CORVINUS UNIVERSITY of BUDAPEST

Doctoral School of Economics,
Business and Informatics

THESIS ON

Ágnes Vaskövi

Lessons from

Financial Readiness for Retirement in Ageing Societies

Ph.D. dissertation

Supervisor:

Prof. Dr. Erzsébet, Kovács

professor

Budapest, 2023

Corvinus University of Budapest, Finance Institute

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1. RESEARCH BACKGROUND AND RELEVANCE OF THE TOPIC

The ageing society is one of the most prominent demographic challenges of our time. The number (and proportion) of retirees is increasing compared to the active working-age population, leading to a rise in the elderly dependency ratio. This process and its implications engage researchers on various fronts, including the sustainability of social security systems, the social and financial well-being of the elderly, transformations in the labour market, and even an examination of the effects on the real estate market. All of these aspects are crucial for decision makers when it comes to resource allocation and institutional development.

Understanding an ageing society is not just a macro-level concern; individuals also have a responsibility to prepare for longer retirement years. One of the most critical aspects of this preparation is ensuring financial security, specifically retirement savings. Retirement savings are closely linked to understanding and managing longevity risk, which arises from the prolonged life expectancy. Individual longevity risk can manifest itself in multiple ways. For example, underestimating life expectancy leads an individual to plan for a shorter retirement period than necessary, resulting in inadequate financial coverage to maintain the desired well-being. They fail to secure savings for potential future expenses and do not account for the impact of increasing inflation, which can be significant over a 20-30-year retirement period. As a result, individuals may not adequately prepare for possible shocks, such as health-related issues during their retirement years or household changes, such as the loss of the spouse.

All of these factors highlight the importance of financial awareness, specifically retirement awareness, which is synonymous with the term "öngondoskodás" in Hungarian terminology. While this term may not be found in international literature, it aptly expresses the idea that individuals must take responsibility for their own financial well-being, particularly to ensure a comfortable retirement.

In the doctoral dissertation, we investigate the topic of retirement awareness in ageing societies. Given the vast scope of this subject, it is not feasible to comprehensively examine every aspect within the confines of a single dissertation. Accordingly, we focus in greater detail on select chapters (lessons) aligned with the title. Our research centres on the challenges faced by ageing societies and, in connection with this, we explore the byproduct of sustainability in state-funded pension systems, namely individual retirement savings.

In examining societal processes and pension systems, our primary focus is on two key age groups: the youth and the elderly. Young people have the advantage of being away from retirement, which allows them ample time to prepare without the need for significant efforts or sacrifices. However, achieving this preparedness requires awareness and a certain change in lifestyle, which requires a transformation in mindset. Therefore, retirement awareness is a central topic of the dissertation. The other age group under scrutiny comprises retirees, where the results of their preparations and individual retirement savings become readily apparent.

The structural framework of the dissertation mirrors the various stages of the lifecycle. The second chapter serves as an introductory section, where we draw attention to one of the fundamental issues of retirement systems in ageing societies by examining the trends in life expectancy among OECD countries. This issue concerns the prolonged (and unpredictably lengthy) years of retirement. Over the past 20-25 years, life expectancy has shown a significant increase in all OECD countries. However, the adjustment of retirement age, where implemented, often lags behind these natural shifts. The pace of life expectancy growth differs between developed and emerging countries, resulting in a reduction in the life expectancy gap between these groups (Raleigh 2019). Some countries have even experienced a mild decline in the upward trend of life expectancy growth. Vaskövi (2018) notes that it is yet unclear whether this decline represents a trend reversal or a transient pause. However, it is evident that the growth of life expectancy cannot be perpetual and constant. Today, experts examining life expectancy growth fall into two clearly delineated camps. The pessimistic camp (Olshansky et al., 2005; Ridsdale and Gallop, 2010) suggests that there are health limitations to life expectancy growth, such as obesity, age-related illnesses, and cardiovascular diseases, which are globally prevalent in modern societies. In contrast, the optimistic camp (Vaupel 2002, Christensen et al. 2009) posits that human life expectancy growth may be limitless and, as a result, a significant portion of those born in the 21st century could reasonably expect to celebrate their 100th birthday with great certainty.

The third chapter, of a descriptive nature, involves a comparative analysis of the pension systems and retirement savings opportunities in the four Visegrad countries. Hungary has long needed a comprehensive pension reform that aligns the principles and parameters of the state pension pillar with the challenges posed by the increasing life expectancy of retirees, all in the interest of sustainability. Therefore, drawing upon the paths traversed by the neighbouring Visegrad countries (Slovakia, Czech Republic, and Poland) that share similar social and economic trajectories, we provide a detailed list of reform elements applicable to Hungary's

state pension pillar. These elements are placed alongside reform proposals advocated by Hungarian pension experts.

The primary consideration for these proposed reforms is the simultaneous pursuit of sustainability (related to the increasing longevity risk and the necessity of retirement savings) and the financial security of the elderly. This is in line with systems such as the Slovak point system or the Polish NDC system, where individuals can regularly monitor the development of their contributions during their active years, enabling them to project the size of their future pension. Annual regular statements can serve as strong incentives to increase retirement awareness.

Among the proposed reform measures, several are deemed worthy of consideration by Hungarian pension experts. For example, Banyár (2023), much like the Slovak system, advocates the implementation of a point-based pension reform based on the German model. Augusztinovics and Matits (2010 and 2015), as well as Borlói and Réti (2010), had already expressed their preference for the point-based system, with Simonovits (2018) joining their ranks later on.

Their primary arguments in favour of the point-based pension calculation system include its simplicity, transparency, and its indirect promotion of financial literacy. Another advantage of the system is its adherence to the principle of proportionality, ensuring that the pension received during retirement remains proportional to the contributions made. Augusztinovics and Matits (2010) also proposed a basic pension alongside the point-based system, a concept that is present in the Czech pension system. The objective of the basic pension is to significantly reduce the risk of old age poverty among the lowest-income individuals.

Simonovits has long advocated for a simplifying measure to address the disparities in valorisation and indexation during different economic periods, which have resulted in significant differences between old and new average pensions. He believes that this simplification could potentially involve transitioning to a point-based system to rectify the differences caused by the deviation between the wage index and the consumer price index (Simonovits, 2018).

The third chapter lays the theoretical foundation for the fourth chapter, in which we analyse expectations related to the state pension system using primary data from an online survey. Primary data were collected in Hungary in 2019, in which 320 (mostly students at Corvinus University) were interviewed about their expectations about the state pension system.

Retirement awareness represents a specialised and challenging subset of financial literacy, often focussing on financial and well-being preparations for distant and uncertain retirement years. Its basis lies in recognising both the longevity risk and the individual's current financial situation, as well as mapping out future possibilities. The importance of recognising longevity risk (longevity literacy) has been highlighted by Yakoboski et al. (2023) in their recent study, emphasising the close connection between retirement awareness and understanding longevity risk. Consequently, an individual can make long-term decisions that ensure the expected quality of life in the years following retirement. This is primarily achieved through savings, which implies that retirement awareness assumes that individuals possess the appropriate financial knowledge, plan for the long term, assess significant longevity risk, recognise the necessity of savings, and actively manage their finances for this purpose.

A. Lusardi and O. Mitchell (2010 and 2014) articulated as far back as 2010 that those with higher financial literacy tend to think long-term regarding their financial savings, allowing them to plan for their retirement years with greater confidence. This notion was further supported by Hauff et al. (2020) and Yakoboski et al. (2022), indicating that retirement awareness encompasses acquiring financial knowledge (including understanding the pension system and longevity risk), striving for long-term financial security, maintaining an appropriate attitude, and undergoing voluntary and regular retirement-focused savings training. However, in Hungary, there is relatively limited literature that specifically addresses retirement awareness and expectations (Czibik and Medgyesi, 2007; Ágoston et al., 2016; Aegon, 2019). Therefore, the expectations research presented in this chapter is an important contribution to the field.

In the fifth chapter, we examined the "effectiveness" of retirement awareness by analyzing data from 25 European countries. In this chapter, we combined macro- and micro-level data to link the generosity of pension systems and the footprint of individual retirement savings to indicators of old age poverty. Kwan and Walsh (2018) provide a comprehensive review of the literature on the topic of elderly poverty. They note that, despite a significant number of studies on poverty in general, there are relatively few dedicated to analysing elderly poverty. Studies typically explore the relationships between demographic factors and elderly poverty, such as education, household composition (living alone or with others), migration, and age, which are recognised as significant influencing factors (Lusardi, 2019; Ebbinghaus, 2019).

Finally, in the sixth chapter, we addressed the quality of life in retirement years, focussing on the last stage of the lifecycle. We highlighted five critical factors that have been analysed in previous publications as determinants of elderly well-being:

(i) education (Mirowsky and Ross, 2003; Foverskov et al., 2018; Becchetti, 2018),
(ii) health (Motel-Klingebiel et al., 2004; Chatterji et al., 2015; Grané et al., 2020),
(iii) investment habits (Garcia and Marques, 2017; Dohmen et al., 2017; Ostrovsky-Berman and Litwin, 2019; Semanez-Larkin et al., 2020),
(iv) marital status (Slagsvold, 2016; Monostori, 2017; Luchetti et al., 2020; Hajek, 2020),
(v) general sense of happiness.

