VIII MIĘDZYNARODOWA KONFERENCJA NAUKOWA

"Systemy zabezpieczenia społecznego wobec wyzwań demograficznych, ekonomicznych i technologicznych"

"Social Security Systems in the light of demographic, economic and technological challenges"

Book of Abstracts

VIII MKE, 26-27 września 2024, Wydział Inżynierii Zarządzania Politechniki Poznańskiej

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BALTAS Ioannis
ROBUST CONTROL WITH APPLICATION IN PENSION FUND MANAGEMENT

Stochastic optimal control theory is an indispensable part of mathematical economics and modern financial risk management. However, despite its importance and wide range of applicability, it suffers from a serious limitation as it does not incorporate model uncertainty aspects, which has been acknowledged by many authors as a key factor when it comes to realistic modeling. As it turns out, the necessary framework to surpass this problem is provided by robust optimal control theory. In one sentence, robust optimal control is a mixture of stochastic optimal control and model selection techniques; The decision maker solves a stochastic optimal control problem under the worst possible scenario, that is, by using the model that may provide the worst case for the problem under consideration. In this presentation, we make a brief introduction to robust control theory and present a fully worked example that elucidates the role of robustness in pension fund management.

BANAŚ Dawid
OPPORTUNITIES TO INCREASE THE EFFECTIVENESS OF PENSION MARKET SUPERVISION THROUGH THE USE OF SUPTECH

The pension system in Poland is very extensive. This provides its participants with many opportunities to accumulate funds for old age in both individual and group form. At the same time, they expect state institutions to exercise comprehensive supervision over them in an appropriate manner. However, the supervisory institutions' possibilities of control are limited, due, among other things, to limited human resources. It is therefore worth noting the potential offered by new technologies, such as SupTech (Supervisory Technology). The author focuses on this subcategory of FinTech, as entities operating within the Polish pension system are obliged to report data on their activities at various times, e.g. IKE and IKZE every six months. The value of the assets they manage is also increasing. Based on the literature study, the author wants to verify the research hypothesis indicating that the application of SupTech will allow to increase the effectiveness of supervision of entities operating in the pension market. The article will consist of an introduction, three parts and a conclusion. In the first, various definitions of SupTech will be presented, as well as the theoretical treatment of this modern technology. This will be followed by an indication of its applicability to the pension market. The third part focuses on the verification of the research hypothesis adopted.

BARTKOWIAK Piotr

ASSESSMENT OF THE CONDITIONS AND HOUSING PLANS OF SENIORS ON THE POZNAN REAL ESTATE MARKET

Senior housing is a relatively new and under-researched segment of the real estate market in Poland. And although recently, as a result of demographic changes, the problem has begun to be recognized (among other things, private investors have emerged, seeing profit opportunities in this segment of the market), in general it can only be said that with a relatively high level of housing independence, the housing conditions of seniors are generally worse than the national average, seniors show passivity when it comes to modernizing their homes and quite rarely decide to replace their current place of residence. However, there are many research gaps in determining the housing situation of seniors, as there is a lack of (1) complete and reliable information on the housing conditions of seniors, (2) sufficiently extensive knowledge on the scale of ownership conversions of apartments occupied by seniors, (3) information on the scale of undeclared subletting of part of the apartment by seniors, (4) information on the scale of the actual place of residence of seniors, (5) subjective assessment of their own housing conditions declared by seniors. These problems are becoming increasingly important, for, as is well known, the aging of the population is progressing. The strength of the phenomenon is reinforced by the fact that the highest growth rate in numbers is characterized by the group of people aged 80 and over. Projections indicate that by 2050 the share of this group in the total Polish population will increase from 4% to more than 10%. This phenomenon is referred to by demographers as the process of double aging of the population.

To meet the needs, the study adopted the following research objectives: (1) to determine seniors' subjective assessment of housing and the immediate housing environment, (2) to determine seniors' housing plans in case of potential problems resulting from deteriorating health and the need for assistance, and their reality. The following hypotheses were subordinated to achieving the goals: (1): seniors positively evaluate their housing situation, (2): seniors positively evaluate their immediate housing environment, (3): seniors in the situation of deterioration of health and need for assistance are ready to use the help of public and commercial nursing homes. Their verification is made possible by a survey of seniors, both living independently and in nursing homes (DPS).

