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THE DETERMINANTS OF EFFECTIVE RETIREMENT AGE – A CROSS-COUNTRY ANALYSIS

Abstract:

To restore the long term sustainability of pension schemes and improve pension benefits adequacy in recent years many countries have raised the statutory retirement age. According to official reports, however, there is a significant difference between statutory and actual (effective) retirement age. While in some countries the former is considerably higher than the latter, in other it is quite the opposite. Thus a question which underlays this research appears: what determines the effective retirement age? To answer these questions the study objectives are 1) to identify and discuss potential factors affecting retirement decisions; 2) to estimate the impact of the identified factors on the decision to retire.

The empirical analysis in the study is based on the cross-country analysis of 34 OECD countries. To assess the impact of different variables on the effective retirement age we use a multivariate regression model. The model considers variables related to general economic conditions, health, and pension system architecture. Moreover, we also add to a model a dummy variable which informs whether a country is a European one or not. To fit the model and eliminate the highly correlated independent variables we apply the stepwise regression with forward selection. Taking into account the persistent gender differences, we calculate two separate models for men and women.

The results of our regression model show that the most significant influence on the retirement age has: perceived health status, life expectancy and the employment rate of people aged 60 to 64. Furthermore, we observe a noticeable impact of “being a European country” variable - simply being the European country leads to 3,76 lower retirement age for men and 2,78 for women. We also find that effective retirement age is positively and statistically significantly correlated with the relative poverty of the elderly, and negatively with old-age dependency ratio and replacement rate. There is also a strong, negative correlation between a dummy “being a European country” variable and effective retirement age. Interestingly, we find no evidence that variables related to pensioners’ income (the level of GDP per capita or disposable incomes of people aged over 65 and average wages) affect the effective retirement age.

As our model is not capable to fully explain the differences in effective retirement age in analysed countries, we believe that apart from the quantitative parameters regarding economic conditions; financial incentives and pension system architecture; and health and demographic that are considered in the model, also other, rather qualitative factors, influence retirement decisions. We suppose that among these factors are mainly attitudinal and behavioural

Keywords:

retirement age, statutory retirement age, effective retirement age, professional activity

JEL Classification: J26, H55, J14

1 Introduction

Due to ageing populations, the pension schemes in developed countries are facing many challenges nowadays. This demographic pressure requires serious, forward-looking actions to restore long-term financial sustainability and preserve the financial viability of pension schemes. Another critical issue for policymakers is the introduction of more adequate pension benefits.

These goals may be achieved with different methods, the most obvious of which is reform of pension systems. Such reforms can focus either on fundamental aspects (e.g. switching from defined benefits to defined contribution formulas) or changes to the parameters of existing systems (e.g. level of contribution, retirement age). Over recent decades, many countries have been adjusting their pension schemes to ensure their sustainability and adequacy. One of the most frequent actions undertaken by developed countries is increasing the statutory retirement age. According to (OECD 2017b), there are plans to increase the normal retirement age in 18 of the 36 (as of 2019) OECD member countries; furthermore, three countries (Iceland, Israel, and Norway) have already implemented a retirement age of 67.

The majority of reports, however, indicate that there is a significant difference between statutory and actual (effective) retirement age; in fact, in most developed countries the former is considerably higher than the latter. On average, the effective retirement age of men in the European OECD member countries is 0.6 years lower than the statutory pensionable age; for women, this difference is 1.2 years. On the other hand, the situation in non-European OECD members is quite the opposite: the effective retirement age for men is 4.3 years higher than the statutory retirement age; the respective value for women is 3.6 (OECD 2017b). Thus, the important question which underlies this study appears: *what are the determinants of the effective retirement age*? On the operational level we seek for answers for the following research questions: *Why effective retirement age in many countries differs from statutory retirement age? What factors have an influence on effective retirement age in analysed countries? What is the extent of this impact and which factors play the most significant role?*

The main goal of the study is to identify the determinants of the effective retirement age and estimate their impact on the retirement decisions on the country level. In order to answer the auxiliary questions, this study aims to meet the following specific objectives: 1) to present to differences between statutory and effective retirement age in the selected countries; 2) to identify potential factors that affect retirement decisions; 3) to estimate the impact of the identified factors on the decisions to retire.

The remainder of this paper is organised as follows. Section 2 provides a broad literature review and discusses the main findings related to the determinants of the effective retirement age. Section 3 presents the observed discrepancies between official and statutory retirement ages in the majority of OECD countries. The methodology of the performed cross-country analysis is presented in Section 4. Section 5 provides the results and discussion. The paper ends with conclusions in which some final remarks are made.

2 Background – the literature review

When analysing the existing body of literature, first of all one can identify at least three different research methods that have been applied in previous studies.

The first group of methods is analysis of survey data. The pioneering work here is the study of Steiner and Dorfrman (1959), in which they found that poor health was the reason for 79 per cent of all voluntary retirements. Other examples of survey-based studies are (Boskin, 1977), (Uccello, 1998), and (Montalto, et al., 2000). More recent examples are the studies of (Lamprianou, 2012) and (Vermeer, 2016).

