ORIGINAL ARTICLE

Contact to corresponding author: sylwia.pienkowska@uwm.edu.pl; University of Warmia and Mazury in Olsztyn, Faculty of Economic Sciences, Department of Finance, ul. Oczapowskiego 4, 10-720 Olsztyn, Poland

Sylwia Pieńkowska-Kamieniecka
University of Warmia and Mazury in Olsztyn, Poland
 orcid.org/0000-0002-5818-2658

Joanna Rutecka-Góra
Warsaw School of Economics, Poland
 orcid.org/0000-0002-2509-8599

Patrycja Kowalczyk-Rólczyńska
Wroclaw University of Economics and Business, Poland
 orcid.org/0000-0002-7952-7678

Milena Hadryan
Adam Mickiewicz University Poznań, Poland
 orcid.org/0000-0003-1391-0671

Readability, efficiency and costliness of individual retirement products in Poland

Abstract

Research background: The role of supplementary pension systems in providing adequate income in old-age is increasing significantly. They are frequently analysed, but rather in terms of architecture, product forms, assets under management or tax incentives than in terms of their efficiency, costliness or readability for individuals.
Purpose of the article: The first aim of this paper is to evaluate individual retirement products in Poland regarding their linguistic readability and transparency, investment efficiency and costliness. Moreover, we examine whether there is any correlation between the analyzed characteristics of contracts that would suggest an intentional strategy by financial institutions to hide low effi-

ciency and high costs. The second aim of the article is to assess which individual retirement products are similar to each other and which are significantly different. The research covers two types of individual retirement products (IKE and IKZE) offered at the beginning of 2017.
Methods: We used the 'Jasnopis' linguistic analysis tool to assess the difficulty level of the language used in the contracts and we conducted desk-research to analyse their transparency. We indicated the costliness and efficiency of the products by calculating the 5-year cost ratios and real average 5-year rates of return. To examine the relations between the characteristics of pension contracts, we used the Spearman's rank correlation coefficient and then verified its significance with a non-parametric test. Moreover, to identify groups of products that are similar to or different from each other, Ward's method was used. The study includes nearly 90% of all individual retirement products offered in Poland.
Findings & value added: For both types of retirement products studied (IKE and IKZE), we found that the more readable a contract is, the higher its rate of return is and the higher the costs charged are. Moreover, the more readable a contract is, the more transparent it is. The findings of the study provide financial institutions, the supervisor and creators of social policy with information on market imperfections and recommendations how to improve the individual retirement products offered on the market. Our research makes a unique contribution to the multidimensional research of supplementary pension systems. It also develops the understanding of how to successfully use linguistic tools in complex analyses of financial services. The results of the hierarchical cluster analysis proved that both IKE and IKZE products differ substantially and their features generally do not depend on the type of the financial provider.

Introduction

Reforms of old-age pension systems have changed the architecture of both basic and supplementary pension schemes. Decreasing replacement rates from public systems resulted in more attention being paid to voluntary pensions plans that should supplement old-age income to an adequate level and offer individuals protection against outliving their savings (OECD, 2012; OECD, 2019). The development of a supplementary pensions system depends on many factors with household wealth, the level of public benefits, and both state and employer participation being the most important (Guardiancich & Natali, 2011; Casey & Dostal, 2013; Collins & Hughes, 2017; Styvens, 2019). Despite their actual existence and the scope of factors stimulating supplementary pension plans, their proper operation and satisfactory development is quite necessary in nearly all countries. This is especially the case of the countries that offer low replacement rates from public pension systems not allowing people to maintain their standard of living after retirement. The Polish public pension system will offer replacement rate of 27.6% for people retiring at the minimum retirement age in 2040 (European Commission, 2018b). Thus, it is a good example of a country that should provide its citizens with efficient supplementary pension plans if the goal of adequate income in old age is to be achieved.

Supplementary pension systems worldwide are frequently studied in research publications and regular reports are released by international organisations (European Commission, 2010; OECD, 2012; European Parliament, 2014; European Commission, 2018a; OECD 2019, Mączyńska *et al*., 2020). But the studies focus mainly on the architecture, product forms, coverage, assets under management and the scope of tax incentives implemented. The macro perspective dominates over the micro perspective. These studies show supplementary pensions from the point of view of the regulator or the watchdog, which is also a consequence of scarce micro data on individual participation in supplementary pension plans and deficits of information policy. The official statistics include the key indicators of the development for the supplementary pension market, but provide no assessment of the appropriateness of retirement plans for individual savers. The official data lack information regarding detailed features and the efficiency and costliness of pension products that exist on the market. This results in problems with plan and product assessment not only for individuals but also for researchers (Mączyńska *et al.*, 2020). Moreover, it leads to very limited research on the efficiency, costliness and other features of retirement contracts marketed to individuals. These negative phenomena coincide with costly tax incentives being offered with supplementary pension plans. Individuals are encouraged to join mechanisms that are not regularly verified in terms of their efficiency in providing adequate income in old age. That could result in mis-selling and income redistribution to financial institutions, above all when people do not understand the financial contracts they conclude.

The only broad analysis of the linguistic difficulty and efficiency of Polish individual retirement products has been carried out by Rutecka-Góra *et al.* (2020), who examined the retirement contracts by type of financial product providers. This resulted in assessment of the correlations in a few groups of products offered by life insurers, asset management companies, voluntary pension funds and banks, but with a significant limitation of the analysis resulting from the small number of products in each sector group and not providing an answer regarding possible correlations to the individual pension market as a whole. However, as an additional value in the present research, we developed and enlarged this approach by calculating a new cost index that reflects fees charged over a longer period, using different indexes of linguistic difficulty and by examining the correlations between readability, transparency, costliness and efficiency for the whole market of individual retirement accounts (IKE) and individual retirement savings accounts (IKZE). Our broader and more developed analysis led us to observe more statistically significant correlations on the Polish market.

Moreover, due to the use of other measures of readability and costliness, we also observed different dependences in particular financial market sectors.

Our study addresses the important research gap concerning the assessment of individual retirement products in Poland from the perspective of savers. It is devoted to complete analysis of all types of individual pension contracts offered in Poland from an economic and linguistic point of view. The interdisciplinary character of the work results in outcomes and findings that could not have been achieved otherwise, e.g. by preparing two separate and parallel linguistic and economic analyses. The main goal of this paper is to answer the question whether any relation exists between the level of linguistic complexity (readability and transparency), and the costliness and investment efficiency of individual pension products offered in Poland. Thus, we wish to examine whether there may be a strategy by financial institutions to hide low efficiency and high fees in less readable and less transparent contracts.

Moreover, our research makes a unique contribution to the multidimensional approach to the assessment of supplementary individual pension systems and financial services. In our view, it also develops the understanding of how to successfully use linguistic tools in complex analyses of financial service contracts.

The article consists of four parts. Following the introduction, in the next part we describe the supplementary pension system in Poland with a particular focus on individual retirement plans. In this section, we also present a review of the literature on the development of supplementary pension systems, their assessment and detailed products analyses, both in Poland and worldwide. We discuss studies on the measurement of readability and linguistic assessment of financial contracts. The next section describes the data and methods used to evaluate individual retirement products in Poland in terms of their linguistic readability, transparency, investment efficiency and costliness. We then present the results of the empirical research and discuss how they correspond with the results of other studies. Finally, we conclude with indicating some limitations of our research and providing suggestions for further studies on individual pension plans.

Literature review

In 1999 Poland reformed its old-age pension system and introduced a multi-pillar old-age security system following the recommendations of the World Bank (Chłoń *et al.*, 1999). The key changes relate to the introduction

of the defined contribution (DC) formula, mixed methods of financing and the creation of supplementary pension plans that were initially related to occupation only (more: Góra, 2003). After several years of unsatisfactory development of employee pension programmes, individual retirement products were introduced. As a result, the Polish supplementary pension system currently consists of many elements: employee pension schemes (Pracownicze Programy Emerytalne, PPE), individual retirement accounts (Indywidualne Konta Emerytalne, IKE), individual retirement savings accounts (Indywidualne Konta Zabezpieczenia Emerytalnego, IKZE), and employee capital plans (Pracownicze Plany Kapitałowe, PPK, introduced in the middle of 2019) (Rutecka-Góra *et al.*, 2020; Szczepański & Kołodziejczyk, 2020; Pieńkowska-Kamieniecka, 2019). Our paper focuses on the individual part of the supplementary old-age pension system, namely two of these elements: IKE and IKZE (individual pension products as a whole).