BLAZHYNSKA Tetiana
THE SYSTEM OF INSURANCE AGAINST ACCIDENTS AT WORK IN THE PENSION FUND OF UKRAINE AND ITS MAIN ELEMENTS

Currently, insurance payments to victims of industrial accidents are made by the Pension Fund of Ukraine. In difficult military conditions, there are cases of arrears for pension payments, the amount of which, according to the decision of the Ukrainian courts, reaches 66 billion hryvnias, which is almost 10% of the budget. In order to improve the structure of the financing organization and reduce the costs of the Pension Fund of Ukraine, it became necessary to conduct an analysis of the functioning of each element of the pension insurance system and today it is a means to optimize costs, especially during martial law.

BRYCZ Marcin
DO YOUNG ADULTS' ATTITUDES TOWARD ETATISM AND PENSION BENEFITS GOES IN LINE?

Pension systems contribute to consumption smoothing throughout life (Chybalski, Diamond & Barr, Góra). In that process, pension adequacy plays a crucial role, of which young adults (18-30 yo) are usually not fully participating due to economic bias and lack of knowledge. I hypothesize that young people bring their pension attitudes from the family house when the family is involved in long-term investment. The questionnaire was filled out by young adults in Poland, the USA, the UK, Canada, and Ireland (N=468). The sample was divided into Poland and Anglosphere groups. Respondents indicated their attitudes toward etatism, pension benefits, and type of pension investment in their family. Using the Necessary Condition Analysis of Dul(2016) we found that a high etatism attitude is necessary for a low pension benefit attitude when the family invests in funds and saveings. The findings contribute to other research that states an unpredictable attidues for young adults on long term investment.

BUCHHOLTZ Sonia
ASSESSING THE ABILITY TO MAINTAIN THE STANDARD OF LIVING IN RETIREMENT IN THE EU- A QUANTITATIVE ANALYSIS

The degree of mobilization to accumulate more retirement wealth depends partially on whether it is perceived as needed. An analysis of the subjective assessment of the ability to maintain living standards in retirement will include statistical and econometric analyses on micro-data from the European Commission Flesh Eurobarometer 2023.

CICHOWICZ Ewa
HOW DO LIFECYCLE, EMPLOYMENT AND CHILDCARE SUPPORT CONTRIBUTE TO THE GENDER PENSION GAP IN EUROPE? THE CLUSTERING METHODS ANALYSIS

This study shifts focus from the design of pension systems to explore other key factors impacting women's careers. By examining life cycle demographics, career paths, and childcare support systems, we utilize clustering to categorize European countries based on factors influencing women's pension capital accumulation, excluding pension design.

GAJOWIAK Małgorzata
AGE MANAGEMENT SYSTEM

The main aim of the article is to present the concept of age diversity management and selected results of own research study made on SMEs from the Poznań poviat. The choice of the area of interest results from the fact that over the last decades the labor force is aging. Such a state will in a short time lead to many problems on the labour market, especially with decreasing number of hands to work, problems with adjusting work conditions to the elderly and as a result the need for prolonging the working age. The originality of the article is seen in the attempt to examine whether SMEs from the Poznań poviat take into account poor demographic predictions and adopt to the challenges connected with demographic crisis.

GIERUSZ-MATKOWSKA Anna
ADVANCED LIFE DEFERRED ANNUITY AS A BENEFIT PAYMENT METHOD IN EMPLOYEE CAPITAL PLANS

Employee Capital Plans, introduced in Poland in 2019, are occupational pension schemes with defined contribution (DC). Contribution rate is set in advance, and the level of benefit depends on many factors: contributions paid into the scheme, number of years of participation, investment rate of return and finally the method of benefit payment. Legislation enables several options for benefit payout – periodic withdrawal of funds by the participant (or by the participant and surviving spouse), provided there will be at least 120 monthly payments, and transfer of funds to an insurance company in order to buy an annuity paid for life. In some countries, as well as in the literature, a different solution can be found, called advanced life deferred annuity. Aim of this paper is to present this concept and to estimate advanced life deferred annuity conversion rates using life tables for Poland. A model of Employee Capital Plan is constructed in order to calculate and compare benefit levels a participant could secure for different payment options.

Keywords: employee capital plans, advanced life deferred annuity, benefit, pension

GOŁASZEWSKA – KACZAN Urszula, AUGUSTYŃCZYK Julita
EMPLOYMENT OF FOREIGNERS AS A RESPONSE TO THE ISSUE OF AN AGEING SOCIETY IN POLAND

Dynamic demographic changes in Poland, leading to an ageing society, significantly impact the labour market. In light of the decreasing number of people of working age and the increasing number of those of post-working age, it becomes crucial to seek effective solutions to counteract the growing labour shortages.