The research had its starting point in the fact that 2012 was designated the European Year of Active Ageing, during which numerous initiatives were launched in Hungary, as well as to improve the quality of life of older adults and preserve their activity. Several Hungarian studies also emerged on the topic of active ageing (Walker, 2009; Gyarmati, 2009; Semsei, 2013; Lampek, 2015). However, we seem to have "forgotten" about our retirees. In the past 5-6 years, demographic-economic studies in Hungary have almost completely lacked analysis of the older age group. The ageing of society has typically been examined from other angles, such as various ageing metrics (Vargha, 2015; Banyár, 2020), the sustainability of pension and healthcare systems (Bajkó, 2015; Kovács et al., 2015; Németh et al., 2019; Péter et al., 2020), lifelong learning and activity in old age (Vehrer, 2017; Berde-Kuncz, 2019; Kenesei et al., 2019), working as a pensioner (Csoba, 2020), or early retirement. Therefore, our study, which compared 24 European countries based on microdata of approximately 17,700 retirees, considering factors such as region, education, income, and age, may help fill this research gap.

2. METHODS AND DATA USED IN THE RESEARCH

Our research explored the retirement awareness in ageing societies using various datasets and statistical methods. The main value of the dissertation lies in its approach to addressing the issues by analysing both macro and microdata. Macro-level data were obtained from Eurostat and OECD databases, while microdata were collected from the SHARE database. The empirical analysis is complemented by primary data collection, where we mapped the retirement expectations of young individuals based on our own questionnaire-based data.

In general, we employed suitable methods to explore the mutual relationships between data, dimension reduction, and classification. The methodological framework of the dissertation includes various clustering techniques, factor analysis, and multidimensional scaling, which are summarised in Table 2.1. These methods were used to analyse the data, identify patterns, and derive meaningful insights from the dataset.

Table 2.1: The methods and data used in the dissertation

Chapter	Title	Methodology	Data
Chapter 2	Mortality, Life Expectancy, and Retirement Age	Clustering: - hierarchical - k-means - k-median	OECD, 2019 HMDB, 2014
Chapter 3	Pension Systems and Retirement Savings in the Visegrad Countries	Multidimensional scaling	Eurostat, and OECD, 2020
Chapter 4	Young People's Retirement Expectations in Hungary	Factor analysis (PCA) Mann-Whitney U-test	primary data collection, 2019
Chapter 5	Old Age Poverty and Pension Awareness in Europe	Hierarchical clustering Multidimensional scaling	OECD, 2018 SHARE, 2017
Chapter 6	Quality of Life in Retirement Along Five Factors	Factor analysis (PCA) ANOVA-test	SHARE, 2017

In the five main chapters, we focus on different groups of countries, so the analyses are extended to the OECD, EU, and V4 countries. The selection of countries was not arbitrary, but rather was driven by the limitations of available data. We started with as many countries as possible, primarily using publicly available data for OECD countries. However, when incorporating microdata, we had to narrow down the range of analysed countries due to the SHARE survey's focus on European retirees. In the study of pension systems, we further reduced the number of countries to V4, as presenting and comparing the pension systems of 24-

27 European countries would go beyond the scope of the dissertation. When examining young people's expectations, we found it most convenient (taking financial and time constraints into account) to gather data in Hungary, specifically among students at Corvinus University.

In the second chapter, we performed clustering of OECD countries based on life expectancy and retirement age, and in the fifth chapter, we grouped EU countries according to elderly poverty and retirement awareness using hierarchical agglomerative clustering, where we used the standardised values of our variables. Robustness was further reinforced with partitioning (McQueen's) k-means clustering. In hierarchical clustering, we applied Ward's method, with the goal of keeping variability within the cluster as small as possible.

We clustered the mortality probabilities of EU countries using the *k-medians method*. The goal of the k-median (or p-medians) procedure is not to align the groups with calculated cluster centroids but rather with actual data points. When using the multidimensional k-medians algorithm, we first calculate a distance or similarity matrix and then determine the actual cluster centre, assigning individual observations in a way that minimises the absolute difference. To compute the distance matrix, we used the QDEV asymmetric distance measure developed by Arató et al. (2009), which takes into account the number of observations in each age group (Equation 2.1).

$$QDEV = \sum_{i=K}^{N} \frac{e_i^a \cdot (q_i^a - q_i^b)^2}{q_i^b} \tag{2.1}$$

In the fourth chapter, we applied factor analysis to the variables in the retirement expectations questionnaire. In the sixth chapter, we also used factor analysis on the SHARE microdata of European retirees. Our goal in both chapters was to create uncorrelated components that preserve the maximum amount of information about the included variables while reducing them to a manageable dimensionality. Principal Component Analysis (PCA) is based on the eigenvalue-eigenvector decomposition of the correlation matrix (R) of the p number of variables included in the analysis. The resulting uncorrelated principal components are linear combinations of the original variables. The mathematics of principal component analysis is described by Kovács (2014) and is presented similarly to the two applications in the dissertation, as shown by Grané et al. (2021).

We conducted PCA on the variables with Kaiser normalisation in both chapters, and to enhance interpretability, we applied Varimax rotation to obtain the final components. It is important to highlight that in both chapters, our variables were factors correlated with each

other but not in a causal relationship. Therefore, we aimed to create a model that could use the correlations between variables for clustering and dimension reduction. In neither of our models had a dependent variable (Y); our objective was to examine the factors influencing retirement expectations and the quality of life of retirees based on their mutual relationships.

We tested our hypotheses about retirement expectations using Mann-Whitney U tests, incorporating the factor scores of the PCA model. We used the factor scores, which are the standardised coordinates of the original observations (meaning the mean of the points on each factor is 0, and the standard deviation is one). The Mann-Whitney U test is a nonparametric test that examines the equality of medians in independent groups. We chose this test because, in our case, the entire sample and its subsamples typically did not follow a normal distribution.

In the fifth chapter (and also in the third chapter for visualising the comparison of pension systems in the Visegrad countries) we used Multidimensional Scaling (MDS) with ALSCAL (Alternating Least-Squares Algorithm) to reduce the space created by the dozens of variables we included in our analysis and to uncover the relationships between our variables. MDS is a less common multivariate statistical method in research practise. It allows for dimension reduction in datasets where Principal Component Analysis cannot be applied due to certain conditions. In our data of 25 European countries, the $n > 5p$ condition is not met because $n = 25$, while $p = 37$ (where n is the number of observations, and p is the number of variables). The MDS method works by mapping differences to spatial coordinates. We used metric scaling, in which the derived coordinates are obtained by performing the eigenvalue-eigenvector decomposition of the distance matrix of observations. The goodness of fit of the MDS model, i.e., the similarity between the mapped and the original space, was measured using Kruskal's STRESS (Standardised Residual Sum of Squares) index.

Finally, in the sixth chapter, alongside PCA, we also applied ANOVA tests. In the initial factor model, there were variables that, when omitted, resulted in better model statistics. However, these variables were still valuable for describing the quality of life of European pensioners. Therefore, we compared the factor model with these variables with the category variables that they formed using analysis of variance (ANOVA).

3. SCIENTIFIC RESULTS

The main findings of the thesis chapters are presented in this third section.

3.1 Mortality, life expectancy, and retirement age

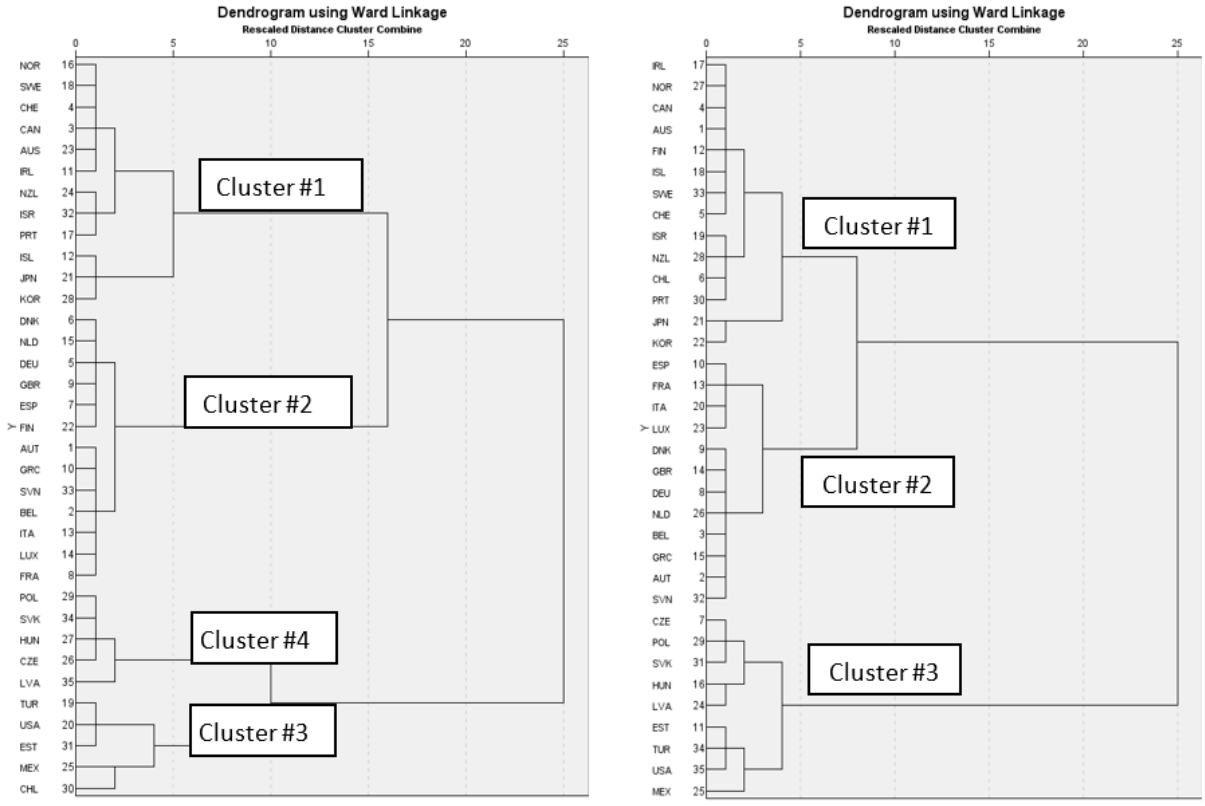
The analysis of life expectancy and retirement age trends discussed in this chapter is based on the English study by Kovács-Vaskövi (2019a). The analysis of mortality rates in European countries was presented in Ágoston-Vaskövi (2020).