Individual retirement accounts (IKE) were introduced in 2004 and individual retirement savings accounts (IKZE) have been operating since 2012. Both types of individual pension products can be offered as an investment fund, a unit-linked life insurance, a voluntary pension fund, a bank account or a securities account in a brokerage house. Moreover, individual retirement products are offered with tax privileges. In IKE, the capital gains and pay-outs are exempt from personal income tax (TEE tax regime, Tax-Exempt-Exempt). In case of IKZE, contributions and capital gains are free of tax and withdrawals are subject to a reduced, flat-rate personal income tax (10%), (EET tax regime, see more: Jedynak, 2016; Rutecka-Góra, 2016; Szczepański, 2015). There are annual quota limits to contributions that amount to 300% and 120% of the average monthly wage in the economy respectively.

The Polish individual pension market is voluntary, highly complex and non-transparent. At the end of 2016, there were 86 IKE and IKZE products offered by financial providers and coverage was 5.5% and 3.9% respectively. The IKE and IKZE market is dominated to a large degree by life insurers and asset management companies that managed ca. 85% of the individual retirement accounts at the end of 2016 (KNF, 2017). As there is neither an official register of retirement products nor any official comparable list of the offers published by the financial watchdog, potential and actual consumers may have immense problems with understanding the products offered, comparing their specific features and choosing the best option. Moreover, the problems may even be exacerbated by either the economic complexity of the products (sophisticated financial mechanisms) or the linguistic difficulty of these contracts.

Supplementary pension systems have been extensively analysed in studies and reports by international organisations (European Commission, 2010; European Commission, 2018a; OECD, 2012; OECD, 2019; Oxera, 2013; European Parliament, 2014). These studies demonstrated that supplementary pension provision varies substantially between countries mainly in terms of the architecture, vehicles used, number of plans and plan participants, coverage and assets under management. The comparative studies that included countries with the most developed supplementary pension systems (both occupational and individual ones) showed that the development of voluntary retirement plans depends strongly on determinants such as replacement rates from the public system, household wealth, pension awareness, transparency of the system, the participation of the state and of employers and tax incentives (Guardiancich & Natali, 2011; Casey & Dostal, 2013; Collins & Hughes, 2017; Marcinkiewicz, 2018; Styvens, 2019). The study by Börsch-Supan (2004) showed that fiscal incentives introduced to voluntary pension systems may bring about the expected effects but at high cost. As far as investment efficiency is concerned, the regular assessment of supplementary retirement products in European countries conducted by Better Finance (Mączyńska *et al.*, 2020) showed that real rates of return including costs may be negative or near zero in selected forms of supplementary retirement plans in some countries, even for the entire period of their operation. In this context, voluntary pension funds and employee pension funds in Poland stood out positively. Extraordinarily high rates of return of voluntary pension funds in Poland were also reported by Marcinkiewicz (2015) and Rutecka-Góra (2019).

Previous studies on the Polish supplementary old-age pension system focus almost solely on the scarce data released by the Polish Financial Supervision Authority including the number of retirement accounts and the amount of pension assets held. They concentrate on describing and commenting on the characteristics of elements of the supplementary pension system, their low coverage and low amount of capital funds accumulated (e.g. Adamska-Mieruszewska & Mosionek-Schweda, 2015; Duda, 2015). The efficiency of individual pension products was analysed much less often and to a rather limited extent, covering only some sectors or products (Marcinkiewicz, 2015; Szczepański & Brzęczek, 2016; Dopierała, 2017; Sołdek & Stachnio, 2018; Dopierała, 2018; Rutecka-Góra, 2019). These studies showed that investment efficiency differs substantially among both pension fund types and financial providers, with voluntary pension funds being the most profitable for individual savers. The most recent reports on returns on pension savings (Berthon *et al.*, 2014; Allgayer *et al.*, 2017; Andersen *et al.*, 2018; Šebo *et al.*, 2019; Mączyńska *et al.*, 2020) also ad-

dress the costliness of some individual pension products and their efficiency, but these analyses only cover a small fragment of the individual pension market in Poland (voluntary pension funds) or present theoretical rates of fees for groups of products. To our knowledge, there has been no comprehensive research on the costliness and actual investment efficiency of the whole supplementary pension market in Poland including both occupational and individual plans. The key reason for this is the lack of microdata collected and officially published by the pension market authority. Moreover, there is no information about the investment strategies of individual savers and their behaviour on the financial markets.

There is a broad literature on the readability of non-literary texts. Returning to the roots, the research on readability formulas started in the 19th century, not only by linguists but also literary scholars. Sherman (1893) noted that the average sentence length in literature since the time of Shakespeare decreased and that concrete concepts are easier to understand than abstract ones. The German researcher Kaeding (1898) came to the conclusion that more frequent words are more comprehensible than those that occur less frequently. These observations were further developed by a Russian linguist, Rubakin (Choldin, 1979), who published a list of 1,500 words which were easy to understand for an average Russian. Furthermore Rubakin (Choldin, 1979) noted that the average sentence length and the use of frequently occurring words affect the readability of texts. However, the first readability formulas were developed in the 1920s. In 1923, Lively and Pressey (1923) published a formula to calculate which vocabulary was difficult for young students to understand. In 1935, Gray and Leary (1935) distinguished five statistical and stylistic indicators which influenced the understanding of texts by adults. In 1948, Flesch (1948) proposed a fundamental readability formula for English, which combined two simple indicators: word length and sentence length. Another formula, using the same indicators, was the Flesch-Kincaid test which presented a score in terms of a grade level in US schools (Kincaid *et al.*, 1975), making it easier for teachers and others to judge the readability level of various books and texts. Another popular formula, the FOG index, was established by Gunning (1952). FOG index results are presented as the number of years of education required to understand a text. This formula is used until the present, even in other countries. However, for Polish texts, the percentage of difficult words used in FOG index had to be modified regarding words that have more than three syllables. The FOG index has frequently been used to calculate the readability of Polish official texts about European Funds in comparison with the Polish press (Broda *et al.*, 2010) or Polish official texts on the Internet (Zarzeczny & Piekot, 2017). There are also hundreds

of readability formulas that have been devised since Flesch's time, including for languages other than English. Björnsson (1968) created the so called LIX-formula for Swedish. There is also a Slovak formula proposed by Mistrík (1968). For Polish texts, there is the formula proposed by Pisarek (1969), based on American formulas using percentage of difficult words and average sentence length. In 2015, the 'Jasnopis' computer application was developed based on the Pisarek formula and on the results of both linguistic and psycholinguistic tests conducted by Polish researchers (Gruszczyński & Ogrodniczuk, 2015). To calculate the readability level of a text, the 'Jasnopis' formula uses ca. 20 linguistic variables and the results of a psycholinguistic readability survey. The results of the formula can be expressed by one of the readability levels presented in Table 1 in the Annex. We use the variables calculated by 'Jasnopis' in our study.

The readability of non-literary texts has been examined extensively in current and recent linguistic studies. But this research did not develop any methods or indices for the examination of text transparency. Moreover, texts that were analysed in studies on readability usually included materials from the press, popular science or legal acts.

Previous research concerning the readability of financial documents has focused on different sectors of the economy. In these studies, researchers used different readability formulas (Ermakova *et al*., 2015). Cogan and Aloysius (2010) described the problem of the readability of health insurance contracts in Rhode Island in the United States. In that study, the Flesch-Kincaid formula was used to estimate the readability level of 55 documents. The results showed that the lowest score was 9.36 (readable by someone who reads at a ninth-grade level) and the highest was 30.4 (readable by someone who reads at a level higher than graduate school). Another study by Gyasi (2019) focused on the problem of readability of annual bank reports in Ghana, using the SMOG readability formula. The findings demonstrated that the reports were difficult to read because the reports were written using polysyllabic words and complex grammatical structures. Jayasree and Shette (2020) in their study concentrated on the readability of the Management Discussion and Analysis (MD&A) section of the annual reports of a bank in India. Their analysis was based on all 39 banking companies listed on the National Stock Exchange (NSE) between 2013–14 and 2016–17. The researchers used the FOG Index and the Flesch Reading Ease Index (FREI) as an alternative measure of readability. They found that the MD&A of Indian banking firms are difficult to read but not unreadable. Moreover, their study indicated that a bank's performance influences the readability of its MD&A. Banks with poor performance would structure their annual reports to veil unfavourable information in adverse situations.