Therefore, the primary aim of this article is to assess the potential of employing foreigners as a response to the issue of an ageing society in Poland.

This aim has been achieved through the analysis of available national and international literature and the examination of accessible statistical data, including data from the Central Statistical Office and the Ministry of Labour and Social Policy.

The considerations undertaken in the article lead to the conclusion that employing foreigners can help mitigate the tensions arising in the Polish labour market. The interest of foreigners in the Polish labour market could potentially allow for a quicker fulfilment of labour market needs than the activation of domestic workers. However, to fully utilise this potential, it is necessary to simplify the procedures for employing foreign workers, thereby enabling employers to respond more swiftly to current market demands.

JAKUBOWSKI Sebastian
SAFEGUARDING THE RIGHTS OF ECP MEMBERS UNDER COUNCIL DIRECTIVE 98/49/EC

This article discusses the safeguarding of the rights of Employee Capital Plans (ECP) participants in the context of Council Directive 98/49/EC. This directive establishes provisions aimed at protecting the rights of employees who benefit from pension programs in the member states of the European Union. The article analyzes how the implementation of Directive 98/49/EC impacts the protection of the interests of ECP participants, with particular emphasis on legal and financial aspects. Additionally, it addresses the key challenges and opportunities associated with the implementation of the directive at the national level. The purpose of the article is to provide a comprehensive review of legal regulations and recommendations for further improvement of the ECP system in Poland in accordance with European standards for the protection of workers' rights.

JEDYNAK Tomasz
DETERMINANTS OF THE DECISION TO RETIRE – ANALYSIS OF SUBJECTIVE DECISION FACTORS

The study addresses the issue of the behavioral determinants of the decision to retire considered, unlike in previous publications, from a subjective perspective. The problem considered in the study is reflected by the following research questions: 1) What factors do future retirees believe will influence their decision to retire? 2) How does the weight assigned by decision-makers to these factors affect their planned retirement age?

The main objective of the study is to assess the importance of the factors identified by future retirees as influencing their retirement decisions in determining their planned retirement age. Two hypotheses were formulated with regard to such a goal: H.1. Decisions regarding the age of retirement are influenced by decision-makers' subjective perceptions of factors such as 1) the amount of pension, 2) the assets they own, 3) their health, 4) their family situation, 5) the age of retirement of those closest to them, 6) job satisfaction and the atmosphere at work, and 7) pressure to vacate the workplace. H.2 The planned retirement age of decision-makers varies according to the weight they give to each factor. The stated hypotheses were verified based on the results of a social survey conducted in February 2021 on a sample of 1114 respondents.

As a result of the research, no grounds were found for rejecting the hypotheses. The research showed that when deciding on the age of retirement, future retirees actually take into account (in order of the most important factor): health status, the amount of pension, job satisfaction and atmosphere at work, family situation, possessions, the age of retirement of those closest to them, as well as pressure to vacate the workplace (H.1). It was also shown that the planned retirement age varies significantly depending on the weight that future retirees assign to each of the aforementioned factors (H.2). The study also formulated a number of application conclusions.

JUREK Łukasz
ATTITUDES TOWARDS THE USE OF WELFARE BENEFITS BY MIGRANTS: EMPIRICAL EVIDENCE FROM POLAND

The use of welfare benefits by migrants is a current issue of growing importance. Globalization and mass population movements are forcing us to rethink the issue. It arouses more and more emotions, but it also poses a real threat to the stability of the welfare state. Today, there is a lot of theorizing on the subject, but relatively little empiric.