The second group of methods is based on statistical analysis of economic data sets of potential factors that influence retirement decisions; studies in this group use either cross-sectional or time-series analysis (Bloemen, 2011). In addition to standard statistical analysis, there have also been attempts to apply other less common tools to describe the determinants of effective retirement age. One example is the study by Bernal and Vermeulen (2014), in which they make use of dynamic programming to address the impact of an increase in the statutory retirement age on the effective retirement age.

The third group of methods is meta-analysis of existing literature in which a unique synthesis of previous studies is performed. Excellent examples of this kind of study are the research conducted by van Erp et. al and Fisher et al. (van Erp, et al., 2014; Fisher, et al., 2016). There are also studies that attempt to use economic models to describe retirement behaviour. For example, the studies by Fields and Mitchell (1984) and Gustman and Steinmeier (1985) attempted to predict changes in effective retirement age caused by changes in normal retirement age.

In studies on the determinants of effective retirement age, one can also distinguish detailed studies that either focus on a single country or on extensive cross-country analyses. The results of the former are usually more precise and accurate and reflect the specifics and characteristics of the analysed country's population. Particularly interesting studies that focus on a single country are (Montalto, et al., 2000) and (Blanchett, 2018) for the US; (Banks, et al., 2007) for the United Kingdom; (Bernal & Vermeulen, 2014) and (Vermeer, 2016) for the Netherlands; (Euwals, et al., 2010) for Denmark. The outcomes of cross-country analyses are generally more useful in identifying general trends and making international comparisons, although this kind of study tends to underestimate country-specific factors such as culture, social norms and attitudes towards work and retirements. Examples of the cross-country approach are (Lamprianou, 2012) and (Axelrad & Mahoney, 2017).

In the standard approach, the determinants of retirement are perceived as factors that impact the actual retirement age. Another look at the retirement age focuses on factors that influence the planned retirement age; in this approach, the emphasis is put on individual decisions about retirement. As Hall and Johnson (1980) point out, an individual's decision to retire depends only partially upon individual preferences, opportunities, and unforeseeable events that are beyond the individual's control. Studies on planned retirement age may be carried out either on a group of people before

retirement (ex-ante) or retirees (ex-post) (Montalto, et al., 2000); in the literature there are examples of both types of studies. A well-conducted prospective piece of research was presented by Hall and Johnson (1980). In some more recent ex-ante studies, the categories of expected retirement age and the probability of retiring are also considered (Blanchett, 2018). A great example of the retrospective approach is the research by Steiner & Dorfrman (1959). However, it is worth mentioning here that when discussing ex-post studies, one can raise concerns over whether such studies are biased by the changed viewpoint of people who have already decided to retire.

The body of literature takes into account a vast range of different factors that have a potential influence on retirement decisions. In his seminal study, Boskin (1977) showed that the level of social security benefits has a strong negative effect on the decision to retire. Quinn (1977) found that the most important determinants of retirement age are health status and pension eligibility. The factors with secondary importance are personal characteristics, local labour market conditions, and the attributes of each individual's job. Fields and Mitchel (1984) showed that retirement decisions are strongly influenced by base wealth and expected retirement income. In another study, they also argue that retirement age depends on pension system rules and differences in workers' preferences (Mitchell & Fields, 1984).

Of the many considered factors, the most significant and most frequently analysed seem to be the financial aspects of pension schemes, whose impact as a prime determinant of retirement behaviour is proven and well documented in the literature (see, e.g. (Gruber & Wise, 2004)). Burtless (1986) showed that higher personal wealth induces lower effective retirement age. Considering, among others, social benefits. and the level of permanent income, Diamond and Hausman (1995) argued that these factors positively correlate with lower planned retirement age. Montalto et al. (2000) also found that the level of financial and nonfinancial assets influences planned retirement age (the more assets, the lower the planned retirement age). The correlation between earlier retirement and the level of income and employment characteristics was also positively verified by Uccello (1998).

However, the impact of strictly financial factors on retirement decisions is limited. For example, Lumsdaine and Mitchell (1999) found that the effect of financial incentives explains not more than half of the observed variation in Americans' retirement behaviour. In the financial context, Mastrobuoni (2009) claimed that the actual response to an increase of the statutory retirement age is more substantial than predicted by financial incentives alone. Banks, et al. (2007) conducted a detailed study on the effect of pension wealth on retirement behaviour in the UK. They found that a reduction of pension wealth of about one year of salary leads to postponement of retirement by about two months. Euwals et al. (2010) and Bloemen (2011) obtained almost identical results for Denmark and the Netherlands, respectively. The limited effects of pension wealth on retirement decisions were also proven in the study by French (2005). In addition to pension wealth, Kotlikoff (1997) found a positive and significant impact of private pension coverage on the expected age of retirement.

Apart from the financial aspects, one of the most explored drivers of early retirement is health. The influence of poor health on early retirement is well proven in the literature (e.g. (Burtless, 1986), (Diamond & Hausman, 1995), (Uccello, 1998)). Thus, the most problematic issue regarding health as a determinant of retirement age is the extent of its influence. Dwyer and Mitchell (1999) argue that health problems influence planned retirement age more strongly than economic variables; according to their estimations, men in poor health are expected to retire one to two years earlier than the national average. McGarry (2004) claims that subjective reports of health are good predictors of the expected probability of working; he also agrees that the impact of poor health on retirement plans is stronger than the impact of financial variables. Previous studies also show that retirement decisions are affected by other health-related factors (e.g. mortality risk) that are reflected in life expectancy (Hurd, et al., 2002).

