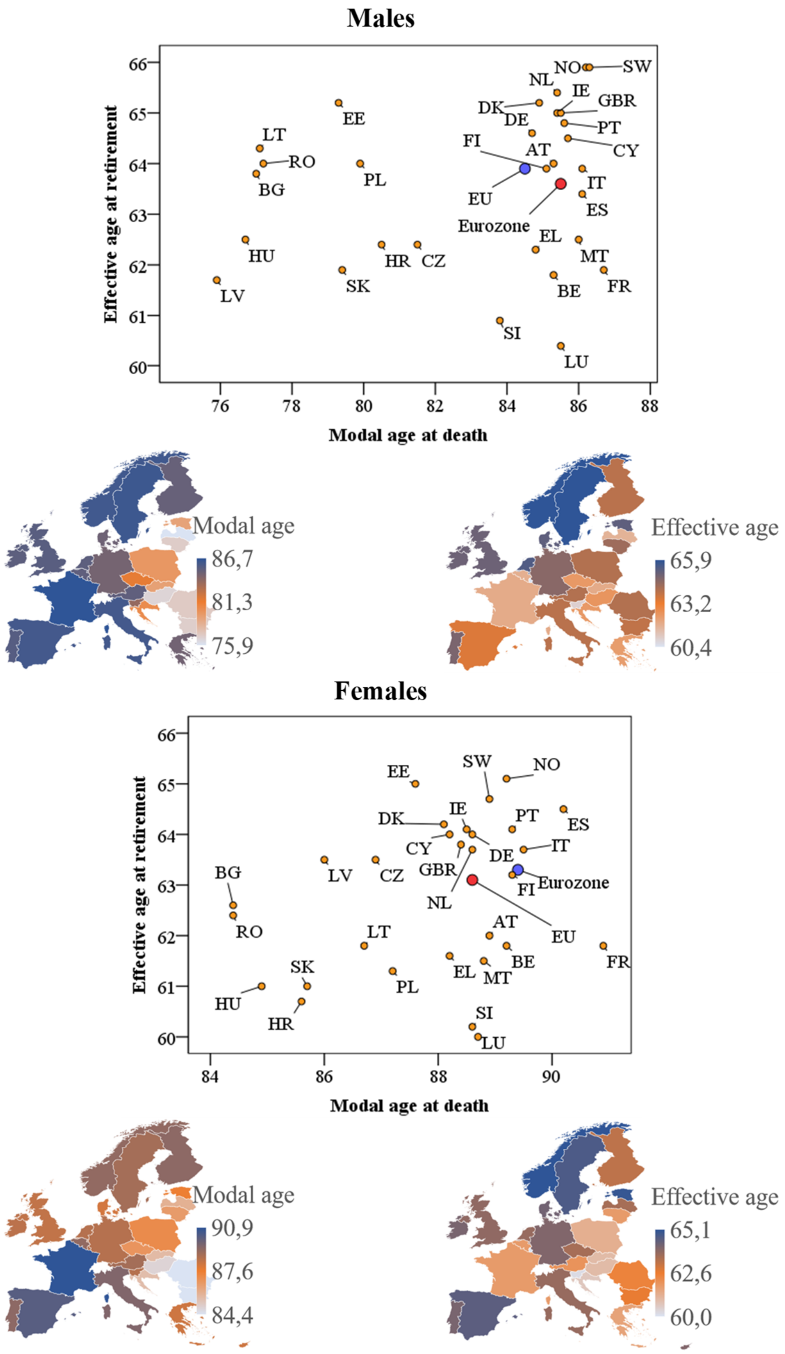
Data come from the Eurostat database (https://ec.europa.eu/eurostat/data/database). The annual deaths and population for each EU member states were collected. Average population per year is the mean population of two successive Januaries. Data for effective exit age per country and gender come from European Commission (2017). Statutory retirement ages come from Express UK (https://www.express.co.uk/finance/personalfinance/1150595/state-pension-age-uk-2019-changes-rises-what-is). All the analyses refer to year 2017.

Finally, modal age at death was calculated as the age of maximum death rates with one decimal precision. An excel sheet was used, which has been developed for the 'Demographics 2019 Workshop' of 'The 18th Conference of the Applied Stochastic Models and Data Analysis International Society' held in Florence 11-14 June 2019 (available at: http://www.asmda.es/demographics2019.html)

3 Results

A first evaluation of the pension systems in EU emerges from Figure 1, in which the modal age at death – as a measure of longevity – is plotted against the effective retirement ages in the EU member States (Norway is also included besides the fact that it is not currently an EU country, in order to illustrate the situation in the Scandinavian countries).

Fig. 1: Modal age at death and effective age at retirement.