Cash and Tsai (2018) used the Flesch Reading Ease Score to measure the readability levels of 2,386 credit card agreements. They found that the average card agreement was written at a level higher than the average American reading level. Moreover, in this study the researchers used regression analysis to examine whether the readability of credit card agreements was associated with the interest rate charged by card issuers. The results showed that difficult-to-read agreements were associated with higher minimum monthly payments, higher annual percentage rates, and higher fees for cash advances.

The first attempts to analyse the readability of financial services contracts and financial disclosures were made by Carlin (2009) as well as Loughran and McDonald (2013). They found that the more costly the product is, the more complex and the less readable the fee disclosure is. Turner (2013) constructed a complexity index for selected aspects of complexity, based on the rating system related to, among other things, fee information, fee structure, fee disclosure, and the level of readability of the financial documents. This research indicates that the complexity in fees and disclosures is strategic. The higher-fee financial services are less readable and have more complex fee structure. Barczuk (2015) characterized the most important methods of measuring text readability that could be used to assess the linguistic difficulty of insurance contracts and formulated some recommendations how to apply them to the Polish market.

The very first preliminary and quite limited assessment of the readability of few pension contracts offered in Poland was conducted by Chłoń-Domińczak *et al*. (2016). This study showed that both retirement plan contracts and general pension information addressed to individuals are unreadable for people without higher education. These findings were confirmed by a broad study conducted by Rutecka-Góra *et al*. (2020). Barczuk-Grędzińska (2018) focused on the readability of general insurance conditions available on the Polish market. Based on the Gunning FOG, Flesch-Kincaid Grade Level, SMOG, ARI and Coleman Liau tests, she estimated the number of years of education which are needed to understand an insurance contract. The results show that between 18 and 23 years of education are required to understand these insurance contracts.

Research methodology

Our linguistic analysis covers 77 of the 86 IKE and IKZE products offered on the Polish market at the beginning of 2017. The high coverage (90%) resulted from the fact that we gathered the contract documents (general

conditions of insurance, general regulations of the contracts, statutes, key informational documents) ourselves by visiting the websites of financial institution or by direct e-mail contact with financial providers. We built the database of rates of returns using the information on the annual investment efficiency of pension funds and investment funds published on a Polish financial website, analizy.pl. In the case of banks, we assembled the information about interest rates of retirement accounts from bank websites or by direct e-mail correspondence. Cost ratios were calculated based on tables of fees and provisions that are attached to financial contracts or based on information presented in other documents communicated to savers. We assessed the efficiency of 65 products (76% of the entire market) and the costliness of 68 products (79%), excluding the products offered of brokerage houses. It was impossible to assess the costliness and efficiency of accounts with brokerage houses, as neither official data on individual savers' investment portfolios nor on savers' behaviour on the financial markets was available for these types of products.

The linguistic analysis includes the measurement of readability and transparency of the texts of financial contracts. The first element is devoted to the group of purely linguistic features that allow an individual to understand a text. The study therefore focuses on the level of difficulty of the text. It should be mentioned, however, that difficulty is as an objective feature of a text, independent of the reader's skills, while comprehensibility comes down to the individual capabilities of the reader of the text, mainly their level of education (Wissing *et al.,* 2016; Wray & Dahlia, 2013). A text can be objectively difficult, e.g. because of complicated syntax or specialist terminology, but it will still be well understood by readers familiar with the subject. It should be noted, however, that the terms "difficult" or "difficulty" are sometimes used interchangeably in this article for stylistic reasons, so as not to overuse the terms "unreadable", "incomprehensible" and the like.

To study the readability of contract texts, we use the 'Jasnopis' application, which was created in 2015 (Gruszczyński & Ogrodniczuk, 2015) to measure the linguistic difficulty of non-literary texts in Polish. It aids in the calculation of many text parameters which are used to determine the level of difficulty of a text. Moreover, in the development of the application, psycholinguistic tests were used, which made it possible to establish which texts are easy for particular Polish readers based on their level of education. This allows the assumption that 'Jasnopis' determines readability of texts for a specific group of readers. Its primary function is to determine the text readability class in the range from 1 to 7, which refers to the indicative

stages of education (as organised prior to the introduction of the 2017 education reform in Poland) (Table 1).

In addition to the text readability class, 'Jasnopis' measures the FOG Index (Gunning, 1952), which indicates the number of years of education required to understand a text. The index is calculated according to the formula:

$$T = 0.4 \times (Tw + Ts) \tag{1}$$

where:
Tw − the average number of words in a sentence;
Ts − the percentage of difficult words.

For texts in Polish, it is assumed that difficult words have four or more syllables or belong to the group of words (corpus) recognized as difficult.

From the wide spectrum of linguistic difficulty parameters that are calculated by 'Jasnopis', we also use the percentage of verbs (the more verbs, the more readable the text is) and the percentage of difficult words as additional indices of readability. The text readability class was, however, considered the key measure of understandability, as only this index uses the results of psycholinguistic studies of literacy. Hence, the starting point of the analysis was the text readability class calculated on the basis of the pdf version of the text. The results produced automatically by 'Jasnopis' were also verified by an expert in linguistics who is a co-author of this article.

We assess the linguistic transparency of financial contracts by giving each contract a score on a 5-point-scale including the following transparency features (one point for each criterion): type size (at least 10 point), structure (max. 15 lines per paragraph), headings and graphics, metatext (e.g. table of contents), direct expressions (e.g. read!). We assumed that only texts that scored at least three points can be regarded as transparent.

Due to the fact that IKZE were introduced in 2012 and that we wanted to make all IKE and IKZE products comparable, we measured investment efficiency using the real average rate of return for the period 2012–2016. We collected the data on nominal rates of return in the second half of 2017 from the websites of financial institutions and from the Polish website Analizy Online (www.analizy.pl). We calculated real average 5-year rates of return using the harmonised index of consumer prices (annual HICP) published by Eurostat. When there were more pension funds offered within a product (e.g. by life insurers and asset management companies) we calculated real rates of return for a theoretical portfolio consisting of an equity fund (40%), a bond fund (40%) and a balanced fund (20%). The portfolio

structure takes into account the average age of a saver (ca. 50 years, KNF 2017) and the savers attitude to the investment risk (for more, see: Luu *et al.*, 2017; Bateman *et al.*, 2011; Fisher *et al.*, 2015; Blake & Haig, 2014).

We assessed the costliness of each analysed product according to the structure and level of costs charged in the first half of 2017. The information on costs was acquired from tables of fees and provisions, fund statutes and key investor information documents (KIID). We assumed that at the beginning of each year an individual saves PLN 3,500 in his/her retirement account that reflects roughly the average yearly contribution in 2016 (KNF, 2017). The cost ratio (CR) was calculated according to the formula:

$$CR = \text{(a fee for opening the account } + \text{ up-front fee } + \\ + \text{purchase fee } + \text{ management fee)/contribution x } 100\% \tag{2}$$

CR informs to what extent (in %) the contributions paid have been consumed by fees charged by a financial institution. In contrast to the study by Rutecka-Góra *et al.* (2020), we calculated this index for a longer period, namely for five years that corresponds precisely with the timeframe for the efficiency analysis. As banks charge no fees, if a contract lasts at least one year, we excluded them from CR assessment. In this case, we calculated the level of cancellation fees, just for comparison only within the bank sector.