Burtless (1986) finds that in addition to poor health and wealth, some personal characteristic and social factors such being married and the size of a household can also influence the effective retirement age. In his other study he finds that labour market participation in older age is positively correlated with educational attainment (Burtless 2013). Montalto et al. (2000) applied the probit regression to investigate the probability of working full-time and found that in addition to health, other personal characteristics such as life expectancy, race, current age, family status, level of education, and occupation are also significant variables.

On the most basic level, Duval (2004) noticed that the existence of an official retirement age has a profound influence on retirement decisions; he also tried to explain this phenomenon in terms of factors which are not considered in the standard age of retirement model, such as myopia, social habits, lack of information, and law limitations. Expected changes in retirement age (and also in labour supply) caused by changes in the statutory retirement age were investigated by Gustman and Steinmeier (1985) and Fields and Mitchell (1984): the results of these studies show that a rise of the statutory retirement age by two years increases the effective retirement age by about two months. Bernal and Vermeulen (2014) analysed the impact of an increase in the legal retirement age on the effective retirement age under different scenarios. They found that a sudden rise of statutory retirement age is significantly less effective than a gradual change that is spread over time. Vermeer (2016) examined the sensitivity of the expected retirement age to standard retirement ages and found that individuals expect to retire later when they are confronted with a higher reference point (age anchor).

Apart from the microeconomic and individual determinants of retirement discussed above, some authors also analyse macro factors. Goda, et al. (2011) showed that people tend to postpone retirement during economic downturns. Coile and Levine (2011) found that the unemployment rate affects the retirement decisions of lower socioeconomic status groups, while financial market fluctuations influence groups with higher socioeconomic status.

Furthermore, there are also studies that attempt to present the full range of factors that affect retirement timing. An excellent example of such a study is the work by Fisher et al. (2016), in which the authors meticulously review the existing literature and provide a

grouped list of determinants of retirement: demographic factors (e.g. age, gender, education, race); physical factors (e.g. cognitive health, mental health, economic status); psychological factors (preferences and expectations regarding retirement, attitudes toward retirement, role identity, personality characteristics); subjective life expectancy; family factors, work factors and macroeconomic factors.

3 Effective and official retirement age in OECD countries

A growing body of research finds that retirement age projections made on the basis of statutory retirement ages are inconsistent with actual retirement age decisions. Generally, people tend to retire earlier than expected (Blanchett, 2018). It is also well known that in many developed countries there is a substantial gap between the official retirement age and the effective retirement age (Bernal & Vermeulen, 2014).

Contrary to these findings, one may say that, at first glance, there are no considerable differences between the average statutory effective retirement age and the effective retirement age. The average, effective retirement age for men in OECD-member countries is 65.1, which is 0.8 years higher than the average statutory pensionable age. For women the average statutory retirement age is almost equal to the average effective retirement age. It is, however, noteworthy that on the country level there are significant differences. While in countries like Chile, Japan, Mexico, South Korea, and Turkey the effective retirement age is significantly higher than the statutory retirement age, in other countries, mostly European ones, the situation is quite the opposite (Table 1).

Table 1. Effective and official retirement age in OECD countries

Country	Men			Country	Women		
	Effective	Normal	Difference		Effective	Normal	Difference
Korea	72.0	61.0	11.0	Korea	72.2	61.0	11.2
Mexico	71.6	65.0	6.6	Turkey	66.3	58.0	8.3
Chile	71.3	65.0	6.3	Chile	67.7	60.0	7.7
Turkey	66.1	60.0	6.1	Israel	66.5	62.0	4.5
Japan	70.2	65.0	5.2	Japan	68.8	65.0	3.8
New Zealand	68.4	65.0	3.4	Mexico	67.5	65.0	2.5
Slovenia	62.3	59.3	3.0	Estonia	65.3	63.0	2.3
Portugal	69.0	66.2	2.9	Slovenia	60.9	59.0	1.9
Iceland	69.7	67.0	2.7	New Zealand	66.4	65.0	1.4
Israel	69.3	67.0	2.3	Luxembourg	61.0	60.0	1.0
Estonia	64.8	63.0	1.8	Hungary	60.7	60.0	0.7
Luxembourg	61.2	60.0	1.2	Austria	60.6	60.0	0.6
Switzerland	66.0	65.0	1.0	Switzerland	64.3	64.0	0.3
Canada	65.9	65.0	0.9	Iceland	67.2	67.0	0.2
Ireland	66.9	66.0	0.9	United Kingdom	63.2	63.0	0.2
OECD	**65.1**	**64.3**	**0.8**	**OECD**	**63.6**	**63.4**	**0.1**
United States	66.8	66.0	0.8	Sweden	64.6	65.0	-0.4
Sweden	65.8	65.0	0.8	United States	65.4	66.0	-0.6
Hungary	63.6	63.0	0.6	Poland	59.8	61.0	-1.2