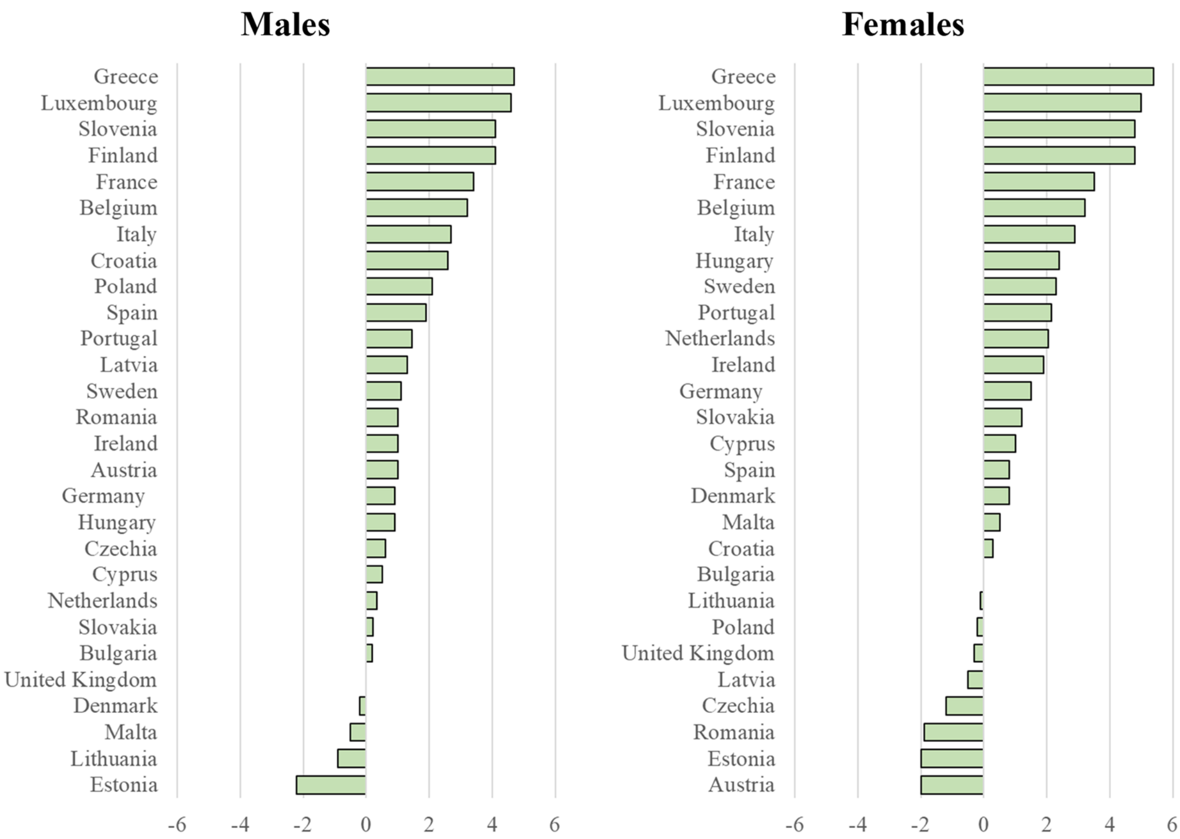


Data source: own calculations based on Eurostat data

Abbreviation of States: Austria: AT, Belgium: BE, Bulgaria: BG, Croatia: HR, Cyprus: CY, Czechia: CZ, Denmark: DK, Estonia: EE, Euro area: Eurozone, European Union: EU, Finland: FI, France: FR, Germany: DE, Greece: EL, Hungary: HU, Ireland: IE, Italy: IT, Latvia: LV, Lithuania: LT, Luxembourg : LU, Malta: MT, Netherlands: NL, Norway: NO, Poland: PL, Portugal: PT, Romania: RO, Slovakia: SK, Slovenia: SI, Spain: ES, Sweden: SW, United Kingdom: GBR.

Effective exit time from the labour markets ranges between 60.4 and 65.9 years in males and 60 and 65.1 years in females. Thus, the differences among the countries are more than 5 years in both genders. The diversity of longevity between these countries is even greater. The range of Modal age at death is about 11 years in males and 16 in females. Most of the Socialist countries are in the less favourable position. Thus, despite the general idea of linking longevity with pension, currently such a relationship does not exist. Countries like Ireland (IE), for example, in which Modal age at death is high, have almost the same effective exit age with others, like Estonia (EE), in which mortality is higher (see males in Figure 1). This constitutes the first disparity of the pension systems in Europe.