During the past two decades, life expectancy at birth has increased by an average of 5 years in OECD countries, reaching 81 years, while life expectancy at 65 has increased by 3.3 years, reaching 20 years. In this chapter, we pointed out that the increase in life expectancy must necessarily contribute to active years, leading to an increase in the official and effective retirement age in almost every country studied. Based on data from 35 OECD countries, we found that an average 5-year increase in life expectancy induced a 2-year increase in effective retirement age between 1996 and 2019. We also examined healthy life expectancy and found that its increase is currently lagging behind other life indicators.

Using two different methodologies, we clustered OECD and EU countries to identify groupings based on variables such as mortality, life expectancy, and retirement age. Both data and methods suggest that historical and economic differences are clearly visible between developed and emerging countries based on indicators of life expectancy and retirement age. In both Europe and the OECD countries, three distinct clusters can be identified based on trends in life expectancy indicators. According to mortality data for European countries, the Eastern European block corresponds to the "emerging" group of OECD countries, where life expectancy is relatively low, mortality is high, but retirement age is moderately high. Based on mortality data from Western European countries, they are divided into two clusters, with three countries, France, Spain, and Italy, forming a separate cluster with the lowest mortality rates, while other developed European countries fall into the ‘*comfortable*’ and ‘*labour ennobles*’ clusters. (Cluster names are aliases, initiated on the basis of the main characteristics of each group.)

The non-European OECD countries[1], with a few exceptions (MEX, TUR, USA), belong to the first cluster (‘*labour ennobles’*) where life expectancy is the highest, and at the same time, the effective retirement age is also the highest. This may indicate that socioeconomic conditions significantly influence not only lifestyle, but also individuals' attitudes toward retirement. However, Mexico, Turkey, and the USA are placed in the third cluster together with the Central-Eastern European block of Europe, where life expectancy is the lowest, combined with a moderate effective retirement age.

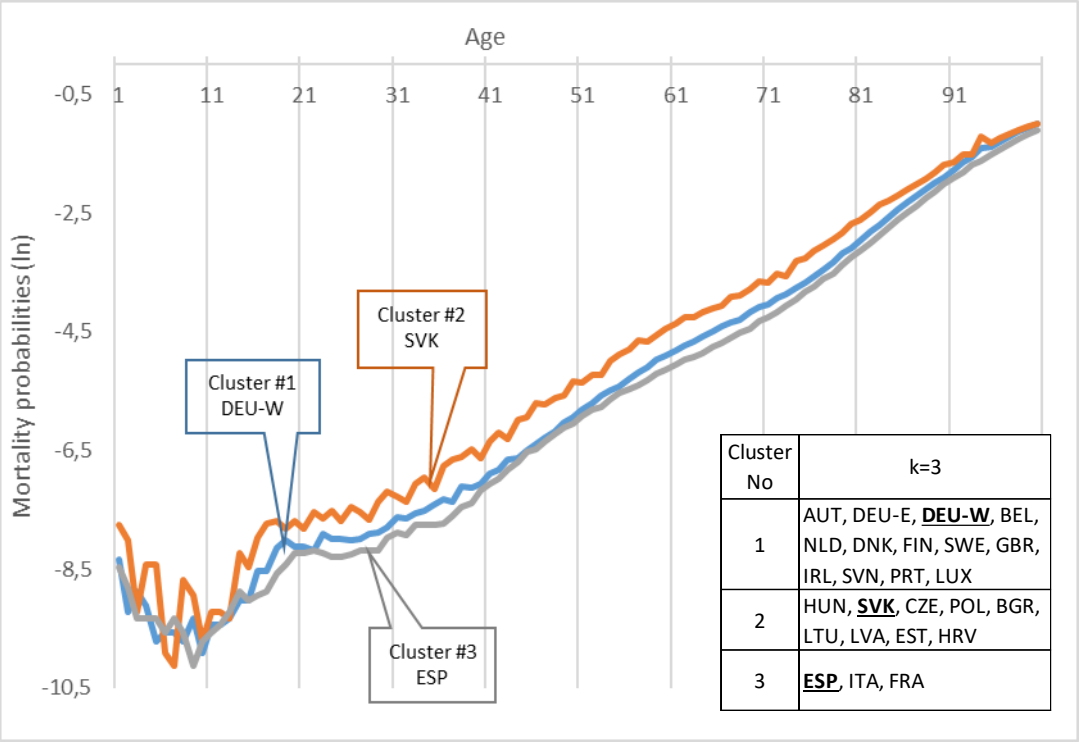
Figure 3.1: Clustering OECD countries
based on their life expectancy and labour market exit age



Based on data 2015 Based on data 2019

[1] Non-European OECD countries are: South-Korea, Japan, Israel, New Zealand, Australia, Canada, and Chile.

Figure 3.2: Death probabilities for age groups, k-median clustering (k=3)



3.2 Pension systems and retirement savings in the Visegrad countries

The comparison of the Visegrad countries' pension systems discussed in the third chapter appeared in the Hungarian study by Vaskövi-Ráduly (2022).

In this chapter, our objective was to compare the pension systems of the Visegrad countries, providing a detailed overview of the mandatory state pension pillar, supplemented by the presentation of pension savings products. The four countries, based on their modern history and economic and social events, form a comparable group, and their pension systems could be expected to be somewhat similar. In terms of the mandatory state pension pillar, Hungary and the Czech Republic have a PAYG DB system, Slovakia uses a points-based system, and Poland transitioned to the NDC system. When it comes to pension savings opportunities, the four countries present a heterogeneous landscape. Hungary, Slovakia, and Poland followed the classical path of pension reform after the postsocialist transition. Due to the significant state debt and World Bank recommendations, they transformed their pension systems into two-pillar structures. In addition to the state DB pillar, they introduced a capital-funded second pillar. In contrast, the Czech Republic, thanks to its balanced public debt, retained a single-pillar pension system with only minor deviations. However, demographic trends in Europe at the turn of the century have posed sustainability challenges to the state pension pillar in all four countries.

Consequently, the role of the third (completely voluntary) pillar has become more pronounced. Enhancing individual retirement savings and pension awareness plays a crucial role in all examined countries, although the results are far from satisfactory. In Hungary, forms of savings incentivised by tax deductions are becoming increasingly popular. However, the per capita savings amount may not ensure comfortable retirement for a wide range of people. In Slovakia, frequent changes to the rules of the second pillar and the high costs and low tax efficiency of the third pillar have made the individual retirement savings unattractive for the population. The Czech Republic offers straightforward and popular savings opportunities in the third pillar, but Poland has a complex and fragmented pension savings system.

The three neighbouring Visegrad countries have embarked on the path of reforms needed for sustainable pension systems. In Hungary, these changes are still pending. Therefore, we conducted a thorough examination of the best practises in the pension systems of the three neighbouring countries and compared them with the considerations of Hungarian pension experts. In general, there is agreement that adjusting the retirement age (whether upward or downwards) should be an essential component of the next reform package, as has already been introduced in Slovakia. Other factors, such as point-based vs. NDC systems or recognition of childbearing in pension calculations, receive different emphases among our experts, much like in our neighbouring countries.

3.3 Pension expectations in the young generation of Hungary

The results discussed in this chapter were published in English by Vaskövi-Kovács (2020).

We conducted a questionnaire survey among Hungarian university students (mostly in Corvinus University) regarding their retirement expectations. We found that most respondents have pessimistic (or, in certain cases, realistic) expectations regarding the state pension system. Negative attitudes may be attributed to the overcomplexity of the pension system, limited information, and the fact that the reform of the state pension system in Hungary is delayed, raising serious questions among young university students about its sustainability.

We formulated two hypotheses:

H1: Retirement expectations differ between students majoring in finance and their non-finance peers.

H2: Retirement expectations are independent of gender, in line with the characteristics of a unisex pension system.

Regarding the H1 hypothesis, we did not find statistically significant differences between finance and non-finance students in terms of their retirement expectations or the retirement age factor.

For the H2 hypothesis, there were no differences in retirement expectations between men and women. However, there was a significant difference between men and women in terms of their expected retirement age.