KALAYCI Betül, PURUTÇUOĞLU Vilda, WEBER Gerhard-Wilhelm
OPTIMAL MODEL DESCRIPTION OF FINANCE AND HUMAN FACTOR INDICES

Economists have conducted research on several empirical phenomena regarding the behavior of individual investors, such as how their emotions and opinions influence their decisions. All those emotions and opinions are described by the word Sentiment. In finance, stochastic changes might occur according to investors sentiment levels. In this study, our main goal is to apply several operational research techniques and analyze these techniques' accurance. Firstly, we represent the mutual effects between some financial process and investors sentiment with Multivariate Adaptive Regression Splines (MARS) model. Furthermore, we consider to extend this model by using distinct data mining techniques and compare the gain in accuracy and computational time with its strong alternatives applied in the analyses of the financial data. Hence, the goal of this study is to compare the forecasting performance of sentiment index by using two-stage MARS-NN (Neural Network), MARS-RF (Random Forest), RF-MARS, RF-NN, NN-MARS, and NN- RF hybrid models. Furthermore, we aim to classify the peoples' feelings about economy according to their confidence levels. Moreover, to forecast the underlying state change of the Consumer Confidence Index (CCI) and to observe the relationship with some macroeconomic data (CPI, GDP and currency rate) at a monthly interval, we apply Hidden Markov Model (HMM). The aim is to detect the switch between these states and to define a path of these states. We also aim to use volatility models for mainly sentiment index, consumer confidence index, and other indices so that we can get better forecasting results from those datasets.

Keywords: Investor Sentiment, Consumer Confidence Index, Sentiment Index, Machine Learning, HMM, Volatility Model, Operational Research.

KHMELYARCHUK Mariya
MODERN CHALLENGES FOR THE LABOR MARKET OF UKRAINE

Russia's military aggression against Ukraine has become a serious challenge for the Ukrainian labor market, leading to a large-scale loss of jobs and an increase in the unemployment rate, and thus to a loss of income of the population and a significant burden on the social protection system in conditions of a budget deficit. These processes, taking into account a number of problems in the socio-economic development of Ukraine in the pre-war period, have a threatening effect on the economic and social security of Ukraine in the short and long term, threatening significant economic losses and degradation of human capital.

The prospects of the post-war development of the Ukrainian labor market should be considered in the context of the formation of a safe economic and social environment at the state level, the imperative of which should be the preservation of human capital in Ukraine. For this purpose, a state strategy for the post-war recovery of the national economy with a pronounced socio-humanitarian orientation should be developed, which will provide for the observance of social guarantees at the level of leading international standards.

Keywords: labor market, war, unemployment, demographic crisis, human capital

KOŁEK Antoni
THE ROLE OF EMPLOYERS IN REALIZING THE RIGHT TO SOCIAL SECURITY

The right to social security is guaranteed by the Constitution of the Republic of Poland and a number of legal acts that specify in what situations the right to benefits arises. The state is responsible for the implementation of this right, but employing entities also play an important role. Their duties include, among others: registering employees for social security, maintaining employee documentation, paying contributions and ensuring access to benefits. This means that cooperation between the state and employing entities is crucial for the implementation of the right to social security, and ensuring social order cannot ignore the role of employing entities.

KOWALCZYK-KROENKE Anna
DIRECTIONS OF CHANGES IN THE MANAGEMENT OF GENERATIONAL DIVERSITY IN ORGANIZATIONS- IMPLICATIONS FOR PEOPLE MANAGEMENT

Generational diversity in organizations is a topic that still arouses wide interest among both practitioners and scientists. What challenges does hiring generationZ employees face for organizations today? How to combine employee goals with organizational goals? What do employees of the youngest working generations focus on today?

KOWALCZYK-RÓLCZYŃSKA Patrycja
THE USE OF HOUSING RESOURCES IN RETIREMENT

Unfavourable demographic trends in Poland have led to a decline in the share of the pre-working age population over the last decade and a significant increase in the share of the post-working age population - from 16.9% in 2011 to 22.3% in 2021[1]. According to available projections, the proportion of older people in the structure of Polish society will increase from year to year. This will require significant changes in financing the risk of old age. The aim of the article is to assess the possibility of using housing resources, both public and private, to improve the living conditions of people of retirement age. The article focuses on releasing capital accumulated in real estate and *senior housing* solutions.

[1] *Narodowy Spis Powszechny Ludności i Mieszkań 2021. Starzenie się ludności Polski w świetle wyników narodowego spisu powszechnego ludności i mieszkań 2021*, GUS 2023

MICHALSKI Michał Adam

EUROPE OF THE LONELY WELFARE OR POVERTY? ZERO-RISK FUTURE BETWEEN WELFARE STATE AND CIVIL SOCIETY

European societies are ageing and more often characterised by single way of living. This is connected with growing loneliness. At the same time EU countries have one of the biggest standards of living. In such context the question of its future welfare and well-being can be asked in the light of Welfare State, Civil and Zero-Risk Society concepts.