Australia	65.2	65.0	0.2	Portugal	64.9	66.2	-1.3
Greece	62.0	62.0	0.0	France	60.3	61.6	-1.3
United Kingdom	64.6	65.0	-0.4	Australia	63.6	65.0	-1.4
Czech Republic	62.5	63.0	-0.5	Czech Republic	60.8	62.3	-1.5
Norway	66.2	67.0	-0.8	Latvia	61.2	62.8	-1.6
Latvia	62.0	62.8	-0.8	Greece	60.2	62.0	-1.8
Slovak Republic	60.8	62.0	-1.2	Germany	63.2	65.0	-1.8
Denmark	63.7	65.0	-1.3	Canada	63.1	65.0	-1.9
France	60.0	61.6	-1.5	Denmark	63.1	65.0	-1.9
Germany	63.3	65.0	-1.7	Spain	62.6	65.0	-2.4
Finland	63.2	65.0	-1.8	Finland	62.5	65.0	-2.5
Netherlands	63.5	65.5	-2.0	Ireland	63.5	66.0	-2.5
Spain	62.2	65.0	-2.8	Slovak Republic	59.5	62.0	-2.5
Austria	62.0	65.0	-3.0	Norway	64.4	67.0	-2.6
Poland	62.6	66.0	-3.4	Netherlands	62.3	65.5	-3.2
Belgium	61.3	65.0	-3.7	Italy	61.3	65.6	-4.2

Source: (OECD, 2017b)

More precisely, one can calculate that the effective retirement age of men in OECD-member European countries is 0.6 years lower than the statutory pensionable age; for women this difference is 1.2 years. For non-European OECD members these numbers are the opposite: the effective retirement age for men is 4.3 years higher than the statutory retirement age, and the respective value for women is 3.6. This situation raises the justified question of what determines the effective retirement age in different countries. This question is formulated in the introduction and underlies the main research problem of this paper; thus, in the following sections we make an attempt to estimate the impact of different factors on retirement decisions.

4 Data and Methodology

Bearing in mind the observed differences between retirement behaviour in European and non-European countries, in the empirical part of the study we applied a cross-sectional, multi-country analysis. Such an approach differs from the majority of studies discussed in the literature review, where the main focus is placed on time-series-based analysis of a single country or survey-based analysis of individuals' attitudes and behaviours. A cross-country approach significantly reduces the number of factors that can be considered in the research model; it also requires some simplifications regarding the considered variables to make them internationally comparable. As a consequence, cross-country analysis inevitably leads to a reduction in the accuracy of research; however, such an analysis allows us to look at the issue broadly and identify the key factors that influence retirement decisions on the macro level.

The research sample consists of all OECD members, except for Latvia, which joined in 2016, and Lithuania, which joined in 2018, thus not all indicators for these countries are available. The study is based mostly on data from 2017; where there is a lack of data from 2017, the most recent data were considered.

The data for the study are drawn from the official OECD database, OECD reports, and national statistics bureaus' databases. The macroeconomic data (e.g. GDP per capita, household savings rates, poverty rates) are taken directly from the OECD database (https://stats.oecd.org/). The OECD Pension at a Glance report (OECD, 2017b) and the OECD Health at a Glance report (OECD, 2017a) were particularly useful in obtaining the international and comparable data on pensions and old population features. The former is also a source of primary data relating to effective and retirement age, average incomes of older people, employment rates, replacement rates, pension wealth, and the impact on additional benefits of deferring pensions. The latter provides data on perceived health status and life expectancies.

To assess the impact of different variables on the effective retirement age, we applied a multivariate regression model: dependent variable y_i is the effective retirement age in country *i*. We define effective retirement age in this study similarly to the OECD definition: it is the average age of exit from the labour force for workers aged 40 and over. As the relevant data come from OECD reports, it is noteworthy that this indicator is estimated using changes in labour force participation rates rather than labour force levels and the changes are calculated for each cohort divided into five-year age groups (OECD, 2017b).

The independent variables are the identified possible determinants of effective retirement age and may be divided into three subgroups: general economic condition indicators, health indicators, pension system architecture, and financial incentives indicators. Moreover, some of the variables are calculated in parallel for men and women. Table 2 below contains the full list of independent variables considered.

Table 2. Selected determinants of effective retirement age

General economic condition indicators		**Health indicators**		**Pension system architecture and financial incentives indicators**	
Employment rate 60–64	ERA	Life expectancy at birth	LE0_M LE0_F	Statutory retirement age	SRA_M SRA_F
GDP per capita	GDP	Life expectancy at 65	LE65_M LE65_F	Pension Wealth	PWE_M PWE_F
Average wage (PPP USD)	AWA	Perceived health status >65	PHS_M PHS_F	Replacement rate	RRA
Household net saving rates	HSR			Disposable incomes of people aged over 65	DII
Relative poverty of elderly	RPE			Impact of deferring pension by one year on annual benefits	DEF
Old-age dependency ratio	DER				

Source: Author's own elaboration.

Furthermore, in the course of research we also distinguished an additional variable: the "is a European country" (EUR) dummy variable informs whether a particular country is a European or non-European country. On a theoretical level, the existence of this

variable may be explained by the difference in the social and cultural conditions between the well-established and socially oriented societies of European countries and the still-developing and more market-focused societies of non-European countries. This phenomenon, its importance, and the interpretation of the "is a European country" variable is explained later in the study.