Figure 3.3: Differences in pension expectations and retirement age along university majors

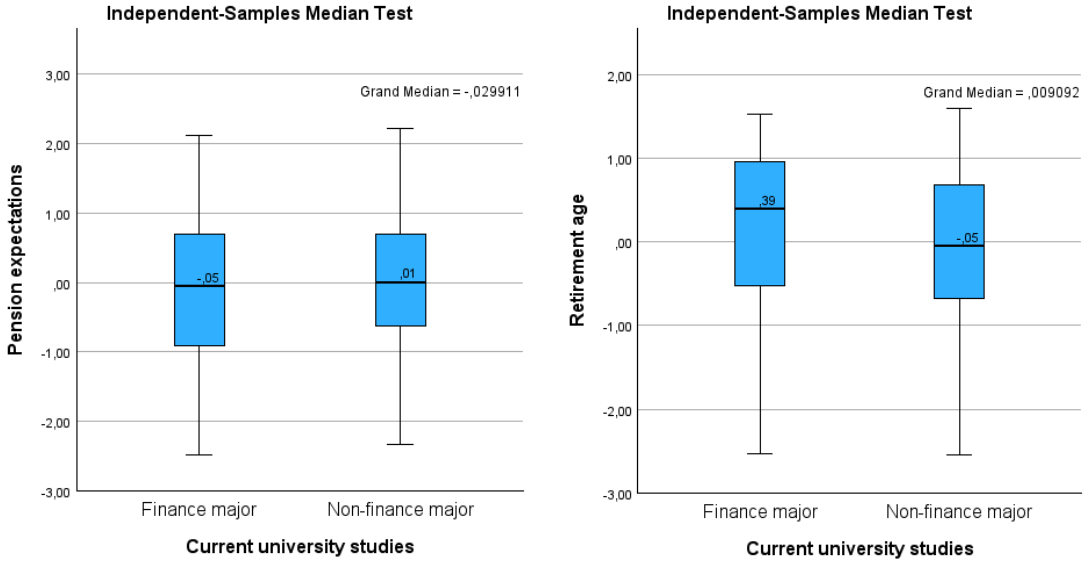
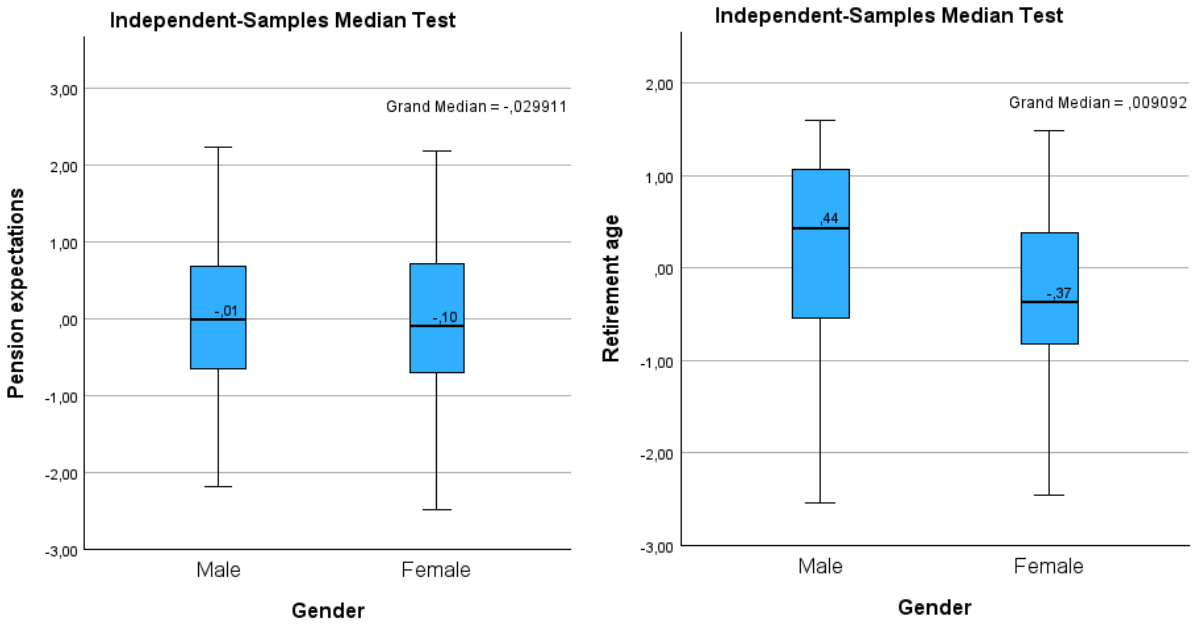


Figure 3.4: Differences in pension expectations and retirement age



Our findings could provide significant input for decision-makers in shaping attitudes towards retirement savings. Kovács (2018) also describes in her study that the insurance and pension industry sees the opportunity to engage with Generation Y or even younger generations in extending retirement savings. These generations have a very long savings period ahead of them and are already quite sceptical of the state pension system. This generation significantly undervalues the expected replacement rate and overestimates the expected retirement age compared to current facts. In this chapter, we thoroughly examined regional differences among the respondents, pointing out that respondents from Budapest and Central Hungary have the most pessimistic (or realistically cautious) attitudes towards the state pension system in almost all aspects. In the case of other regions, we received a mixed picture, with respondents from Southern Transdanubia and Northern Hungary showing a more optimistic attitude on several questions compared to the average.

3.4 Old age poverty and financial awareness in Europe

The research presented in this chapter has been published in English in Vaskövi (2023).

European countries face various poverty impacts that affect both the elderly and the entire population. In addition to the existing literature, we attempted to determine the relative position of countries based on factors that influence poverty in those 65 and older, as well as their long-term savings habits, to create homogeneous clusters. This may serve as an indication for decision-makers about intervention points. We found that the 23 examined countries (Luxembourg and Bulgaria as outliers are not involved in clustering) can be divided into three distinct clusters, each with a unique combination of long-term savings and old age poverty.

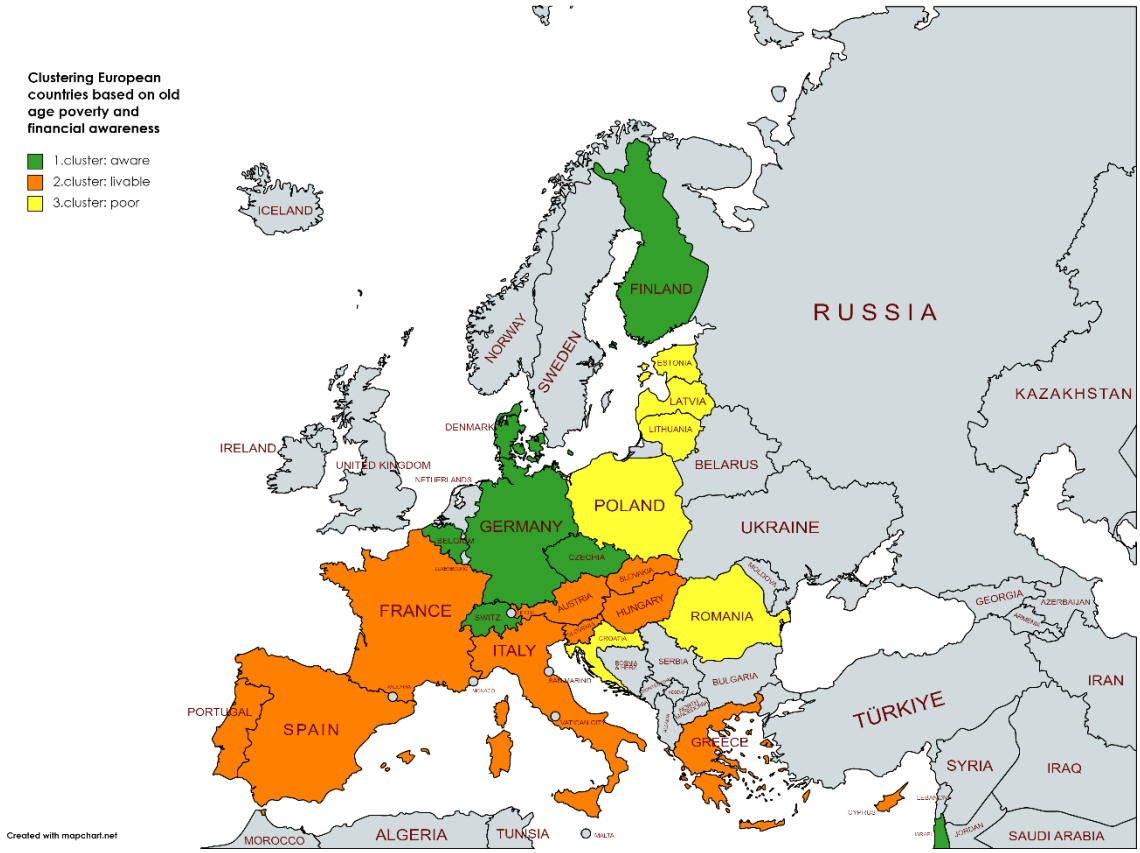
The first cluster (*'aware'*) consists of countries (BEL, CZE, DNK, FIN, ISL, DEU, CHE) where long-term saving methods are the most prevalent, combined with favourable macroeconomic indicators and a less generous pension system. Elderly poverty in these countries is at a moderate level.