MILEV Jeko, ROBEV Kliment

PENSION FUNDS IN BULGARIA – ARE THEY A STABILIZING FACTOR FOR THE SOCIAL SECURITY SYSTEM IN THE COUNTRY

Bulgarian social security system was seriously reformed in the late 1990's and it was transformed into a three-pillar structure. The first pillar functions on a pay-as-you-go principle and comprises 5 distinct funds: Pension fund, General disease and motherhood fund, Occupational accident and professional disease fund, Unemployment fund and Non-work-related pension fund. The second pillar is supplementary compulsory pension insurance that functions on a fully funded principle. Pension insurance companies manage defined contribution pension plans based on individual accounts. The third pillar is supplementary voluntary pension insurance which is again based on fully funded principle where all individuals may accumulate additional resources to finance supplementary pension benefit. The implemented reforms were trying to address the unfavorable demographic changes that were expected to unfold in the next years and to put under severe pressure the pension system in the country. The establishment of the second and third pillar was expected to stabilize financially the system and to raise the adequacy of the pension benefits for the future generations of retirees. More than two decades later, the demographic structure of the Bulgarian population continues to deteriorate which corresponds to the predictions expressed earlier. However, a few factors have adversely influenced the second and the third pillar so that their support for the first column cannot be fully proved. The current paper is trying to assess the reforms made in the Bulgarian social security system during the years, the problems, and the demanded solutions. The accent is put on the pension system since it is the structure that absorbs the greatest part of the resources, and it affects the most numerous parts of the population in the country. The first part of the paper describes the reforms and their expected results, the second part analyses the current problems of the system, and the third part recommends certain future reforms that could raise the sustainability of the pension system in the long term.

MOSTOVA Anastasiia

DEVELOPMENT OF DIGITAL SKILLS FOR A COMPETITIVE ECONOMY AND SOCIETY IN UKRAINE

The digital transformation changes the economy and society, the labor market and education, and requires a high level of digital skills from all participants in digital markets. Most jobs today require digital skills. The high level of digital skills of the population stimulates the development of Internet business, e-commerce, online services, etc., and contributes to the growth of the digital economy. A key aspect of the digital transition is a high level of digital literacy of people who are consumers of digital services.

In Ukraine, in 2021, the The Concept of Development of Digital Competencies until 2025 was approved. Its purpose is to increase the digital literacy of the population. The study of digital literacy is conducted by the Ministry of Digital Transformation of Ukraine every two years. A number of digital projects aimed at developing digital skills of the population are being implemented. The dynamics of digital skills of Ukrainians is positive. However, in Ukraine today there is still a large number of people who cannot join the digital economy and information society due to the low level of digital literacy. According to research, older people have lower levels of digital skills than younger people. Young people are more inclined to believe that increasing the digital literacy has a positive effect on the economic growth of Ukraine. Also, more than 80% of individuals believe that a high level of digital skills contributes to career growth and professional fulfillment.

Attracting more qualified (in terms of digital skills) employees will contribute to increasing business performance, accelerate the development of digital entrepreneurship, create new jobs and digital transformation of the economy and society.

PETELCZYC Janina
SELF-EMPLOYED INDIVIDUALS IN THE SOCIAL SECURITY SYSTEM

In this paper, based on the theory of institutionalism, I analyze the situation of self-employed individuals in the Polish social security system, with particular emphasis on the issue of false self-employment. False self-employment, described by researcher Annette Thörnquist as a means to circumvent collective agreements, labor law regulations, wage taxes, and social security contributions, is particularly prevalent in Poland (Thörnquist, 2015; Nikulin, 2020). Using data from the Social Security Institution (ZUS) and the National Health Fund (NFZ) regarding contribution levels and actual incomes of self-employed individuals, I present forecasts for future pensions, taking into account gender and the year of starting work. These simulations are based on data concerning the basis of contribution calculations, initial capital valorization indices, the status of accounts and subaccounts in the Social Security Fund (FUS), and the minimum pension, as well as on estimations of future trend indices. Despite limitations due to the difficulty of predicting most data for future years, this analysis allows for an assessment of the (in)efficiency of the current pension system and the proposed changes for self-employed individuals.