The multivariate regression model equation adopted in the study can be represented as:

$$y_i = \beta_0 + \beta_1 x_{1i} + \cdots + \beta_k x_{ki} + \varepsilon_i \quad (1)$$

$$i = 1,\ 2, \ldots,\ n$$

Where: y_i – effective retirement age; $x_1,\ x_2, \ldots, x_k$ – determinants of effective retirement age

To fit the model and eliminate the highly correlated independent variables, we applied the stepwise regression with forward selection in which we considered the value of the F statistic and adjusted R2. Taking into account considerable variations between particular indicators for men and women, we decided to build separate models for each gender.

5 Results and discussion

In the first step of our research, we analyse the relationship between effective retirement age and the considered variables on a country level. In table 3, we present the calculated Pearson's correlation coefficients for men and women. Figures 1 and 2 demonstrate the interdependencies between effective retirement age and the selected explanatory variables. Besides the graphical presentation, we also calculate the R2 coefficients and estimate a simple single-factor linear regression equation using ordinary least squares.

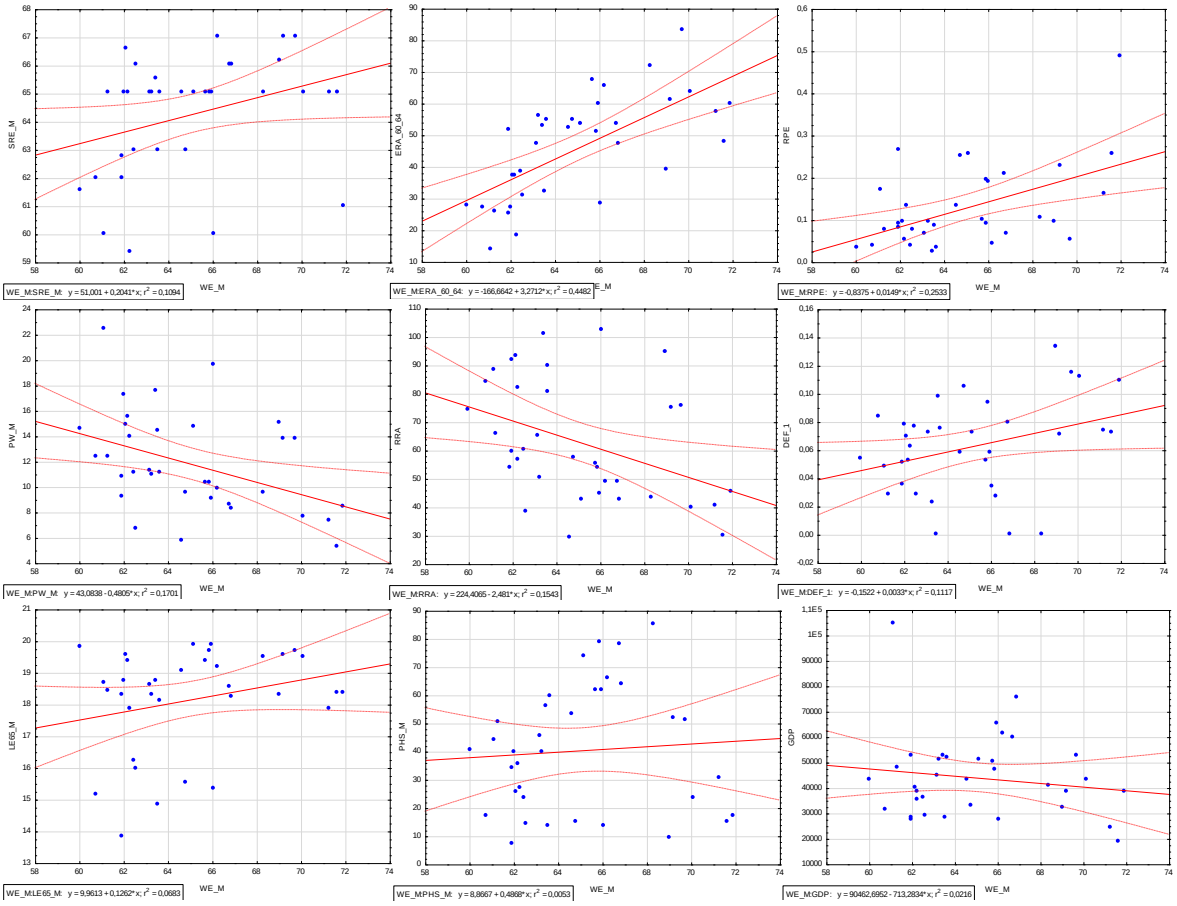
Table 3. Pearson's correlations between effective retirement age and selected variables