In the next step, we applied correlation analysis to examine the statistical dependencies between readability, transparency, efficiency and costliness (cost ratio) of individual pension products. We verified the following research hypotheses:

H1: *The texts of contracts of high-cost individual pension products are less transparent and less readable for consumers.*

H2: *The more transparent and the more readable a pension contract is, the higher the efficiency of the product is.*

Taking into account both the accessibility of documents constituting the contracts and the accessibility of information on rates of return and costs, at this stage of the research we analysed 55 individual pension products. The correlation analysis included eleven individual pension products offered by eight life insurance companies, 27 individual pension products offered by 16 asset management companies, seven individual pension products offered by seven banks, ten individual pension products offered by seven voluntary pension funds. As was mentioned earlier, we did not apply correlation

analysis to products offered by brokerage houses due to the lack of data on their costliness and efficiency.

As the first step, Spearman's rank correlation coefficient was used (Spearman, 1904). In the second step, we used a non-parametric test to assess the significance of the Spearman's rank correlation coefficient. Assuming the null hypothesis of the independence of random variables X and Y, as well as the independence of pairs (x_i, y_i), the statistics distribution:

$$t = r_s \sqrt{\frac{n-2}{1-r_s^2}} \tag{3}$$

of rank correlation asks (with increasing sample size) for the Student's t distribution with n-2 degrees of freedom, where n is the sample size (Kendall, 1948; Hamburg & Young, 1996). The test was performed at the significance level of α=0.05.

We used the following variables for the analysis of dependence:
X_1 – 5-year cost ratio (costliness);
X_2 – real average 5-year rate of return (efficiency);
X_3 – readability class (readability);
X_4 – FOG index (readability);
X_5 – percentage of verbs (readability);
X_6 – transparency level;
X_7 – percentage of difficult words (readability) - this variable was excluded from the correlation analysis in the bank sector because all texts of bank contracts are characterized by the same percentage of difficult words.

With the characteristics of the variables in mind, we assumed that lower values are better for costliness, readability class, FOG index and percentage of difficult words. Thus, the lowest values of these variables had rank 1. In the case of real average 5-year rates of return, the percentage of verbs and the transparency level the highest values received rank 1.

To achieve the second purpose of our paper, we used Ward's method to classify the examined individual pension contracts (51 products after excluding IKE and IKZE sold as a financial package). Ward's method is one of the hierarchical methods used for clustering objects according to their similarities and/or separation of them according to the differences. It belongs to the hierarchical agglomerative methods (Ward, 1963; Hartigan, 1975; Zivadinovic *et al.*, 2009; Everitt *et al.*, 2011).

Results and discussion

Within the scope of this article, we first measured the readability, transparency, efficiency and costliness of each individual pension product and then conducted the separate correlation analyses for different types of financial providers. In the final stage, we examined the correlations between the contract features for the entire IKE and IKZE market. We marked in bold the values of statistically significant correlations.

The readability analysis indicated that the largest group of texts of contracts (60) were in readability class 6, the next largest group included texts in class 7 (15 texts) and the smallest group was class 5 (only two texts). The last class is understandable enough for people with secondary school education, but they consisted of key information sheets, which are short documents that do not include the full conditions of a contract. The two largest text groups, class 6 and 7 (in total 75 of 77 texts) are comprehensible for people with a master's or doctoral degree level of education, which is achieved by ca. 24 percent of the adult population in Poland (OECD, 2019).

Regarding the transparency, only two texts obtained five points, 16 documents scored three points, 29 documents received two points, 26 texts obtained one point and four documents scored zero. As we regard texts which scored at least three points as transparent, we can conclude that only 23 percent of texts of contracts fulfil the minimum transparency requirements.

The real annual average rates of return in the period 2012–2016 amounted to 0.87–3.05% in banks, 2.67–20.08% in voluntary pension funds, 0.07–6.07% in life insurance companies and -0.46–7.55% in asset management companies. Only one theoretical portfolio of investment funds reported a real negative return in the analysed period. Voluntary pension funds turned out to be the most efficient in general but at the same time the best bank product offered higher efficiency than the worst voluntary pension fund.

We found that the costliness differs strongly between products. The lowest costs were observed in banks due to the fact that these institutions do not charge any fees when an individual saves at least for one year. In life insurance companies, cost ratios (CR) amounted to 6.9%–29%, in asset management companies and voluntary pension funds the fees charged constituted 6.6%–14.4% and 3.3%–11.7% respectively of the contributions paid. We observed that the cost ratio increases with the risk profile of the investment fund. These fit in with findings of the research by Mączyńska *et al*. (2020) and Rutecka-Góra *et al*. (2020). Interestingly, however, we ob-

served that regardless of the risk level, the costliness is similar in products offered by providers belonging to the same financial group. This resulted from the general strategy of a group of charging high up-front fees or a fee for opening an account in all retirement products, regardless of their characteristics.

Correlation analysis by the sector of financial institution

The correlation analysis conducted for individual pension products offered by life insurance companies showed two statistically significant dependencies between the efficiency, costliness and readability of unit-linked insurance contracts (Table 2).

We found that the higher the costliness of an insurance product is, the higher its real rate of return. This confirms the theory that an investor has to bear higher costs when wishing to achieve higher rate of return (Markauskas & Saboniene, 2020; Baker *et al*., 2020). However, we also found that higher costs are charged in less readable contracts. Thus, a saver has to be more educated to understand the terms of a costlier retirement product. This suggests that there may be some strategy on the part of life insurers to hide higher costs in less readable contracts. This supports the findings of studies conducted by Turner (2013) and Cash and Tsai (2018) regarding some institutional strategies that may exist on the financial market.

In the case of asset management companies (Table 3), we observed statistically significant correlations regarding all characteristics of the contracts. The results show that the more efficient a product is, the lower its costs are and the less readable the contract is. Additionally, the less readable a contract is, the lower its costliness is. We found the positive correlation between transparency and readability (FOG index) that reflects consistent linguistic characteristics of retirement products offered by asset management companies. Moreover, we observed that the higher the percentage of difficult words in a contract is, the higher the percentage of verbs in the contract is. That may suggest that asset management companies try to make difficult contracts easier to understand by using more verbs.

In the next stage of our analyses, we found three statistically significant correlations between the characteristics of individual retirement products offered by banks (Table 4). We observed that the more readable a contract is, the higher the costs are (cancellation fees) and the higher its efficiency (interest rate) is. Thus, again we supported the findings of the research by Carlin (2009), Turner (2013) and Cash and Tsai (2018). Moreover, the more readable a contract is, the less transparent it is. This may indicate that

banks may unintentionally hide high cancellation fees in difficult contracts. They rather want to make them visible to discourage individuals from terminating the contracts in the first year of saving. In our opinion, the inconsistent linguistic characteristics of retirement products suggest that banks in general may not pay attention to this aspect of the products they offer.

Our correlation analysis by financial sectors also included voluntary pension funds. In this group of products, we observed a statistically significant positive dependency between readability (FOG index) and the transparency level (Table 5). We found that the more readable a voluntary pension fund's contract is, the more transparent it is. Other correlations concerned dependencies between different readability measures.

Correlation analysis for the entire IKE and IKZE market

In the final part of our research, we examined the correlations between readability, transparency, efficiency and costliness for all IKE and IKZE offered on the market. The analysis covers individual retirement products offered by asset management companies, life insurance companies and voluntary pension funds. We decided to exclude products offered by banks due to the different method of calculating the costliness for this type of financial provider (only a cancellation fee is charged in these products).

In the case of individual retirement accounts (IKE), we observed statistically significant dependencies between readability and costliness, readability and efficiency, as also readability and the transparency level (Table 6).

We found that the more readable a contracts is, the higher its cost ratio is. This suggests that financial providers do not intend to hide high fees in hardly readable contracts. At the same time the more readable a contracts is, the higher the real rate of return it offers. We also observed a positive correlation between the readability and transparency of IKE products that suggests a consistent linguistic strategy applied by financial institutions.

Having analysed the IKZE products (Table 7), we found a statistically significant correlation between all the analysed traits of contracts. We observed a positive correlation between the readability and efficiency of contracts and between the readability and transparency of IKZE products. However, the more readable an IKZE contract is, the higher its costs are and the more efficient a contract is, the less transparent it is. So IKZE providers do not hide high fees in unreadable contracts but they also adopted an inconsistent linguistic approach to creating their IKZE products or do not have any strategy in this area at all.