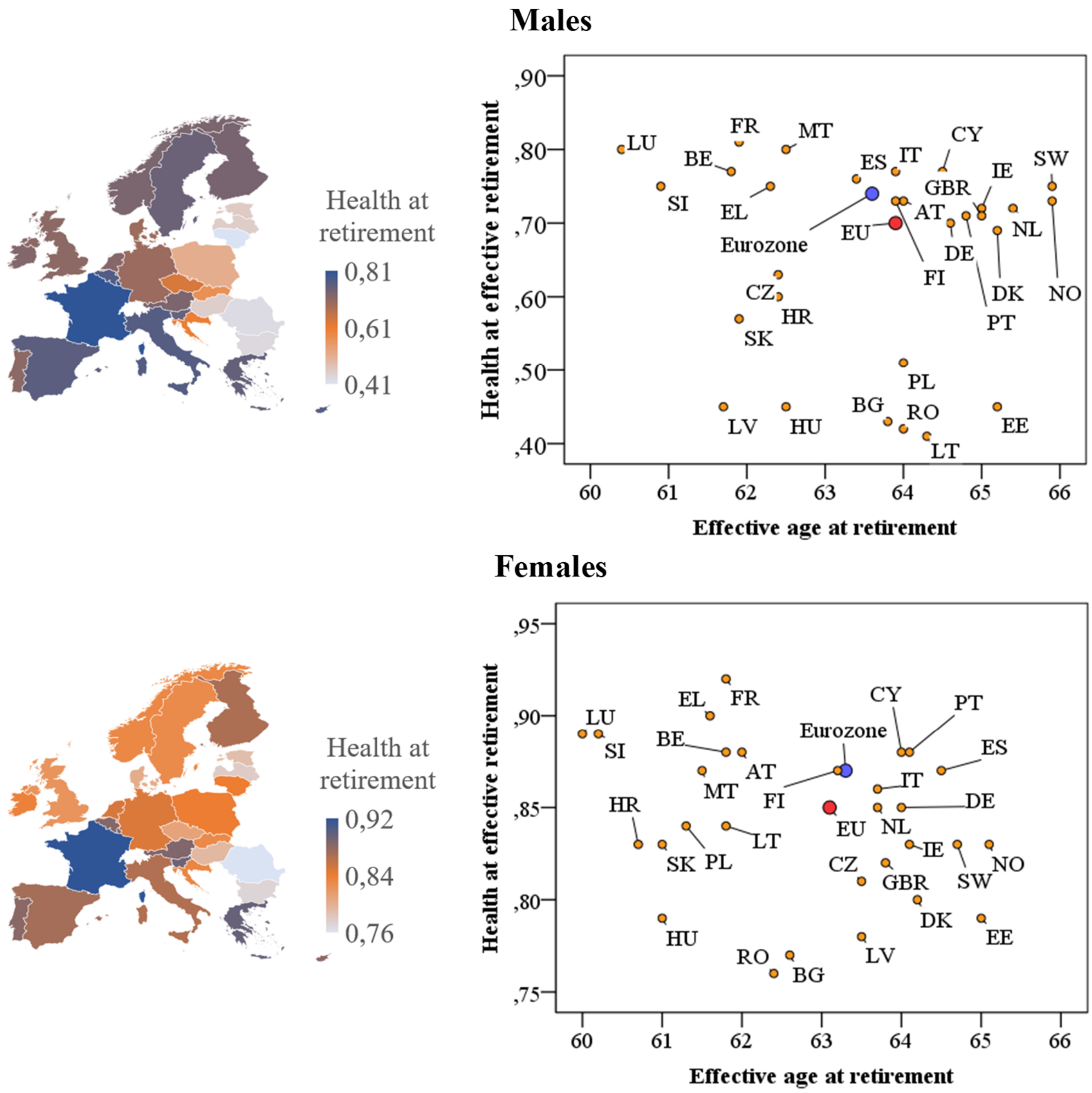
Fig. 2: Difference in years between the pensionable age and the effective exit age from the labour market.



Data source: own calculations based on Eurostat data

A second disparity comes from the time distance between effective exit time and the statutory pension age (Figure 2). In most of the European countries and in both genders the effective exit age is lower than the statutory one. The differences are highest in countries like Greece, Luxembourg and Slovenia. In some countries, like Estonia, effective exit age is higher than the retirement age. Obviously, the legal arrangements of the pension system in each country are affected by several political and socio-economic factors which account for such divergences between the effective exit time (real pension age) and the statutory age limits in working life.

Fig. 3: Effective age and health at retirement.