WE_M			WE_K		
AWA	-0.173		AWA	0.100	
DEF_1	0.235		DEF_1	0.235	
DER	-0.356	**	DER	-0.186	
DII_65	-0.182		DII_65	-0.319	*
ERA_60_64	0.634	***	ERA_60_64	0.727	***
EUR	-0.704	***	EUR	-0.639	***
GDP	-0.161		GDP	0.004	
HSR	0.234		HSR	0.240	
LE65_M	0.202		LE65_K	0.301	
LEO_M	0.014	***	LEO_K	0.180	
PHS_M	0.097		PHS_K	0.176	
PW_M	-0.525	***	PW_K	-0.410	**
RPE	0.540	***	RPE	0.645	***
RRA	-0.502	***	RRA	-0.413	**
SRE_M	0.289		SRE_K	0.188	

*p < 0.1; **p < 0.05; *** p < 0.01

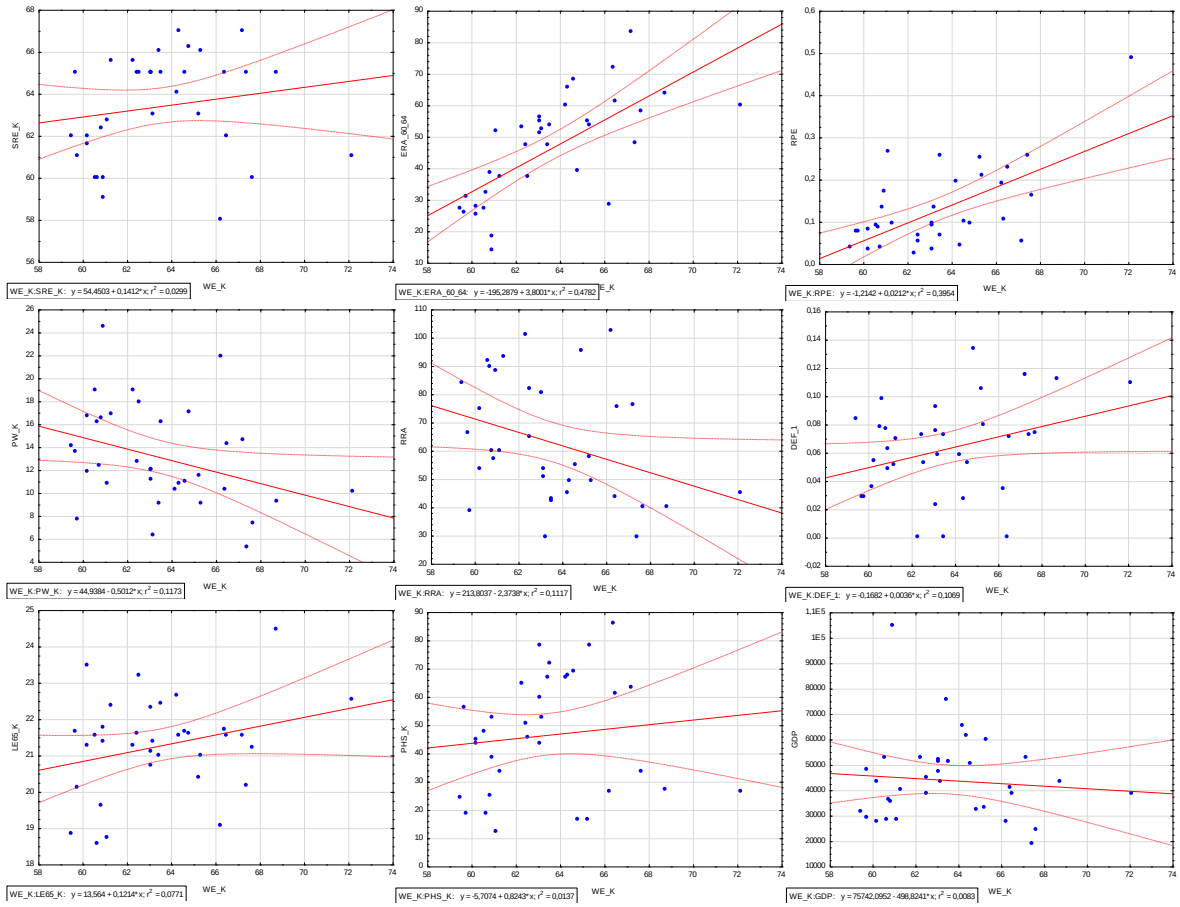
Source: Author's own elaboration.

Figure 1. The relationship between effective retirement age and selected explanatory variables for men



Source: Author's own elaboration

Figure 3. The relationship between effective retirement age and selected explanatory variables for women



Source: Author's own elaboration

The very first conclusion which can be drawn from the performed analysis is that the observed dependencies and correlations are considerably weaker than in the single-country analyses performed in the previous studies. It seems that international patterns are harder to grasp and measure: this is one of the most significant limitations of cross-country analyses, including our study.

Based on the analysis of correlations, we can indicate the following variables that are positively correlated with effective retirement age: the employment rate between 60 and 64 and the relative poverty of the elderly and life expectancy at birth. There is also a positive correlation between effective retirement age and household net saving rates. Moreover, we observed a weak correlation between effective retirement age and the impact of deferring retirement by one yea. However, these dependencies are not statistically significant.

On the other hand, we observe a negative correlation between effective retirement age and the old-age dependency ratio and parameters related to wealth and income: replacement rate and pension wealth. In the light of other studies discussed in the literature review, these dependencies are not surprising and confirm previous findings. It is, however, noteworthy that contrary to single-country studies, the results on the cross-country level show only weak dependencies.