The second cluster (*'livable'*) includes countries (AUT, CYP, FRA, GRC, ITA, PRT, ESP + HUN, SVK, SVN) with a high life expectancy and a high elderly pension income, derived mainly from the generosity of the state pension system. Overall, elderly well-being is associated with moderate financial retirement awareness and elderly poverty.

The third group of countries (*'poor'*) includes the most vulnerable countries (HRK, POL, EST, LVA, LTU, ROM), where European directives provide significant space for policies

targeting elderly poverty. In these countries, the least financially aware habits are combined with the least generous pension systems, resulting in the highest levels of elderly poverty and the lowest life expectancy.

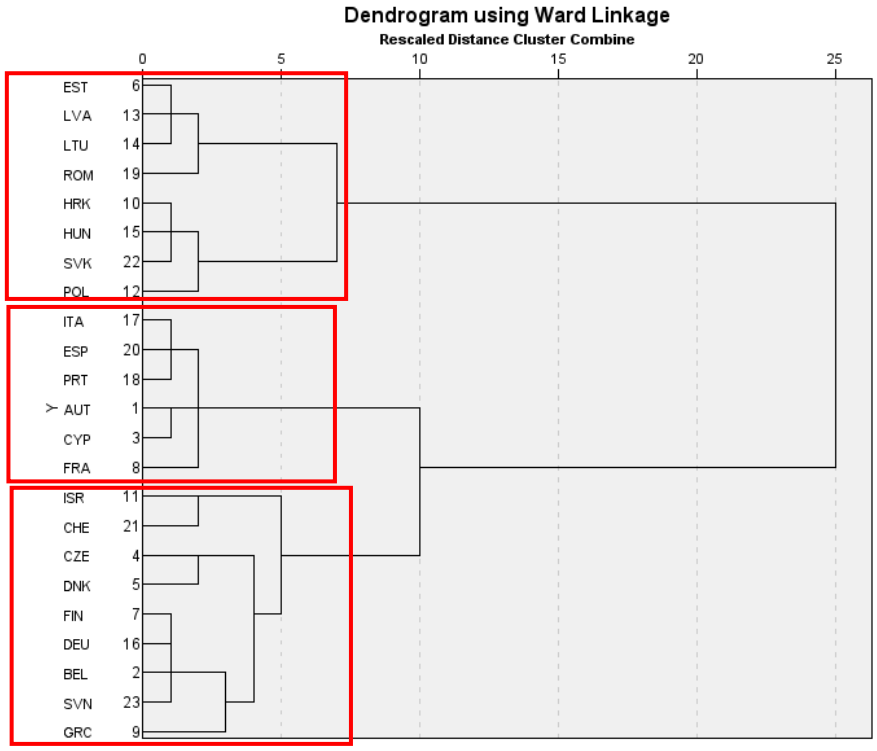
Figure 3.5: Clusters of the European countries



As a supplement to the study on which this chapter is based, we found that in the case of Hungary, using the average pension/net average wage ratio (and accordingly scaling the net present values of pension benefits) for clustering instead of the net replacement rates calculated by the OECD model would result in a significant rearrangement among the clusters.

By modifying the Hungarian data, not only Hungary but also Slovakia moved to the previous third "poor" cluster, thus creating a bipolar group, where one pole consists of the three Baltic states and Romania, and the other pole consists of Hungary, Slovakia, Poland, and Croatia. Slovenia and Greece also joined the 1st "conscious" cluster, which may warrant further investigation (Figure 3.6).

Figure 3.6: The dendrogram by recalculating the Hungarian net replacement rate and the net present value of pension benefits



3.5 Quality of life in retirement, along five main factors

In the sixth chapter, our results were published in the studies by Szanyi-Nagy and Vaskövi (2021) and Vaskövi et al. (2022).

The field of gerontology extensively deals with the social, physical, and mental health of the elderly, but in the Hungarian economic and demographic literature, the quality of life of the elderly is a less researched area. In this chapter, we attempted to provide an overview of the well-being of elderly people living in Hungary and the European Union. By examining the data of 17,726 retirees from 24 European countries, we reached the following conclusions.

- Regarding the level of *education of the retirees* studied, retirees in Northern European countries spent the most time in education. The time spent in education increases in parallel with the income percentiles of the households.
- Higher-education people have fewer *health problems* and fewer chronic illnesses. Retirees who are more educated and in better financial situation tend to live healthy lifestyles and are willing to spend more on prevention. We confirmed the literature's finding that as individuals age, their health deteriorates, and in parallel, women face more health problems than men, as their life expectancy is longer.

- When examining their *investment habits*, we found that more highly educated elderly people have tried more investment products throughout their lives than those with lower levels of education. Therefore, our sample confirmed that prudent investment behaviour is associated with higher education. We also found a significant relationship between European regions and investment confidence. Retirees living in Northern and Western European countries used more investment instruments than those in Eastern and Southern regions.
- Concerning the importance of having a partner (spouse) as a significant social aspect of retired life, we found that women live more frequently without a partner than men and this effect becomes stronger as they get older. We also found a strong significant relationship between income levels and having a partner.
- In terms of the subjective sense of happiness of the retirees, we identified significant differences based on their education and regional categorisation.

In summary, our findings show that general well-being in old age is primarily influenced by education and the financial situation derived from it. Among the highly educated population, the occurrence of health problems and multimorbidity is lower, but it naturally increases with age. Women generally live alone to a greater extent due to their longer life expectancy, which is an important social factor affecting general well-being. "The situation is better in the West (and North)," as we found a significant relationship between the region and investment awareness, health, having a partner, and overall happiness in the retirement years.

The main contribution of the dissertation to the literature is its extensive methodological analysis of various datasets (OECD and EUROSTAT macro data, SHARE, and microdata based on a primary survey). It aims to draw attention to the importance of retirement awareness in ageing societies. Although knowledge of the state pension pillar is crucial, there is also a significant role for personal retirement savings. Recognising and properly managing longevity risk is essential in this context. Retirement savings should be adopted as a lifestyle, and is most effective when individuals start early and integrate it into their daily thinking. Quality of life in old age, including risks of poverty, should be examined as a result of this lifestyle. The risk of poverty in old age can be reduced through the use of retirement savings products since substantial retirement savings can be accumulated with regular savings, starting early and using it to ensure financial security during retirement years.

Note: English proofreading was done by *Writefull.*

4. BIBLIOGRAPHY

Ágoston, K. Cs., Kovács, E. (2007): A magyar öngondoskodás sajátosságai, *Közgazdasági Szemle*, 54(6), pp. 560-578.

Ágoston, K.Cs., Banyár, J., Kovács E. (2016): Mennyire tudatosan tervezzük meg nyugdíjunkat? in: Patkós (szerk.): Simonovits 70: Társadalom- és természettudományi írások Arkhimédésztől az időskori jövedelmekig, *MTA KRTK Közgazdaság-tudományi Intézet, Budapest*, pp. 200-225.

Arató, M., and Bozsó, D. and Elek, P. and Zempléni, A. (2009): Forecasting and simulating mortality tables, *Mathematical and Computer Modelling*, Vol. 49, pp. 805-813. https://doi.org/10.1016/j.mcm.2008.01.012

Atkinson, A., F. Messy (2012): Measuring Financial Literacy: Results of the OECD / International Network on Financial Education (INFE) Pilot Study, *OECD Working Papers on Finance, Insurance and Private Pensions*, No. 15, OECD Publishing, Paris, https://doi.org/10.1787/5k9csfs90fr4-en

Augusztinovics, M., Matits, Á. (2010): Pontrendszer és alapnyugdíj (NYp + a) – öregséginyugdíj-reform, in: *Holtzer* (szerk.): Jelentés a Nyugdíj és Időskor Kerekasztal tevékenységéről pp. 234-246.

Augusztinovics, M., Matits, Á. (2015): Alapnyugdíj és pontrendszer. A társadalombiztosítás öregségi nyugdíjrendszerének egy lehetséges modellje, *Közgazdasági Szemle*, 62(6), pp. 599-610. http://real.mtak.hu/24513/1/02_AugusztinovicsMatits_u.pdf

Bajkó, A., Maknics, A., Tóth, K., Vékás, P. (2015): A magyar nyugdíjrendszer fenntarthatóságáról, *Közgazdasági Szemle*, Vol. 62, 2015.dec. pp.1229-1257. https://doi.org/10.18414/KSZ.2015.12.1229

Banyár, J. (2020): Miként javítható az állami nyugdíjrendszer? Öt lehetséges lépés egy átfogó reformhoz, *Közgazdasági Szemle*, 67(6), pp. 632-652. http://dx.doi.org/10.18414/KSZ.2020.6.632

Banyár, J. (2021): The Outlines of a Possible Pension System Funded with Human Capital. *Risks*, 9(4), 66. http://dx.doi.org/10.3390/risks9040066

Banyár, J. (2023): A magyar nyugdíjrendszer pontrendszerre való áttérésének vizsgálata, *Közgazdasági Szemle*, 70(9), pp. 964-1000. http://dx.doi.org/10.18414/KSZ.2023.9.964

Barrett, A., Mosca, I., Whelan. B. (2015): How well-informed are pension scheme members on their future pension benefits? Evidence from Ireland. *Journal of Ageing and Social Policy*, Vol. 27, No. 4, pp. 295-313. http://dx.doi.org/10.1080/08959420.2015.1044817

Becchetti, L., Conzo, P., Pisani, F. (2018): Education and health in Europe, *Applied Economics*, 50:12, pp.1362-1377., https://doi.org/10.1080/00036846.2017.1361013

Been, J., Caminada, K., Goudswaard, K., & Van Vliet, O. (2017): Public/private pension mix, income inequality and poverty among the elderly in Europe: An empirical analysis using new and revised OECD data, *Social Policy & Administration*, 51(7), pp. 1079-1100. https://doi.org/10.1111/spol.12282

Benitez-Silva, H., Demiralp, B., Liu, Z. (2009): Social Security Literacy and Retirement Well-Being, *Discussion Paper, University of Michigan, Ann Arbor*

Berde, É., Kuncz, I. (2019): Az Aktív Idősödés Indexe (AAI). Az internet szerepe az AAI-ben, *Szociológiai Szemle*, *29*(1), pp. 33-57. https://doi.org/10.51624/szocszemle.2019.1.2

Bergmann, M., Scherpenzeel, A., Börsch-Supan, A. (eds.) (2019): SHARE Wave 7 Methodology: Panel Innovations and Life Histories, Munich: Munich Center for the Economics of Ageing (MEA)

Béres, D., Huzdik, K. (2012): A pénzügyi kultúra megjelenése makrogazdasági szinten, *Pénzügyi Szemle*, 57(3), pp. 322–336.