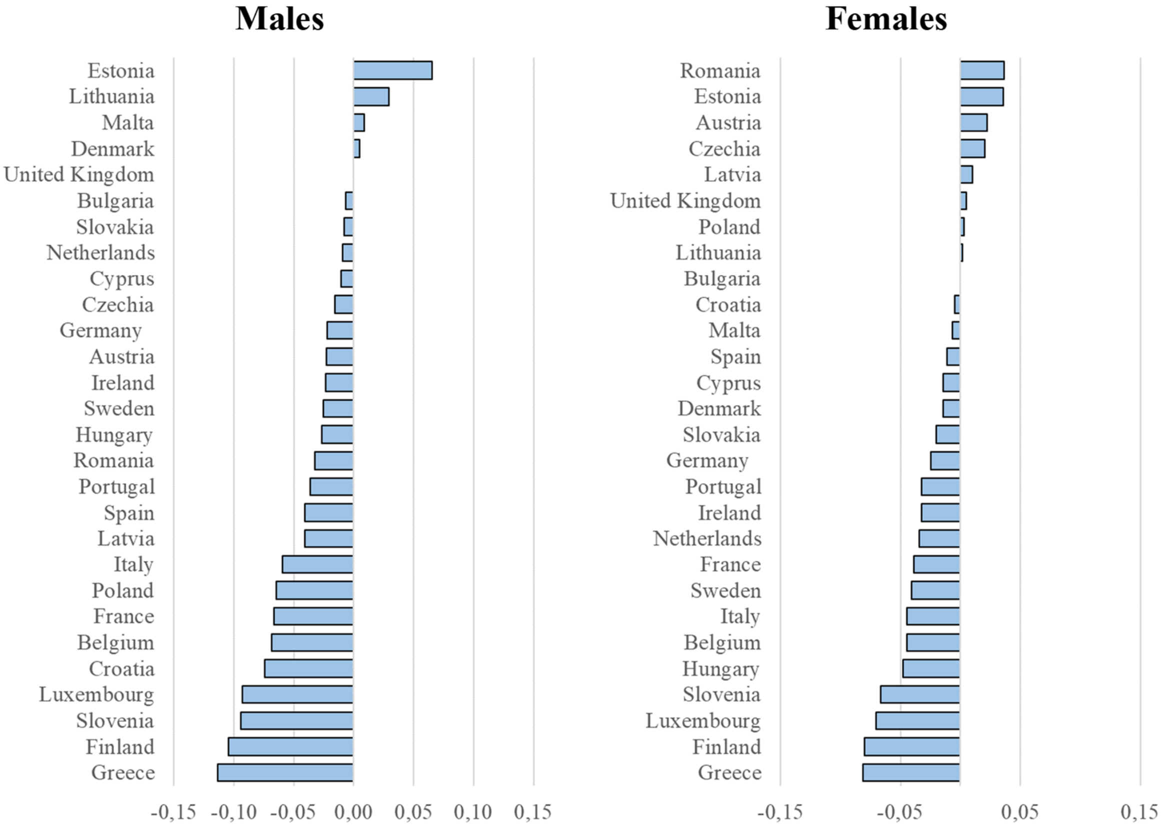
Data

source: own calculations based on Eurostat data

However, the most important disparity of the pension systems comes if the effective age at retirement is screened against health at this age (Figure 3). Obviously, the less advantaged people come from the former Socialist countries in both genders. A characteristic example are the males of Lithuania, who have almost the half level of health in comparison to those of France by the time of their effective age form the labour market.

Obviously, the real working capabilities of senior people are not taken into consideration in the planning and legal arrangements of the pension systems in the European Union. The development of social and economic policies aiming to achieve the convergence of mortality and health among the European countries must be done. Another matter which needs attention is the gender differences. However, this will not be discussed in this paper due to space limitation.

Fig. 4: Health differences between pension age and the effective exit age from the labour market.



Data source: own calculations based on Eurostat data

A final question remains to be answered. If the effective exit age from the labour market will be equated with the statutory pension age, what will happen with the health of the pensioners? The answer is straightforward: in most of the European countries, and in both genders, the pensioners would have worse health by the time of their retirement, and only in few countries their health would be better (Figure 4). This finding raises questions about the link between longevity and retirement age. Obviously, this link emanates from the striving of restriction of the financial cost of pensions without considering the employee's health. Thus, such a bureaucratic approach cannot be sustainable, as people's health level and longevity do not perfectly coincide.

Conclusion

There are many disparities concerning the pension system among the European countries. The first disparity comes from the age at retirement which is significantly variable among them. At the same time, the longevity diversity is significant, and in reality, it is not taken into consideration concerning the retirement ages. Furthermore, the time distance between effective exit time and the statutory pension age is positive in most of the countries. However, the most important disparity between EU member States is the health level of the pensioners by the time of their retirement. If the effective exit age from the labour market and the statutory pension age are equated, people would get their pension in a worse health state. This fact raises questions about the direct link between longevity and retirement age.

These differences show that the bureaucratic regulation of pension systems cannot be effective unless further adjustments are made considering the health levels of the workers in order to achieve the desired convergence between European countries.

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