To sum up, we obtained very similar results regarding IKE and IKZE markets. Unlike the study by Rutecka-Góra *et al.* (2020), we proved general dependencies on the whole markets of individual retirement products. Regardless of the product type, the higher the costs of an individual retirement plan are, the more readable a text of the contract is. So, the results are the opposite of the findings of Carlin (2009), Turner (2013) and Cash and Tsai (2018). We also observed consistent linguistic characteristics of the products demonstrated by the positive correlation between readability and transparency. However, this does not mean that good readability goes hand in hand with high transparency for any product. All contracts of individual retirement products are almost equally unreadable, and the most transparent ones still require that an individual have at least a master's degree to understand them. This supports the results of other studies on the readability level of documents meant for individuals (Chłoń-Domińczak *et al.*, 2016; Barczuk-Grędzińska, 2018; Cash & Tsai, 2018; Rutecka-Góra, *et al.*, 2020). On the other hand, we have a positive message that the more understandable a contract is, the higher real rate of return it offers.

Due to the originality of the study and taking into account adopted research methodology, the obtained results cannot be directly compared with any studies on the features of individual retirement contracts in other countries. But in a broader context our study confirms the findings of the higher costliness of less readable products when analysing financial sectors separately (e.g. Cash & Tsai, 2018). Fees seem to be of key importance for the financial decisions of individuals, so hiding them in unclear contracts may lead to lower take up of financial products by individuals or result in misselling and redistribution towards financial institutions. Tse *et al.* (2016) conducted an experiment to examine how retirement investment decisions are affected by complex fee structures. They results show that individuals who perceive the system of fees in retirement products as too complicated more often remain with the default option. Kaliciak *et al.* (2019) revealed that people who are risk averse are less likely to save for retirement in general. Hence, a better option for them may be a supplementary pension plan offered by employers with an appropriate default option or even with automatic enrolment. Han and Stańko (2020) found that personal pension plans not linked to employment are less cost effective than plans that are linked to the place of employment. This cost advantage of workplace pensions over individual plans was also confirmed in a research report by Mączyńska *et al.* (2020) especially in regard to Central and Eastern European countries.

Cluster analysis for IKE and IKZE markets

Having applied Ward's method to identify groups of similar products in terms of their readability, transparency and efficiency, we found that individual pension accounts (IKE) can be classified into six clusters dependently (for example the first and the third class) and independently (other classes) from the type of provider (Table 8). The hierarchical cluster analysis indicates that in the first class is the only IKE offered by asset management company which reached the highest real rate of returns for the five-year period. The individual pension products in the second class are both difficult and turned out to be the least effective in the studied period. In the next cluster are IKEs offered by the same asset management company that differ only slightly from each other in the FOG index. The IKEs offered only by banks and asset management companies are in the fourth class, which is characterized by a similar (low) transparency level of the contracts. The fifth class consists of products from different types of providers, except banks, which are more readable but less effective. Indeed, in the sixth class are IKE offered by asset management companies and one bank which are similar in terms of their moderate transparency and efficiency.

In the case of IKZE, we identified five classes (Table 9). In the first class are voluntary pension funds and life insurance contracts with this same level of readability and almost the same level of transparency. In the second class are IKZEs offered only by asset management companies which are the least readable (a master's or doctoral degree is needed to understand them) but have the highest efficiency. Opposite to this group of IKZEs, in the third class, are products offered by an asset management company and a life insurer which are the most readable (with the highest percentage of verbs) but with low and even negative real rate of return for the five-year period studied. In the fourth class of IKZE's are voluntary pension funds, one life insurance product and one bank account with a low level of efficiency and low readability. Insurance products and investment fund contracts which require a similar (high) number years of education to understand their terms are in the fifth class. This is confirmed also in their difficulty level (texts difficult for average Poles or even very complicated).

The results of the hierarchical cluster analysis proved that both IKE and IKZE differ substantially in terms of their readability, transparency and efficiency and this rather does not depend on the type of the financial provider.

Conclusions

In the face of ageing populations, the future well-being of societies depends largely on the ability to provide adequate income in old age. As mandatory pension systems are undergoing deep reforms and state pensions are being reduced, more attention is paid to the proper development of supplementary old-age pension systems. Financial institutions are quite pleased with the proposals to broaden the supplementary pension coverage, especially with tax incentives. However, too little attention is paid to their fair and sustainable operation and the development of supplementary pension markets. This is especially so when pension systems (statutory and supplementary), created through numerous reforms, are highly complex in many respects. In our study, we have shown that all retirement products offered in Poland are hardly understandable and unclear to individuals. The efficiency and costliness of retirement products differ significantly between providers, with voluntary pension funds being the most efficient and bank pension products being the least costly. Although the characteristics of products offered on the Polish market differ from those offered in other countries, the results of our study are highly relevant and important for the broader community. They signal a general problem of unreadability of financial contracts, low efficiency and high costs that may also exist in supplementary pension systems in other countries, especially when retirement products are not regularly examined.

Our analysis showed a significant correlation between the efficiency and costliness of individual pension products only in the case of asset management companies and the opposite was observed in insurance plans. Hence, we may draw the general conclusion that the costlier the product of an asset management company is, the higher the rate of return it offers to savers is. Moreover, the lower the costliness of an insurance product is, the higher its investment efficiency is.

Our first hypothesis, that high-cost products are less transparent and less readable for a consumer, was partly supported only in the case of insurance companies offering individual pension products. In insurance IKEs and IKZEs, the readability level is significantly statistically correlated with the costliness of the financial contracts. The less difficult the language used in these contracts is, the lower the costs charged are. In contrast, in banks and asset management companies, the first hypothesis was negatively verified as it turned out that the more readable bank and asset management companies contracts are, the higher the costs of these products are. The hypothesis was also negatively verified regarding the whole IKE and IKZE markets.

We found that the more readable an individual retirement contract is, the higher its cost is.

We observed no correlation between contract transparency and its costliness in any of the studied groups of products. Moreover, we found a positive dependency between the transparency level and difficulty of language used for products offered on both the IKE and IKZE markets. This, however, also suggests that financial providers do not pay attention to the linguistic aspects of the contracts they offer. High levels of language difficulty observed in all contracts go hand in hand with low levels of transparency.

The second hypothesis, that the more transparent and the more readable a pension contract is, the higher the efficiency of the product is, was partly supported in the banking sector. The analysis showed that the more readable an IKE/IKZE product offered by a bank is, the higher the real interest rates it offers are. In contrast, in asset management companies the hypothesis was negatively verified due to the fact that the less readable contracts of asset management companies turned out to be more efficient. Moreover, we found a positive correlation between readability and efficiency for the whole IKE and IKZE market. In addition, in the case of IKZE products, transparency correlates negatively with efficiency.

Finally, we would like to emphasise that, by analogy to the results of other studies, the low readability and low transparency of all individual pension contracts in Poland is a serious obstacle for the development of the market for individual pension plans. The difficult language used in retirement contracts may deter people from concluding the contracts or result in mis-selling. When this coincides with a poor information policy in the accumulation phase, it may bring about an unintended redistribution towards financial institutions and allow inefficient and inadequate products to be offered on the market for many years. Not knowing what the real costs and efficiency of the plan are and how it works in detail, an individual investor lacks the basic knowledge needed to assess the financial instrument they may purchase or to compare it with those available on the broader market. Moreover, savers may be exposed to excessive risk that is not reflected in the system and level of fees.

Undoubtedly, the deficits in financial literacy and problems with understanding financial contracts may be reduced by financial education. Proper retirement planning cannot be conducted without effective financial education. It should be complemented with good communication between financial providers and individual investors by means of effective pension information. A simple, transparent and efficient pension platform for savers, including the pension plan ranking and key characteristics, could be a good solution to this problem. A pension platform or a dashboard could increase

the transparency of the whole market for retirement products and facilitate pushing inadequate retirement plan offers off the supplementary pension market.