Béres D., Németh E., Zsótér B. (2016): A pénzügyi kultúra személyiség-, attitűd- és viselkedésbeli komponensei, *Kultúra és Közösség*, 7(3), pp. 89-102.

Bora, Zsuzsanna (2014): Baby boom után nyugdíj boom? *Biztosítás és Kockázat*, 1(1), pp. 78-99.

Borlói, R., Réti, J (2010): A pontrendszeres nyugdíjparadigma (NYpont), in: *Holtzer* (szerk.): Jelentés a Nyugdíj és Időskor Kerekasztal tevékenységéről pp. 218-233.

Börsch-Supan, A., Brandt, M., Hunkler, C., Kneip, T., Korbmacher, J., Malter, F., Schaan, B., Stuck, S., Zuber, S. (2013): Data Resource Profile: The Survey of Health, Ageing and Retirement in Europe (SHARE). *International Journal of Epidemiology*, Vol. 42, https://doi.org/10.1093/ije/dyt088

Castles, F. G. (1998): The really big trade-off: home-ownership and the welfare state in the new world and the old, *Acta Politica*, 33(1), pp. 5-19.

Chatterji, S., Byles, J., Cutler, D., Seeman, T., Verdes, E. (2015): Health, functioning, and disability in older adults – present status and future implications, *The Lancet*, Volume 385, Issue 9967, pp. 563-575. https://doi.org/10.1016/S0140-6736(14)61462-8

Christensen, K., Doblhammer, G., Rau, R., Vaupel, JW (2009): Ageing populations: the challenges ahead, *The Lancet*, Vol.374, Issue 9696, pp. 1196-1208. https://doi.org/10.1016/S0140-6736(09)61460-4

Celidoni, M., Rebba, V. (2017): Healthier lifestyles after retirement in Europe? Evidence from SHARE, *The European Journal of Health Economics*, 18(7), pp. 805-830. https://doi.org/10.1007/s10198-016-0828-8

Coppola, M.. Wilke, C. B. (2014): At what age do you expect to retire? Retirement expectations and increases in the statutory retirement age. *Fiscal Studies*, 35(2), pp. 165-188. https://www.jstor.org/stable/24440305

Czibik, Á., Medgyesi, M. (2007): A lakosság nyugdíjjal kapcsolatos megtakarítási tudatossága és hajlandósága, *MKIK Gazdaság- és Vállalkozási Intézet, Budapest*

D'Amato, V., Di Lorenzo, E., Haberman, S., Sibillo, M., Tizzano, R. (2021): Pension schemes versus real estate, *Annals of Operations Research*, 299, pp. 797-809. https://doi.org/10.1007/s10479-019-03241-y

de Bresser, J., van Soest, A. (2015): Retirement expectations and satisfaction with retirement provisions. *Review of Income and Wealth*, Vol. 61, pp.119-139. https://doi.org/10.1111/roiw.12079

Dohmen, T., Falk, A., Golsteyn, B. H. H., Huffman, D., Sunde, U. (2017): Risk attitudes across the life course, *The Economic Journal*, 127 (October) pp. F95-F116, https://doi.org/10.1111/ecoj.12322

Dewilde, C., Raeymaeckers, P. (2008): The Trade-Off Between Home-Ownership and Pensions: Individual and Institutional Determinants of Old Age-Poverty, *Ageing & Society*, 28 (6), pp. 805-830. https://doi.org/10.1017/S0144686X08007277

Ebbinghaus, B., Nelson, K., Nieuwenhuis, R. (2019): Poverty in old age, *The Routledge International Handbook of Poverty*, 256-267.o (LIS Working Paper Series is publikálta, No.777)

Ebbinghaus, B. (2021): Inequalities and poverty risks in old age across Europe: The double-edged income effect of pension systems, *Social Policy & Administration*, https://doi.org/10.1111/spol.12683

Fall, O.F., Cahu, P. (2021): A simulation framework to project pension spending: The Czech pension system. *OECD Economics Department Working Papers* No. 1657.

Faragó, M. (2015): Egészségesen várható élettartamok Magyarországon, 2011, *Statisztikai Szemle*, 93(7), pp. 633-661.

Foverskov, E., Glymour, M. M., Mortensen, E. L., Holm, A., Lange, T., & Lund, R. (2018): Education and cognitive aging: accounting for selection and confounding in linkage of data from the Danish registry and survey of health, ageing and retirement in Europe. *American Journal of Epidemiology*, *187*(11), 2423-2430., https://doi.org/10.1093/aje/kwy162

Füzesi, Zs., Boros, J. (2015): Az idősek életminősége és egészségmagatartása. In: Lampek, K., Rétsági, E. (szerk.): *Egészséges idősödés: Az egészségfejlesztés lehetőségei idős korban*. PTE Egészségtudományi Kar, Pécs, 28–47. o.

Gogola, J., Vékás, P. (2020): Élettartam-kockázat Csehországban és Magyarországon, *Biztosítás és Kockázat* 7(3-4), pp. 14-27. http://dx.doi.org/10.18530/BK.2020.3-4.14

Garcia, M. T. M., Marques, P. D. C. V. (2017): Ownership of individual retirement accounts–an empirical analysis based on SHARE, *International review of applied economics*, 31(1), pp. 69-82. https://doi.org/10.1080/02692171.2016.1221389

Grané, A., Albarrán, I., Lumley, R. (2020): Visualizing Inequality in Health and Socioeconomic Wellbeing in the EU: Findings from the SHARE Survey, *International Journal of Environmental Research and Public Health.* 17(21):7747. pp.1-18. https://doi.org/10.3390/ijerph17217747

Grané, A., Albarrán, I., Guo, Q. (2021): Visualizing Health and Well-Being Inequalities Among Older Europeans, *Social Indicators Research*, 155(2), pp. 1-25. https://doi.org/10.1007/s11205-021-02621-x

Greenwald, L., Copeland, C., VanDerhei, J., (2017): The 2017 retirement confidence survey: many workers lack retirement confidence and feel stressed about retirement preparations. *EBRI Issue Brief, No. 431*, p.32.

Gulyás, Attila (2016). Érdemes-e adókedvezménnyel ösztönözni a nyugdíj-megtakarításokat? *Biztosítás és Kockázat*, 3(1), pp. 70-99. http://dx.doi.org/1018530/BK.2016.1.70

Gyarmati, A., Farkas, G., Molnár, Sz. (2009): Az idősödő társadalom gazdasági és társadalmi kihívásai Magyarországon, *Információs társadalom*, 9(4), pp. 7-31. https://dx.doi.org/10.22503/inftars.IX.2009.4.1

Hajek, A., König, H-H. (2020): Which factors contribute to loneliness among older Europeans? Findings from the Survey of Health, Ageing and Retirement in Europe: Determinants of loneliness, *Archives of Gerontology and Geriatrics*, Volume 89 (2020), 104080, pp. 1-4., https://doi.org/10.1016/j.archger.2020.104080

Hansen, T., Slagsvold, B. (2016): Late-Life Loneliness in 11 European Countries: Results from the Generations and Gender Survey. *Social Indicators Research*, 129(1), pp. 445–464, https://doi.org/10.1007/s11205-015-1111-6

Hargitai, D. M., Sasné Grósz, A., Veres, Z. (2020): Hagyományos és online tanulási preferenciák a felsőoktatásban – A COVID-járvány kihívásai, *Statisztikai Szemle*, 98. évf, 7. szám, pp. 839-857, https://doi.org/10.20311/stat2020.7.hu0839

Harsányi, Gyöngyi (2018): Befektetés és nyugdíj-előtakarékosság. *Biztosítás és Kockázat*, 5(1), pp. 50-61. http://dx.doi.org/1018530/BK.2018.1.50

Hauff, J. C., Carlander, A., Gärling, T., Nicolini G. (2020): Retirement Financial Behaviour: How Important Is Being Financially Literate? *Journal of Consumer Policy*, 2020:43, pp.543-564. http://dx.doi.org/10.1007/s10603-019-09444-x

Holtzer, P. (szerk) (2010): Jelentés a nyugdíj és időskor kerekasztal tevékenységéről, *Miniszterelnöki Hivatal, Budapest*

Huston, S. J. (2010): Measuring financial literacy, *Journal of Consumer Affairs, 44*, pp. 296–316. https://doi.org/10.1111/j.1745-6606.2010.01170.x

Huzdik, K., Béres, D., Németh, E. (2014): Pénzügyi kultúra versus kockázatvállalás empirikus vizsgálata a felsőoktatásban tanulóknál, *Pénzügyi Szemle*, 59(4), pp 476-488.