PIEKUT Marlena
INEQUALITIES IN THE PERSONAL FINANCES OF RETIRED HOUSEHOLDS

The aim of this study is to identify and evaluate the income situation and consumption patterns in retiree households. The primary focus is on the level and structure of disposable income, the main and additional sources of income, and consumption patterns, taking into account socio-economic and demographic factors. The study period covers the years 2004–2022. Data from the GUS Household Budget Surveys were used to conduct the analysis. Various simple and multivariate statistical analyses were employed. The results indicate an asymmetric distribution of disposable income. The Gini coefficient indicates the stabilization of income inequality among retirees. Socio-economic and demographic factors, such as household size, education level, and degree of urbanization, significantly influenced income and consumption. The study provides insights into the living standards of retiree households, indicating an improvement in their living conditions, while also highlighting persistent significant disparities.

POBŁOCKA Agnieszka

PROPOSALS FOR REDUCING PENSIONER INCOME INEQUALITY IN SELECTED OECD COUNTRIES

Most countries in the world have a gender pay gap (GWG), the size of which depends on, among other things, wages. In 2019, the average gender pay gap in OECD countries was 10% for the first decile of earners, 12% for the median and 17% for the ninth decile. The effect of the pay gap is a difference in pensioners' incomes (gender gap in pensions, or GGP) due to, among other things, lower earnings, longer life expectancy for women, shorter tenure for women (due to maternity, parental and caring leave). The average pension gap in the EU27 countries in 2019 for people aged 65 and over was 29% (the maximum in Luxembourg (44%) and the minimum in Estonia (2%), and the highest in the world in Japan (50%)). Such wide disparities and low pensions put women at risk of poverty. In 2019 alone, 15 per cent of pensioners aged 65 and over were living on the poverty line (13 per cent of men and 17 per cent of women). The replacement rate (RR) does not take into account the gender pay gap. The average replacement rate in OECD countries in 2019 for those earning the national average was 51% for women and 52% for men (in Poland: 31% for women and 32% for men). The aim of the study is to assess the level and diagnose the factors influencing pensioner income inequality in selected OECD countries. Another aim of the study is to try to estimate the level of pay increases for women that would reduce or close the pension gap.

POTERAJ Jarosław

COMPARATIVE ANALYSIS OF THE PENSION SYSTEMS OF COSTA RICA, NICARAGUA, AND PANAMA

The article presents a comparative analysis of the pension systems of Costa Rica, Nicaragua, and Panama, focusing on the context of aging populations and changing demographic trends. The study examines differences and similarities in the structure, financing mechanisms, benefit calculation methods, and demographic challenges. The analysis also considers financial and social aspects, such as financial stability, accessibility for various social groups, and impact on poverty reduction. The results indicate significant differences in the efficiency and adequacy of the pension systems in the studied countries, affecting the level of social security for citizens. The conclusions aim to provide a deeper understanding of the functioning of these systems in a regional context and to identify best practices to improve their effectiveness and financial sustainability.

RATAJCZAK-LESZCZYŃSKA Joanna

SURVIVOR PENSION – CHALLENGES, CHANGES AND CONSEQUENCES

Survivor benefits are intended to protect against poverty and equalize consumption after the death of the breadwinner. In the social security system, they usually take the form of a survivor's pension (widow's/widower's pension or orphan's pension) addressed to those to whom the deceased had a maintenance obligation.

However, pension entitlements resulting from the death of the breadwinner can also be obtained through the inheritance of pension capital. This is the case both in public systems with a DC pension formula and in privately managed systems (with private pension capital). The application of the "idea of inheritance" of pension capital in public systems is influenced by the introduction of financing. This is also accompanied by the individualization of pension rights. The latter generates solutions seen as alternatives to survivor pensions, such as Rentensplitting or spousal pensions.

These two perspectives - alimony obligation and private property - can sometimes come into conflict with each other. The article aims to address this issue and focus on the regulation of survivor pensions in various countries and the proposed changes to survivor pensions in Poland.

STĘPNICKA Nina

NU-IZATION AND THE DEVELOPMENT OF THE LABOR MARKET IN THE 21ST CENTURY – A THEORETICAL APPROACH

Niu-ization is a type of trend, trend or direction (sometimes also fashion); the way in which a given entity implements its profit and competition policy on principles similar to Uber. Uberization as a solution in the field of modernization changes the perception of the way work is performed and the approach to the labor market.