Our research has some limitations that raise valuable possibilities for future research. First, we analysed documents constituting the contracts for individual pension products only for a specified moment in time, namely at the beginning of 2017. To verify whether and to what extent the financial institutions change these individual retirement contracts over time and improve their transparency, readability, costliness and overall efficiency, similar work could be done in the future. Second, we did not directly examine the readability of financial contracts by asking individual readers about their understanding of the contract rules. We did this indirectly using 'Jasnopis", which was built and calibrated in accordance with results of psycholinguistic tests conducted by experts in linguistics.

In order to precisely identify the socio-economic factors affecting understanding of the pension contracts by individual savers, other broad primary research studies could be conducted. Such research has been never carried out on the market for additional pension products in Poland, which provides an opportunity for the next interesting and important findings.

References

Adamska-Mieruszewska, J., & Mosionek-Schweda, M. (2015). Individual pension saving plans in the context of savings tendencies in Poland. *Praca i Zabezpieczenie Społeczne*, *8*, 3–19.

Allgayer, S., Christoff, L., Davydoff, D., Gabaut, L., Hagen, J., Houdmont, A., Klages, M., Mączyńska, A., Mujagić, E., Nielsen, M., Prache, G., Toscano, A. R., Rutecka-Góra, J., Šebo, J., Vial, M., & Voicu, Ș. (2017). *Pension savings: the real return. 2017 edition*. Brussels: Better Finance. Retrieved from https://betterfinance.eu/wp-content/uploads/publications/Pension_Report_2017_-_Full_Report_-_Online_Version.pdf (10.03.2020).

Andersen, C., Christoff, L., Davydoff, D., Diaz, M., Gabaut, L., Hagen, J., Herrero, F., Houdmont, A., Mączyńska, A., Marchionni, L., Mešťan, M., Mujagić, E., Naacke, G., Prache, G., Rutecka-Góra, J., Šebo J., Voicu, Ș. D., & Strandvåg Nagell, L. (2018). *Pension savings: the real return. 2018 edition*. Brussels: Better Finance. Retrieved from https://betterfinance.eu/wp-content/uploads/Pensions_Report_2018_-_Final_Version_-_for_Web.pdf (10.03.2020).

Baker, H. K., De Ridder, A., & Rasbrant, J. (2020). Investors and dividend yields. *Quarterly Review Of Economics and Finance*, 76, 386–395. doi: 10.1016/j.qref.2019.09.004.

Bateman, H., Islam T., Louviere, J., Satchell, S., & Thorp, S. (2011). Retirement investor risk tolerance in tranquil and crisis periods: experimental survey evidence. *Journal of Behavioral Finance*, *12*(4), 201–218. doi: 10.1080/15427560. 2011.620199.

Barczuk, K. (2015). The usefulness of readability formulas in the insurance industry. *Olsztyn Economic Journal, 10*(4), 338–351.

Barczuk-Grędzińska, K. (2018). Readability of the general insurance terms and conditions – theory and application in insurance practice. Retrieved from https://www.wir.ue.wroc.pl/info/phd/WUT03e5b5f5160d4fa7b2b74650e5af36d c/Czytelno%C5%9B%C4%87+Og%C3%B3lnych+Warunk%C3%B3w+Ubezp ieczenia+%E2%80%93+teoria+i+zastosowanie+w+praktyce+ubezpieczenio wej (20.10.2020).

Berthon, J., Davydoff, D., Gabaut, L., Klages, M., Prache, G., Rossi, M., Rutecka, J., Struwe, K., & Viver, J.M. (2014). *Pension savings: the real return. 2014 edition*. Brussels: Better Finance. Retrieved from https://betterfinance.eu/wp-content/uploads/publications/Pensions_Report_2014_FINAL_-_EN_FOR_W EB.pdf (10.10.2020).

Björnsson, C. H. (1968). *Läsbarhet*. Stockholm: Liber.

Blake, D., & Haig, A. (2014). *How do savers think about and respond to risk? Evidence from a population survey and lessons for the investment industry*. London: Cass Business School. Retrieved from https://openaccess.city.ac.uk/id/ eprint/6815 (10.10.2020).

Börsch-Supan, A. (2004). Mind the gap: the effectiveness of incentives to boost retirement savings in Europe. *OECD Economic Studies, 39*, 111–144.

Broda, B., Maziarz, M., Piekot, T., & Radziszewski, A. (2010). Difficulty of texts on european funds in the light of statistical measures. *Wrocławskie Towarzystwo Naukowe. Rozprawy Komisji Językowej, 37*, 23–40.

Carlin, B. I. (2009). Strategic price complexity in retail financial markets. *Journal of Financial Economics, 91*(3), 278–287. doi: 10.1016/j.jfineco.2008.05.002.

Cash, A., & Tsai, H.-J. (2018). Readability of the credit card agreements and financial charges. *Finance Research Letters*, *24*, 145–150. doi: 10.1016/j.frl.2017 .08.003.

Casey, B. H., & Dostal, J. M. (2013). Voluntary pension saving for old age: are the objectives of self-responsibility and security compatible? *Social Policy & Administration, 47*(3), 287–309. doi: 10.1111/j.1467-9515.2012.00853.x.

Chłoń, A., Góra, M., & Rutkowski, M. (1999). Shaping pension reform in Poland: Security through diversity. *World Bank Social Protection Discussion Paper, 9923*.

Chłoń-Domińczak, A., Góra, M., & Rutecka, J. (2016). *Jakie zmiany regulacyjne mogłyby wpłynąć na podniesieniu poziomu przyszłych świadczeń emerytalnych?* Warszawa: Research Report for IGTE. Retrieved from http://documents1.worldbank.org/curated/en/372221468758982295/pdf/multi-page.pdf (10.08.2020).

Choldin, M. T. (1979). Rubakin, Nikolai Aleksandrovič. In A. Kent, H. Lancour, & W. Z. Nasri (Eds.). *Encyclopedia of library and information science: Volume 26*. CRC Press.

Cogan, Jr., & Aloysius J. (2010). Readability, contracts of recurring use, and the problem of ex post judicial governance of health insurance policies. *Faculty Articles and Papers*, *59*, 93–126.

Collins, M. L., & Hughes, G. (2017). Supporting pension contributions through the tax system: outcomes, costs and examining reform. *Economic and Social Review, 48*(4), 489–514.

Dopierała, Ł. (2017). Efficiency of pension products offered by life insurance companies: the case of individual pension accounts. *Finanse i Prawo Finansowe*, *2*(14), 23–39. doi: 10.18778/2391-6478.2.14.03.

Dopierała, Ł. (2018). *Indywidualne konta emerytalne prowadzone przez zakłady ubezpieczeń. Efektywność inwestycyjna i zasady funkcjonowania*. Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego.

Duda, I. (2015). Individual retirement accounts and individual retirement savings accounts in comparison to the savings potential of Polish households. *Finanse: Czasopismo Komitetu Nauk o Finansach PAN*, *2*(8), 145–161.

Ermakova, T., Fabian, B., & Babina, E. (2015). Readability of privacy policies of healthcare websites. *Wirtschaftsinformatik Proceedings*, *73*.

European Parliament (2014). Pension schemes. Retrieved from https://www.europarl.europa.eu/RegData/etudes/STUD/2014/536281/IPOL_STU(2014)536281_EN.pdf (15.09.2020).

European Commission (2010). *Private pension schemes - their role in adequate and sustainable pensions.* Luxembourg: Publications Office of the European Union.

European Commission (2018a). *Pension adequacy report 2018 – current and future income adequacy in old age in the EU (Volume 1).* Luxembourg: Publications Office of the European Union. doi: 10.2767/40627.

European Commission (2018b). *The 2018 ageing report: economic and budgetary projections for the EU member states (2016-2070).* Luxembourg: Publications Office of the European Union. doi: 10.2765/615631.

Everitt, B. S., Landau, S., Leese, M., & Stahl, D. (2011). *Cluster analysis*. Chichester: John Wiley & Sons Ltd.

Fisher, P. J., Hayhoe, C. R., & Lown, J. M. (2015). Gender differences in saving behaviours among low- to moderate-income household. *Financial Services Review, 24*, 1–13.