Joshi, H., Davies, H. (1991): Pension Splitting and Divorce, *Fiscal Studies*, 12(4), pp. 69–91.

Klerby, A., Larsson, B., & Palmer, E. (2012): To share or not to share: that is the question. in: Holzman, R. et al. (szerk.) *Nonfinancial Defined Contribution Pension Schemes in a Changing Pension World*, pp. 39-65., World Bank

Kovács, E. (2014): Többváltozós adatelemzés, *Typotex Kiadó, Budapest*

Kovács, E., Rétallér, O., & Vékás, P. (2015). Modellpontok szerepe a nyugdíj-hatásvizsgálatban. *Közgazdasági Szemle*, 62(12), 1328-1342. http://dx.doi.org/10.18414/KSZ.2015.12.1328

Kovács, E. (2018): Ön/gondoskodik vagy tovább dolgozik? *Biztosítás és Kockázat*, Vol. 5 No. 4, pp. 72-81.

Kovács, L., Sütő, Á. (2020): Megjegyzések a pénzügyi kultúra fejlesztéséről, *Gazdaság és Pénzügy*, 7(1), pp 137-146., https://doi.org/10.33926/GP.2020.1.6

Kovács, P., Kuruczleki, É., Rácz, T., Lipták, L. (2021): A magyar középiskolások pénzügyi kultúrájának vizsgálata az elmúlt 10 évben Econventio-teszt alapján, *Pénzügyi Szemle*, 66(2), pp. 179-198., https://doi.org/10.35551/PSZ_2021_2_1

Kruskal, J. B. (1964): Multidimensional scaling by optimizing goodness of fit to a nonmetric hypothesis, *Psychometrika*, 29, pp. 1-27.

Kuti, M., Schepp, Z. (2020): Az idősödő társadalom és a kockázati attitűd, *Pénzügyi Szemle* 2020/4. pp. 457-471. https://doi.org/10.35551/PSZ_2020_4_1

Kutubaeva, R. Z. (2019): Analysis of life satisfaction of the elderly population on the example of Sweden, Austria and Germany. *Population and Economics*, 3(2), pp. 102-116. https://doi.org/10.3897/popecon.3.e47192

Kwan, C., Walsh, C.A. (2018): Old age poverty: A scoping review of the literature, Cogent Social Sciences, 4(1), 1478479, pp. 1-21. https://doi.org/10.1080/23311886.2018.1478479

Lambert, G. (2020): Az Insurance Europe felmérése tíz európai ország lakosságának nyugdíjcélú megtakarításairól, *Biztosítás és Kockázat*, VII. évf. 3-4. szám, pp. 102-112. http://dx.doi.org/10.18530/BK.2020.3-4.102

Lampek, K. (2015): Az aktív időskor és a társadalom, In: Lampek K, Rétsági E (szerk.) *Egészséges idősödés: Az egészségfejlesztés lehetőségei idős korban*. Pécs: Pécsi Tudományegyetem Egészségtudományi Kar (PTE ETK), pp. 8-27.

Lance, G. N., Willams, W. T. (1967): A general theory of classificatory sorting strategies – 1. Hierarchical systems, *The Computer Journal*, 9(4), pp. 373-380. https://doi.org/10.1093/comjnl/9.4.373

Lotrič Dolinar, A., Sambt, J., Korenjak-Černe, S. (2019): Clustering EU Countries by Causes of Death, *Population Research and Policy Review*, 38, pp. 157–172. https://doi.org/10.1007/s11113-019-09518-1

Luchetti, M., Terracciano, A., Aschwanden, D., Lee, J. H., Stephan, Y., Sutin, A. R. (2020): Loneliness is associated with risk of cognitive impairment in the Survey of Health, Ageing and Retirement in Europe. *International Journal of Geriatric Psychiatry*, 35(7), pp. 794-801. https://doi.org/10.1002/gps.5304

Lusardi, A., Mitchell, O. S. (2010): How ordinary consumers make complex economic decisions: Financial literacy and retirement readiness. *CFS WorkingPaper, No. 2010/11, Goethe University, Center for Financial Studies (CFS), Frankfurt a. M.* http://hdl.handle.net/10419/43204

Lusardi, A., Mitchell, O. S. (2011): Financial literacy and planning: implications for retirement well-being, In: Mitchell-Lusardi (szerk.): *Financial Literacy: Implications for Retirement Security and the Financial Marketplace, Oxford University Press, Oxford*, pp. 17-39.

Lusardi, A., Mitchell, O.S. (2014): The economic importance of financial literacy: theory and evidence. *Journal of Economic Literature*, Vol. 52, No. 1, pp. 5-44. http://dx.doi.org/10.1257/jel.52.1.5

Lusardi, A. (2015): Financial literacy skills for the 21st century: evidence from PISA. *The Journal of Consumer Affairs*, Vol. 49, No. 3, pp. 639-659., https://doi.org/10.1111/joca.12099

Lusardi, A. (2019): Financial literacy and the need for financial education: evidence and implications, *Swiss Journal of Economics and Statistics*, 155(1):1, pp. 1-8. https://doi.org/10.1186/s41937-019-0027-5

Májer I., Kovács E. (2011): Élettartam-kockázat – a nyugdíjrendszerre nehezedő egyik teher, *Statisztikai Szemle*, 89(7-8), pp. 790-812.

Marshall, A.W., Olkin, I. (2007): Life Distributions. Structure of Nonparametric, Semiparametric, and Parametric Families, *Springer, New York,* https://doi.org/10.1007/978-0-387-68477-2

Mirowsky, J., Ross, E. C. (2003): Education, Social Status, and Health, *Aldine De Gruyter, New York*.

Molnár, Zs. (2017): Állami tulajdonban lévő erdőgazdaságok adatainak elemzése sokdimenziós skálázás (MDS) módszerével, *BCE*, Budapest

Monostori, J. (2017): Stabilitás és változás az idősek háztartás-szerkezetében, *Demográfia*, évf. 60. szám 1., pp. 105-137. https://doi.org/10.21543/Dem.60.1.3

Motel-Klingebiel, A., Kondratowicz, H-J., Tesch-Römer, C. (2004): Social inequality in the later life: Cross-national comparison of quality of life, *European Journal of Ageing,* Vol. 1, pp. 6-14. https://doi.org/10.1007/s10433-004-0001-6

Németh, A.O., Németh, P., Vékás, P. (2019): Demographics, Labour Market, and Pension Sustainability in Hungary, *Society and Economy*, Online first, pp. 1-26. https://doi.org/10.1556/204.2019.015

Németh E., Botos K., Botos J., Béres D., Csernák J., (2012): Pénzügyi kultúra és kockázatvállalás a közép-alföldi háztartásokban, *Pénzügyi Szemle*, 2012(3), pp. 291–309.

OECD (2019): Health at a Glance 2019: OECD Indicators, OECD Publishing, Paris, https://doi.org/10.1787/4dd50c09-en.

OECD (2021a): Pension at a Glance 2021: OECD and G20 Indicators. OECD Publishing, Paris. https://doi.org/10.1787/ca401ebd-en

OECD (2021b): Health at a Glance, *OECD Publishing*, Paris, https://doi.org/10.1787/ae3016b9-en

Olshansky S.J., Passaro, D.J., Hershow, R.C. et al. (2005): A potential decline in life expectancy in the United States in the 21th century, *The New England Journal of Medicine*, 2005:352. pp. 1138-1145. https://doi.org/10.1056/NEJMsr043743

Ostrovsky-Berman, E., Litwin, H. (2019): Social network and financial risk tolerance among investors nearing and during retirement. *Journal of Family and Economic Issues*, 40(2), pp. 237-249. https://doi.org/10.1007/s10834-018-9592-5

Pandurics, A., Szalai, P. (2017): A második és harmadik nyugdíjpillér szerepe a magyar nyugdíjrendszerben. *Pénzügyi Szemle*, 2017(2), pp. 214-233.

Peeters, H., de Tavernier, W. (2015): Lifecourses, pensions and poverty among elderly women in Belgium: interactions between family history, work history and pension regulations, *Ageing and Society*, 35 (6), pp. 1171-1199, https://doi.org/10.1017/S0144686X14000129

Péntek, M., Hajdu, O., Rencz, F., Beretzky, Z., Brodszky, V., Baji, P., Zrubka, Zs., Major, K., Gulácsi, L. (2019). Subjective expectations regarding ageing: a cross-sectional online

population survey in Hungary. *The European Journal of Health Economics*, *20*, pp. 17-30. https://doi.org/10.1007/s10198-019-01059-w

Péter, Á., Németh, E., & Vargha, B. T. (2020). A nyugdíjrendszer fenntarthatósága, kockázatok és lehetőségek. *Pénzügyi Szemle* 65 (KSZ2), pp. 57-85. https://doi.org/10.35551/PSZ_2020_k_2_3

Poterba, J.M., Venti, S. F., Wise, D. A. (2010): Demographic Trends, Housing Equity, and the Financial Security of Future Retirees, In: John B. Shoven (szerk): *Demography and the Economy, University of Chicago Press*, pp. 227-287.