Interestingly, the influence of the level of GDP *per capita*, which is one of the major economic parameters used to measure the level of national wealth, is proven to be statistically insignificant: it is the same with disposable incomes of people aged over 65 and average wages.

It is also worth mentioning that there is a strong, negative correlation between the dummy “is a European country” variable and effective retirement age. As the “is a European country” variable may be vague and its influence on the effective retirement age is not intuitive, it requires further explanation. In our view, this variable represents a vast range of factors that are not measured by other explanatory variables that are considered in the model. “Is a European country” is then a kind of meta-variable that covers a whole spectrum of cultural, sociological, and environmental determinants of retiring which are tough to quantify at the individual level and impossible to quantify at the international level.

Table 4 presents the results of a stepwise regression with forward selection. The left side of the table shows the stages of building a model for men, and the right side consists of respective values for women. Starting from the first row, each subsequent row represents the consecutive steps of the stepwise regression.

Formally, fitting the model starts with step zero, in which there are no variables in the model as the initial model contains only the intercept. In the first step for each considered variable that can be theoretically included in the model, we calculate the value of the F statistic. This "F-to-add” statistic is computed as the square of the t-statistic calculated for the estimated coefficient of the particular variable in the model. As a result, the variable with the highest “F-to-add” statistic is added to the model. In each successive step, the variable whose inclusion gives the most statistically significant improvement (considering the F-to-add statistic) is added to the model. This process is repeated as long as adding the additional variable brings a statistically significant improvement in the model.

In our analysis of the determinants of the effective retirement age, the most significant variable for men is the “is a European country”, and for women it is the employment rate of people aged 60–65. These variables are added to each of the models in the first step and explain 46.68% in the model for men and 47.82% in the model for women of the differences in effective retirement age in the analysed group of countries. The results of the second steps in both models show that “is a European country” and the employment rate of people aged 60 to 64 are almost similarly significant for both genders. The R^2 coefficients of models with these two variables are respectively 68.57% and 71.02%. In the next steps, variables related to health are added to both models: in the case of men, these are perceived health status and life expectancy at 65. Including these two variables in the model gives R^2 at the level of 78.38%. The results for women confirm the importance of health-related factors; however, this time the life expectancy at birth seems to be more important than life expectancy at 65. Moreover, this model shows that the effective retirement age of women is also influenced by the relative poverty of the elderly. The final value of R^2 of the model for women with five statistically significant variables is 82.04%.

Table 4. The stepwise regression procedure

Variable	Step	Men R2	F	p-value		Variable	Step	Women R2	F	p-value	
EUR	1	0.4668	28.89	0	***	ERA	1	0.4782	30.25	0	***
ERA	2	0.6857	22.3	0	***	EUR	2	0.7102	25.62	0	***
PHS_M	3	0.7498	7.94	0.0084	***	RPE	3	0.7755	9	0.0053	***
LE65_M	4	0.7838	4.72	0.0379	**	PHS_K	4	0.7961	3.03	0.0919	*
DER	5	0.7988	2.16	0.1526		LEO_K	5	0.8204	3.93	0.057	*
GDP	6	0.8068	1.16	0.29		HSR	6	0.8356	2.59	0.119	
AWA	7	0.8289	3.49	0.0725	*	DII_65	7	0.8451	1.65	0.2098	
PW_M	8	0.834	0.8	0.3788		RRA	8	0.8482	0.55	0.4664	
RRA	9	0.8405	1.01	0.3234		PW_K	9	0.8501	0.32	0.5783	
LEO_M	10	0.8472	1.05	0.3147		GDP	10	0.8514	0.21	0.6533	
DEF_1	11	0.851	0.58	0.4557		AWA	11	0.8518	0.05	0.8217	
SRE_M	12	0.8535	0.38	0.5438		LE65_K	12	0.8522	0.06	0.811	
HSR	13	0.8551	0.24	0.6285		DER	13	0.8523	0.02	0.8875	
RPE	14	0.8553	0.02	0.8814		DEF_1	14	0.8525	0.02	0.8865	
DII_65	15	0.8557	0.05	0.8317		SRE_K	15	0.8525	0.01	0.9345	

*p < 0.1; **p < 0.05; *** p < 0.01
Source: Author's own elaboration.

Table 5 presents the detailed results of the multivariate regression model with the variables selected through the stepwise regression procedure. It contains values of the respective beta coefficients, their significance, and values of standard errors.

Table 5. The regression results

Men				Women			
Variable	**Beta**		**Std. error**	**Variable**	**Beta**		**Std. error**
Intercept	55.4157	***	4.0133	Intercept	40.9556	***	10.052
EUR	-3.7568	***	0.6625	ERA_60_64	0.1054	***	0.017
ERA_60_64	0.1224	***	0.0201	EUR	-2.782	***	0.677
PHS_M	-0.0655	***	0.0178	RPE	7.1993	**	3.185
LE65_M	0.5146	**	0.2369	PHS_K	-0.0319	**	0.014
				LEO_K	0.2432	*	0.123
R2	0.78			R2	0.82		
R2 cor.	0.75			R2 cor.	0.79		

*p < 0.1; **p < 0.05; *** p < 0.01
Source: Author's own elaboration.