Flesch, R. (1948). A new readability yardstick. *Journal of Applied Psychology*, *32*(3), 221–233. doi: 10.1037/h0057532.

Góra, M. (2003). *System emerytalny*. Warszawa: Polskie Wydawnictwo Ekonomiczne.

Guardiancich, I., & Natali, D. (2011). The EU and supplementary pensions: instruments for integration and the market for occupational pensions in Europe. *ETUI Working Paper, 2009.11*. doi:10.2139/ssrn.2264143.

Gunning, R. (1952). *Technique of clear writing*. New York: McGraw-Hill.

Gyasi, W. K. (2019). Readability and corporate communication: the case of four banks in Ghana. *Journal of Communications, Media & Society*, *6*(1), 21–44.

Gray, W., & Laery. B. (1935). *What makes a book readable*. Chicago: University of Chicago Press.

Gruszczyński, W., Ogrodniczuk, M. (Eds.). (2015). *Jasnopis czyli mierzenie zrozumiałości polskich tekstów użytkowych*. Warszawa: SWPS Uniwersytet Humanistycznospołeczny.

Han, T., & Stańko, D. (2020). Pension scheme fees and charge ratios in 44 countries: a comparative study. *International Social Security Review*, *73*(1), 99–137. doi: 10.1111/issr.12229.

Hamburg, M., & Young, P. (1996). *Statistical analysis for decision making*. Belmont: Wadsworth Publishing Company.

Hartigan, J. A. (1975). *Clustering algorithms* New York: Wiley.

Jayasree, M., & Shette, R. (2020). Readability of annual reports and operating performance of Indian banking companies. *IIM Kozhikode Society & Management Review*. Advance online publication. doi: 10.1177/2277975220941946.

Jedynak, T. (2016). The directions of the development of supplementary pension scheme in Poland. *Journal of Insurance, Financial Markets and Consumer Protection*, *22*(3), 34–48.

Kaeding, W. (1898). *Häufigkeitswörterbuch der deutschen Sprache*. Steglitz.

Kaliciak, A., Kurach, R., & Merouani, W. (2019). The importance of behavioural factors for pension savings decisions – cross-country evidence. *Acta Oeconomica, 69*(3), 357–391. doi: 10.1556/032.2019.69.3.3.

Kendall, M. G. (1948). *Rank correlation methods*. London: Charles Griffin & Company Limited.

Kincaid, J. P., & Fishburne, Jr R. P., Rogers R. L., & Chissom, B. S. (1975). Derivation of new readability formulas (automated readability index, FOG count and Flesh reading easy formula) for Navy Enlisted Personnel. Technical report, Institute for Simulation and Training. 56. Retrieved from https://stars.library.ucf.edu/istlibrary/56 (20.10.2020).

KNF (2017). Indywidualne konta emerytalne i indywidualne konta zabezpieczenia emerytalnego w 2016 roku. Warszawa. Retrieved from https://www.knf.gov.pl/?articleId=56377&p_id=18 (15.06.2020).

Lively, B. A., & Pressey, S. L. (1923). A method for measuring the 'vocabulary burden' of textbooks. *Educational Administration and Supervision*, *9*, 389–398.

Loughran, T., & McDonald, B. (2013). Measuring readability in financial disclosures. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id= 1920411 (12.11.2020).

Luu, L., Lowe, J., Butler, J., & Byrne, T. (2017). *Essential personal finance*. New York: Routledge.

Marcinkiewicz, E. (2015). Dobrowolne fundusze emerytalne w Polsce – analiza działalności i wyników inwestycyjnych. In F. Chybalski & E. Marcinkiewicz (Eds.). *Współczesne problemy systemów emerytalnych. Wybrane zagadnienia*. Łódź: Wydawnictwo Politechniki Łódzkiej, 196–209.

Marcinkiewicz, E. (2018). *Uwarunkowania rozwoju dobrowolnych programów emerytalnych. Perspektywa makro- i mikroekonomiczna*. Łódź: Wydawnictwo Politechniki Łódzkiej.

Markauskas, M., & Saboniene, A. (2020). Evaluation of capital cost: long run evidence from manufacturing sector. *Inzinerine Ekonomika-Engineering Economics, 31*(2), 169–177. doi: 10.5755/j01.ee.31.2.21439.

Mączyńska, A., Šebo, J., Voicu, S. D., Carlucci, E., Christoff, L., Christensen, L., Deinema, M., Hagen, J., Herce, J. A., Houdmont, A., Gabaut, L., Popova, Y., Grænge-Hansen, L., Mešťan, M., Naacke, G., Nacheva, D., Nava, C., Joab, M., Prache, G., Rutecka-Góra, J., & Url, T. (2020), *Long-term and pension savings. The real return. 2020 Edition*. Brussels: Better Finance. Retrieved from https://betterfinance.eu/wp-content/uploads/The-Real-Return-Long-Term-Pension-Savings-Report-2020-Edition.pdf (10.11.2020).

Mistrík J. (1968). Meranie zrozumittel'nosti prehocoru. *Slovenská reč*, *33*, 171–178.

OECD (2012). *OECD pension outlook 2012*. Paris: OECD Publishing. doi: 10.1787/9789264169401-en.

OECD (2019). *Pensions at a glance 2019: OECD and G20 indicators*. Paris: OECD Publishing. doi: 10.1787/b6d3dcfc-en.

Oxera (2013). *Study on the position of savers in private pension products*. Brussels: Oxera Consulting Ltd. Retrieved from https://www.oxera.com/wp-content/uploads/2018/07/Position-of-savers-in-private-pension-products.pdf.pdf (15.04.2020).

Pieńkowska-Kamieniecka, S. (2019). Diagnosis of the behavioural basis of decisions made in the area of pension provision and application in stimulating additional savings for old age. *Ubezpieczenia Społeczne. Teoria i praktyka*, *3*(142), 79–96. doi: 10.32088/0000_12.

Pisarek, W. (1969). Jak mierzyć zrozumiałość tekstu. *Zeszyty Prasoznawcze*, *4*(42), 35–48.

Rutecka-Góra, J. (2016). Evolution of supplementary old-age pension systems in selected CEE countries. *Journal of Management and Finance*, *14*(4), 149–162. doi: 10.33119/ZiF.2016.14.4.

Rutecka-Góra, J. (2019). Efficiency of a supplementary old-age pension system - the case of Polish voluntary pension funds. *Financial Internet Quarterly „e-Finanse", 15*(3), 76–87. doi: 10.2478/fiqf-2019-0022.

Rutecka-Góra, J., Bielawska, K., Hadryan, M., Kowalczyk-Rólczyńska, P., & Pieńkowska-Kamieniecka, S. (2020). *Zrozumiałość, przejrzystość i efektywność indywidualnych produktów emerytalnych w Polsce*. Warszawa: Oficyna Wydawnicza SGH. doi: 10.33119/978-83-8030-378-2.2020.202.

Šebo, J., Voicu, Ş. D., Andersen, C., Carlucci, E., Christoff, L., Deinema, M., Gabaut, L., Galvaire, T., Hagen, J., Herce, J. A., Houdmont, A., Mączyńska, A., Manis, A., Mešťan, M., Naacke, G., Strandvåg Nagell, L., Prache, G., Rutecka-Góra, J., Url, T., & Vysniauskaite, A. (2019). *Pension savings: the real return. 2019 edition*. Brussels: Better Finance. Retrieved from https://betterfinance.eu/wp-content/uploads/Pension-Savings-The-Real-Return-2019-Edition-1.pdf (10.3.2020).

Sherman, L. A. (1893). *Analytics of literature: a manual for the objective study of English prose and poetry*. Boston: Ginn and Co.

Sołdek, A., & Stachnio, M. (2018). Sequence-of-returns risk in the management of retirement savings. *Journal of Insurance, Financial Markets and Consumer Protection, 28*(2), 22–38.

Spearman, C. (1904). The proof and measurement of association between two things. *American Journal of Psychology*, *15*, 72–101. doi: 10.2307/1412159.