Potóczki, J. (2017): A magyar lakosság pénzügyi kultúrájának szintje az öngondoskodás tükrében – nemzetközi és hazai kutatási eredmények, In: Farkas Beáta, Pelle Anita (szerk.): *Várakozások és gazdasági interakciók, JATEPress, Szeged*, pp. 157–170.

Prados, M. J., Kapteyn, A. (2019): Subjective expectations, social security benefits, and the optimal path to retirement. *Working Papers* MRDRC WP 2019-405*, University of Michigan, Michigan Retirement Research Center, Michigan*

Raleigh, V. (2019): Trends in life expectancy in EU and other OECD countries: Why are improvements slowing?, *OECD Health Working Papers*, No. 108, OECD Publishing, Paris, https://doi.org/10.1787/18152015

Ridsdale, B. and Gallop, A. (2010): Mortality by Cause of Death and by Socio-Economic and Demographic Stratification 2010, *Paper for ICA2010*. https://www.actuaries.org.uk/search/site/ridsdale

van Rooij, M., Lusardi, A., Alessie, R. J. (2011): Financial literacy and retirement planning in the Netherlands, *Journal of Economic Psychology,* Vol.32(4), pp. 593-608. https://doi.org/10.1016/j.joep.2011.02.004

Rutecka-Góra, J. (2019): Supplementary pension schemes: needs, possibilities and problems with evaluation from the perspective of an individual saver. *Warsaw: Institute of Statistics and Demography, Warsaw School of Economics*

Sekita, Sh. (2011): Financial literacy and retirement planning in Japan. *Journal of Pension Economics and Finance*, 10(4), pp. 637-656. https://doi.org/10.1017/S1474747211000527

Semsei, I. (2014). Őszülő társadalmak: Aktív idősödés–nemzedékek közötti szolidaritás. *Acta Medicinae et Sociologica*, 4, pp. 5-17.

Simeunović Bajić, N., Ercegovac, I. (2017): European picture of the elderly people: Research on the main socio-demographic characteristics and trends in selected countries, *Journal of the Geographical Institute "Jovan Cvijic"*, SASA 2017 Volume 67, Issue 3, pp. 317-332, https://doi.org/10.2298/IJGI1703317S

Simonovits, A. (2015): Hogyan hat a nyugdíjszabályok hiányos ismerete a dolgozók döntéseire? *Közgazdasági szemle*, 2015. március, pp. 263–283.

Simonovits, A. (2018): Miért kell a nyugdíj-valorizálást és -indexálást pontrendszerrel felváltani*?* *Közgazdasági Szemle*, 65(9), pp. 903-922. https://doi.org/10.18414/ksz.2018.9.903

Szikra, D. (2017): A magyar nyugdíjrendszer a rendszerváltás óta, In: Ferge Zs. (szerk.): *Társadalom- és szociálpolitika Magyarország, 1990-2015*, pp. 287-309. Osiris kiadó, Budapest

Turner, J., Zhang, S., Hughes, G., Rajnes, D. (2019): Irrational expectations, future social security benefits, and life cycle planning. *The Journal of Retirement*, Vol. 6, No. 3, pp. 60-68.

Yakoboski, P. J., Lusardi, A., Hasler, A. (2022): How Financial Literacy Varies among U.S. Adults: The 2022 TIAA Institute-GFLEC Personal Finance Index, *TIAA Institue and Global Financial Literacy Excellence Center*

Yakoboski, P. J., Lusardi, A., Hasler, A. (2023): Financial literacy, longevity literacy, and retirement readiness, *TIAA Institue and GFLEC*

Vargha, L. (2015): A társadalmi öregedés hagyományos és alternatív indikátorai, *Demográfia*, 58(1), pp.57-78.

Vaupel. J.W., Oeppen J. (2002): Broken limits to life expectancy, *Science*. 2002; 296. pp. 1029-1031. https://doi.org/10.1126/science.1069675

Vehrer, A. (2017): Az idősödők informális tanulási szokásai, *Opus et Educatio*, Vol 4, No 4, pp. 464-475. http://dx.doi.org/10.3311/ope.221

van Vliet, O., Been, J., Caminade, K., Goudswaard, K. (2012): Pension reform and income inequality among older people in 15 European countries, *International Journal of Social Welfare*, 21: pp. S8-S29, https://doi.org/10.1111/j.1468-2397.2012.00873.x

Walker, A. (2009): Az aktív idősödés stratégiája, (ford. Gyarmati Andrea) *Kapocs*, 8. évf., 1.szám, pp. 46-55.

Zsótér, B., Németh, E., Luksander, A. (2017): A társadalmi-gazdasági környezet változásának hatása a pénzügyi kultúrára, *Pénzügyi Szemle*, 62(2), pp 251-266.

Zsótér Boglárka (2018): A fiatal felnőttek pénzügyi kultúrájának vizsgálata. Pénzügyi Szemle, 2018/1. szám, pp. 39-54.

5. LIST OF OWN PUBLICATIONS

(related to the topic of the dissertation)

Publications in Hungarian

Scientific articles

1. Vaskövi, Á. (2018): Pénzügyi tudatosság és hosszabbodó nyugdíjas évek: Beszámoló az idei Nemzetközi Aktuárius Kongresszusról (Berlin, 2018. június), *Biztosítás és Kockázat* 5(3), pp. 48-57. https://doi.org/10.18530/BK.2018.3.48
2. Ágoston, K. Cs., Burka, D., Kovács, E., Vaskövi, Á., Vékás, P. (2019): Klaszterelemzési eljárások halanódósági adatokra, *Statisztikai Szemle* 97(7), pp. 629-655. https://doi.org/10.20311/stat2019.7.hu0629
3. Szanyi-Nagy, S., Vaskövi, Á. (2021): Hogyan élnek az európai nyugdíjasok? Egyéni szintű különbözőségek vizsgálata SHARE-adatok alapján, *Közgazdasági Szemle* 68(12), pp. 1336-1363. https://doi.org/10.18414/KSZ.2021.12.1336
4. Vaskövi, Á., Ráduly, D. (2022): Nyugdíjrendszerek és nyugdíj-előtakarékossági formák a visegrádi országokban, *Biztosítás és Kockázat* 9(3-4), pp. 38-71. http://doi.org/10.18530/BK.2022.3-4.38
5. Vaskövi, Á., Jászfi, E. (2023): Az időskori szegénység és az öngondoskodás összefüggései Európában, *Közgazdasági Szemle* 70(7-8), pp. 898-923. http://dx.doi.org/10.18414/KSZ.2023.7-8.898

Conference proceedings

6. Kovács, E., Vaskövi, Á. (2018): Tovább élünk, tovább dolgozunk?, In: Temesi, J. (szerk.): *XV. Gazdaságmodellezési Szakértői Konferencia: Előadások*, Budapest, pp. 64-72.

Book chapters

7. Vaskövi, Á. (2020): Fiatalok nyugdíjvárakozásai Magyarországon – kitekintéssel az OECD országok lakosságának nyugdíjba vonulási és várható élettartam trendjeire, in: Cserháti, I. (szerk): *Munkapiaci trendek – demográfiai és jóléti kihívások*, Typotex kiadó, Budapest, pp. 50-68.

Publications in English

Scientific articles

8. Vaskövi, Á., Kovács, E. (2020): Pension Pessimism in the Young Generation: Basics on Instincts to Blame?, *Business Systems Research Journal* 11(2), pp. 117-131. https://doi.org/10.2478/bsrj-2020-0019

Conference proceedings

9. Kovács, E., Vaskövi, Á. (2019a): Living Longer. Working Longer? Life Expectancy and Retirement Age Trends is OECD Countries, in: Iacono, M. et al. (szerk.) *Proceedings of the 33rd International ECMS Conference on Modelling and Simulation*, Caserta, Olaszország, pp. 103-108.
10. Kovács, E., Vaskövi, Á. (2019b): Rational or Irrational? Pension Expectations in Hungary, in: Zadnik Stirn, L. et al. (szerk.): *Proceedings of the 15th International Symposium on Operational Research: SOR '19*, Ljubljana, Szlovénia, pp. 411-416.
11. Ágoston, K. Cs., Vaskövi, Á. (2020): Clustering EU Countries Based on Death Probabilities, in: Steglich, M. et al. (szerk.) *Proceedings of the 34th International ECMS Conference on Modelling and Simulation*, Wilhelmshaven, Németország, pp. 91-96.
12. Vaskövi, Á., Szanyi-Nagy, S., Kovács, E. (2022): European Quality of Life in Retirement – Analyzing Personal Differences based on SHARE Data, in: Hameed, I.A.. et al. (szerk.) *Proceedings of the 36th International ECMS Conference on Modelling and Simulation*, Alesund, Norway, pp. 91-96.
13. Vaskövi, Á. (2023): Old Age Poverty and Financial Awareness in Europe, in: Vicario, E. et al. (szerk.) *Proceedings of the 37th International ECMS Conference on Modelling and Simulation*, Florence, Italy, pp. 107-113.