The most notable finding is a powerful negative influence of the EUR factor on the effective retirement age. Our results show that simply being a European country leads to 3.76 years lower retirement age for men and 2.78 years for women. In accordance with other studies, our results lead to the conclusion that health status significantly affects the effective retirement age. Generally, the lower the perceived health status, the lower the effective retirement age. On the other hand, higher objective life expectancy leads to a longer professional career. Interestingly, this effect is more prominent for men and their life expectancy at 65 than for women and their life expectancy at birth. Furthermore, we found that the employment rate of people aged 60 to 64 influences the effective retirement age. On average, an employment rate that is one percentage point higher leads to 0.12 and 0.11 higher effective retirement age for men and women, respectively. As for the direction of the influence, these findings are also consistent with the main body of literature. Our study also finds that the relative poverty of the elderly has a prominent influence on the effective retirement age of women, but it does not affect men. The possible explanation for this is the persistent inequalities between men and women on the labour market (e.g. lower wages, interruptions in careers and higher unemployment of women)

Regarding all of the observed relationships, particularly the influence of health status and employment rate, one must ask whether this is a true causation or only a correlation. For example, it may be true that rational economic and social policies which promote longer professional careers also lead to better health of the population. Furthermore, a lower employment rate of the elderly that is a result of poor labour market conditions may force some people to retire earlier. Undoubtedly, such relations are very ambiguous and hinder the detailed analysis of determinants of many economic phenomena, including the analysis of determinants of effective retirement age undertaken in this study.

6 Conclusions and final remarks

This paper examined the determinants of the effective retirement age on the country level. Besides the literature review and analysis of differences between statutory and effective retirement age in OECD countries, the paper also embodies an empirical study with a regression model. The regression results suggest that in the analysed group of countries there are some common economic and demographic factors that affect people's decisions about retirement age. The most significant economic factors are the employment rate of people aged 60 to 64 and the relative poverty of the elderly. The general rule states that the higher the employment rate and the lower the poverty of the elderly, the higher the effective retirement age. As could have been expected, effective retirement age is also considerably affected by life expectancy. The direction of this dependency is obvious: higher life expectancy goes hand in hand with higher effective retirement age. The study also proves the positive influence of perceived health status on the effective retirement age.

Interestingly, there is no evidence that differences in statutory retirement age and income or wealth directly influence the effective retirement age on the international level. These variables are important on the individual level, but at the international level their impact is diffused.

What may be surprising is the great relevance of the "is a European country" factor. The dummy variable that was added to the analysis to improve the fit of the model turned out to be one of the key explanations of the differences in the effective retirement age. This variable is very broad in meaning and may cover a vast range of differences

between the analysed countries. Bearing in mind that the regression model takes into account a vast range of economic and demographic variables, it leads to the conclusion that “is a European country” is a kind of a meta-variable that contains factors not included in the analysis that are presumably related to cultural, sociological, and environmental determinants of retirement which are difficult to quantify. An alternate explanation is the historical conditions that have made the pension systems of European countries more generous. These conditions brought about consequences that still persist today, mainly due to the inertia of pension policies and the existence of social norms.

Summarizing the analysis, one can state that the final regression model is not very complex as it contains only four (men) or five (women) independent variables. Moreover, even with the addition of the “is a European country” dummy variable, the model explains the differences in effective retirement age only partially as the R2 coefficient is 0.78 (men) and 0.82 (women). This means that retirement decisions are influenced not only by the quantitative parameters considered in the model (economic conditions; financial incentives and pension system architecture; health and demographic), but also by qualitative factors that impact retirement decisions. We suppose that these factors include mainly attitudinal and behavioural determinants of retiring that are not covered by the neo-classical explanations of retirement decisions.

Thus, another conclusion that emerges from the study is that the traditional, neo-classical life-cycle model which focuses mainly on the economic determinants of retirement decisions is not sufficient to explain all the differences in retirement behaviour. Even adding some non-financial factors within the neo-classical framework (e.g. perceived health or life expectancy) is not enough.

Apart from the considered set of the variables, one of the study limitations are also the restrictions of the applied model and the available dataset and its accuracy. We should also point out that additional results concerning trends and tendencies of retirement behaviour may be obtained only through a time-series analysis. Furthermore, we should also mention that observed dependencies are considerably weaker than in the single-countries analyses performed in the previous studies. Even though on the international level patterns are usually harder to grasp and measure, it has to be pointed as one of the limitations of our study.

When planning further research, first of all, one should consider incorporating new categories of factors into the research: particularly promising are the influence of the bounded rationality of decision makers and social norms (van Erp, et al., 2014). Further studies that investigate the non-economical determinants of effective retirement age will improve our understanding of the factors that affect retirement decisions. Such studies will also give a better insight into how to effectively influence people’s retirement behaviour.

Another avenue of further research is an extensive study based on the results of surveys conducted simultaneously in many countries. These surveys should contain questions regarding different possible determinants of retirement decisions, not only aspects that fit the neo-classical model. An in-depth study that investigates in detail as yet unobserved and unmeasured individual differences might play an important role in retirement decisions.

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