St" Styvens, Y. (2019). The role of the government in creating or enhancing the access to funded or unfunded pensions in the modern welfare state. In N. da Costa Cabral & N. Cunha Rodrigues (Eds.). *The future of pension plans in the EU internal market. Coping with trade-offs between social rights and capital markets*. Springer, Cham, 55–74. doi: 10.1007/978-3-030-29497-7_4.

Szczepański, M. (2015). Insurance against longevity risk in a pension system. The case study of Poland. *Olsztyn Economic Journal*, *10*(4), 297–309.

Szczepański, M., & Brzęczek, T. (2016). *Risk management in occupational pension schemes. Institutional, fiscal-economic and demographic determinants*. Poznań: Polskie Towarzystwo Ekonomiczne.

Szczepański, M., & Kołodziejczyk, K. (2020). The initial stage of the implementation of employee capital plans in greater Poland from the perspective of human resource management: a research report. *Human Resource Management*, *3-4*, 75–97. doi: 10.5604/01.3001.0014.1674.

Tse, A., Friesen, L., & Kalayci, K. (2016). Complexity and asset legitimacy in retirement investment. *Journal of Behavioral and Experimental Economics*, *60*, 35–48. doi: 10.1016/j.socec.2015.12.001.

Turner, J. A. (2013). Pension investors: complexity in advisory fee disclosures. In M. Szczepański (Ed.). *Pension reforms - comparison and evaluation*. Poznan: Publishing House of Poznan University of Technology, 49–75.

Wissing, G-J., Blignaut A. S., & Van der Berg, K. (2016). Using readability, comprehensibility and lexical coverage to evaluate the suitability of an introductory accountancy textbook to its readership. *Stellenbosch Papers in Linguistics*, 46, 155–180. doi: 10.5774/46-0-205.

Ward, J. H. (1963). Hierarchical grouping to optimize an objective function. *Journal of the American Statistical Association, 58*, 236–244.

Wray, D., & Dahlia, J. (2013). Exploring the readability of assessment tasks: the influence of text and reader factors. *Multidisciplinary Journal of Educational Research*, *3*(1), 65–95. doi: 10.4471 /remie.201 3.04.

Zarzeczny, G., & Piekot, T. (2017). *Przystępność tekstów urzędowych w internecie*. Wrocław: Oficyna Wydawnicza ATUT (10.03.2021).

Zivadinovic, N. K., Dumicic, K., & Casni, A. C. (2009). Cluster and factor analysis of structural economic indicators for selected European countries. *WSEAS Transactions on Business and Economics, 6*, 331–341.

Acknowledgements

Annex

Table 1. Text readability level determined by the 'Jasnopis' application

Class	Text readability characteristics	Indicative stage of education
1	Extremely easy text	Primary school grades 1-3
2	Very easy text	Primary school grades 4-6
3	Easy text understandable for the average Pole	Junior secondary school
4	Text somewhat more difficult, understandable for people with secondary education or who have extensive life experience	Secondary school
5	More difficult text, understandable for educated people	Bachelor's/Engineering degree
6	Difficult text for the average Pole	Master's degree
7	Very complicated, professional text whose understanding may require expertise	Doctoral degree or specialisation in the field of the text

Source: Gruszczyński & Ogrodniczuk (2015).

Table 2. Life insurance companies – correlation analysis

Variables	Spearman's rank correlation coefficient (p<.05)						
	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	1.00	**-0.74**	-0.41	**0.71**	-0.28	0.15	-0.45
X_2	**-0.74**	1.00	0.35	-0.50	0.48	0.35	0.21
X_3	-0.41	0.35	1.00	0.17	0.22	0.06	0.45
X_4	**0.71**	-0.50	0.17	1.00	-0.27	0.35	0.06
X_5	-0.28	0.48	0.22	-0.27	1.00	0.26	0.39
X_6	0.15	0.35	0.06	0.35	0.26	1.00	0.22
X_7	-0.45	0.21	0.45	0.06	0.39	0.22	1.00

Table 3. Asset management companies – correlation analysis

Variables	Spearman's rank correlation coefficient (p<.05)						
	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	1.00	**0.44**	**-0.50**	-0.04	-0.30	-0.32	0.27
X_2	**0.44**	1.00	**-0.39**	-0.03	**-0.52**	-0.08	**0.51**
X_3	**-0.50**	**-0.39**	1.00	-0.12	0.01	0.02	0.33
X_4	-0.04	-0.03	-0.12	1.00	0.33	**0.59**	-0.18
X_5	-0.30	**-0.52**	0.01	0.33	1.00	-0.01	**-0.59**
X_6	-0.32	-0.08	0.02	**0.59**	-0.01	1.00	-0.17
X_7	0.27	**0.51**	0.33	-0.18	**-0.59**	-0.17	1.00

Table 4. Banks – correlation analysis

Variables	Spearman's rank correlation coefficient (p<.05)					
	X_1	X_2	X_3	X_4	X_5	X_6
X_1	1.00	-0.21	-0.41	**-0.79**	-0.06	0.36
X_2	-0.21	1.00	0.20	0.21	**0.90**	0.09
X_3	-0.41	0.20	1.00	0.20	0.34	**-0.76**
X_4	**-0.79**	0.21	0.20	1.00	0.00	-0.45
X_5	-0.06	**0.90**	0.34	0.00	1.00	-0.07
X_6	0.36	0.09	**-0.76**	-0.45	-0.07	1.00

Table 5. Voluntary pension funds – correlation analysis

Variables	Spearman's rank correlation coefficient (p<.05)						
	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	1.00	-0.11	-0.42	0.41	-0.04	0.17	-0.18
X_2	-0.11	1.00	0.27	0.42	-0.60	0.05	-0.26
X_3	-0.42	0.27	1.00	0.12	**-0.75**	0.62	0.33
X_4	0.41	0.42	0.12	1.00	-0.31	**0.68**	0.35
X_5	-0.04	-0.60	**-0.75**	-0.31	1.00	-0.55	-0.09
X_6	0.17	0.05	0.62	**0.68**	-0.55	1.00	**0.66**
X_7	-0.18	-0.26	0.33	0.35	-0.09	**0.66**	1.00

Table 6. Individual retirement accounts (IKE) – correlation analysis

Variables	Spearman's rank correlation coefficient (p<.05)						
	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	1.00	0.02	**-0.53**	0.35	-0.38	-0.05	-0.10
X_2	0.02	1.00	-0.05	-0.19	-0.07	-0.15	**0.51**
X_3	**-0.53**	-0.05	1.00	-0.23	0.21	-0.06	**0.43**
X_4	0.35	-0.19	-0.23	1.00	-0.02	**0.54**	-0.26
X_5	-0.38	-0.07	0.21	-0.02	1.00	-0.19	0.07
X_6	-0.05	-0.15	-0.06	**0.54**	-0.19	1.00	-0.23
X_7	-0.10	**0.51**	**0.43**	-0.26	0.07	-0.23	1.00

Table 7. Individual retirement savings accounts (IKZE) – correlation analysis

Variables	Spearman's rank correlation coefficient (p<.05)						
	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	1.00	-0.03	-0.30	0.25	**-0.39**	0.00	-0.13
X_2	-0.03	1.00	0.34	-0.35	0.17	**-0.46**	**0.40**
X_3	-0.30	0.34	1.00	0.09	0.03	0.03	0.34
X_4	0.25	-0.35	0.09	1.00	-0.28	**0.58**	-0.15
X_5	**-0.39**	0.17	0.03	-0.28	1.00	-0.26	0.15
X_6	0.00	**-0.46**	0.03	**0.58**	-0.26	1.00	0.03
X_7	-0.13	**0.40**	0.34	-0.15	0.15	0.03	1.00

Table 8. The results of Ward's analysis for IKE (number of products in a class)

Type of financial provider	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
Asset management company	1	1	2	4	2	4
Life insurance company	0	1	0	0	3	0
Bank	0	0	0	5	0	1
General pension society	0	1	0	0	2	0

Table 9. The results of Ward's analysis for IKZE (number of products in a class)

Type of financial provider	Class 1	Class 2	Class 3	Class 4	Class 5
Asset management company	0	5	1	0	3
Life insurance company	1	0	1	1	4
Bank	0	0	0	1	0
General pension society	3	0	0	4	0