SZCZEPAŃSKI Marek
PROPOSED MODEL FOR MANAGING LONGEVITY RISK IN PENSION SYSTEM

When a comprehensive systemic reform of the pension scheme was introduced in Poland in 1999, based on the World Bank's three-pillar model, it was assumed that the pension provision from the public pension system would be supplemented by additional savings, accumulated in voluntary pension schemes. Over the 25 years of implementing the pension reform, several changes have been introduced, but the basic structure of the public pension system has been maintained (individual pension accounts, equivalence of pension benefits in relation to paid contributions).

It is worth mentioning that none of the voluntary additional pension schemes: Emloyee Pension Programs (PPE), Employee Capital Plans (PPK), Individual Savings Accounts (IKE), and Individual Pension Security Accounts (IKZE), provides lifetime income for elderly people (life annuity). The dominant forms of payment are lump sum payments or programmed withdrawals.

None of these products guarantees protection against retirement longevity risk (the risk of outliving additional pension assets). In fact, none of these products meets the definition of retirement product, providing lifetime income after reaching retirement age.
The author has proposed a new model for managing longevity risk in the Polish pension system.

The proposed model assumes the payment of 2/3 of the savings accumulated in capital pension plans (PPK) during the period corresponding with the statutory pensionable age of program participants (either as a lump sum payment or programmed withdrawals), and the remaining 1/3 of the savings in the form of a deferred life annuity, payable from age 75. It would be a default option for PPK participants, with the right to opt-out.

WALISZEWSKI Krzysztof
FIRST EXPERIENCES OF PEPP IMPLEMENTATION IN POLAND

In October 2023, the Slovak brokerage house Finax, operating through a branch in Warzsaw, offered Poles the first Pan- European Individual Pension Product called European Pension. The paper aims to present experiences almost a year after the introduction of this product on the Polish market as part of the third pillar of the pension system.

WEBER Gerhard-Wilhelm

USING VARIOUS METRICS TO EVALUATE THE CONNECTION BETWEEN FINANCIAL AND HUMAN ELEMENTS

There are numerous empirical phenomena that relate to individual investors' behavior, such as how their emotions and opinions influence their decisions. Sentiment encompasses all of these emotions and perspectives. In finance, stochastic changes can occur in reaction to changes in investor mood. Machine Learning methods are well- known and useful tools for prediction problems, and they have already been effectively used to solve a variety of financial difficulties. In this study, we look at the behavior of financial troubles based on investor emotion rather than pure financial problems. The purpose of this study is to assess sentiment index prediction performance with two-stage MARS-NN, MARS-RF, RF-MARS, RF-NN, NN- MARS, and NN-RF hybrid models. We plan to describe people's attitudes toward the economy based on their level of confidence. For this purpose, we use HMM to estimate the underlying state change of the Consumer Confidence Index (CCI) and examine its association with some macroeconomic indices (CPI, GDP, and currency rate) at monthly intervals. The goal is to track and understand the transitions between these phases, as well as to plot a course through them. We also intend to apply volatility models to each subgroup we receive from HMM to see if we can improve our prediction results.

XIE Xiaohong

HYBRID PENSION SCHEMES FOR POLAND: INTEGRATING DEMOGRAPHIC AND ECONOMIC INSIGHTS TO ENHANCE SUSTAINABILITY

This study develops a hybrid pension scheme aimed at addressing the challenges of demographic change and economic instability affecting Poland's pension system. By integrating elements from both Defined Benefit (DB) and Defined Contribution (DC) plans, the scheme seeks to ensure financial sustainability and fairness across generations. Utilizing the modified Lee-Carter model with adjustments for geometric and hyperbolic growth, this research offers precise projections of mortality and demographic evolution. Furthermore, the Overlapping Generations (OLG) model is applied to explore the economic dynamics that influence pension outcomes. Through Monte Carlo simulations and Bayesian Optimization, this paper evaluates the performance of the hybrid pension scheme under various economic conditions, emphasizing Certainty Equivalent Consumption (CEC) as a metric of welfare. The results indicate that the hybrid approach provides superior adaptability and resilience compared to conventional pension models, particularly in managing the inherent risks of demographic and economic fluctuations in Poland. The study advocates for the adoption of hybrid pension schemes, underscoring the need for policy reforms such as extending working life to enhance pension system viability. It encourages further research into the actuarial underpinnings of hybrid models and the exploration of new technologies, such as predictive analytics, for advanced pension management. This paper contributes important new perspectives to pension economics, offering actionable strategies for fortifying pension systems against the challenges of an aging global population.