Summary

Demographic changes, which have been observed to intensify dynamically since the 1950s, play a significant role for maintaining the stability of pension system in most parts of the world. In developing countries, especially those in Africa and Asia, medical and scientific advances have helped to lengthen the lifespan, particularly for new-borns and babies. This process has increased the number of working-age people, stimulated economic growth and improved competitiveness. However, the situation is quite different in developed countries, in which the demographic changes are related to the ageing of societies. On the one hand, the birth rate is dropping but on the other, life expectancy is growing. As a result, the ratio of working-age people to those who collect pension benefits is becoming disproportionate, which disrupts structures based on inter-generation agreements and pay as you go pension systems. Moreover, developed countries are experiencing dynamic increase of lifespan of older people. In the last decade, life expectancy for people over 65 has increased by close to two months each year. On the one hand the problem of ageing societies will, in the next few years, become one of the greatest challenge for demographic policy in most countries of the world, on the other the rate of this changes is difficult to predict, what generates the so called longevity risk. Longevity risk refers to the risk that actual survival rates and life expectancy will exceed projections. It may be considered at the individual and aggregate level. Aggregate longevity risk relates to fluctuations in the lifespan of a group of insurance-holders, often an entire generation. Individual longevity risk means that an individual lives longer than average.

The subject of the thesis is longevity risk and its significance for the stability of pension systems in the European Union member states, with special emphasis on its effects on the EU-15 group (member states before 2004), as compared to the new member states (NMS) which acceded to the European Union in 2004 or later. The paper concentrates on aggregate longevity risk. The main hypothesis stresses that pension systems operating in the European Union member states fail to ensure adequate protection from aggregate longevity risk, resulting in adverse effects on their stability.

The thesis presents the results of research on pension systems and the significance of longevity risks, including through multi-dimensional statistical methods, simulation scenarios of population growth envisioning a sudden lifespan increase, aggregate pension-to-GDP expenditure ratio equations as well as the author's specially

designed expert survey. The research has found that longevity risk represents a powerful impact on the financial stability of pension systems in all the EU member states. The component method and simulation scenarios used to forecast population size seem to suggest that a 40% change in death rate among senior citizens over 65 years of age will contribute to further lengthening that group's lifespan by more than 3.7 years. This is an example of a sudden even leading to a major lifespan underestimation (longevity risk). Only in the surveyed year, this will mean a 1.38% increase in the demographic burden of aging, leading to the pension-to-GDP expenditure ratio rising on average by 0.21 percentage point in the EU member states. The research also applies a linear ordering method with synthetic measures to enable pension systems to be classified through multi-criteria analysis into five sets of factors: demographic, retirement age, labour market, public finance and pension system structure. The stability of these systems was subject to long-term evaluation extending to 2050. The evaluation found that the EU member states do not have a single, universal forward-looking pension system prepared to address lifespan fluctuations. Top ratings were given to the Swedish and Latvian systems featuring a publicly funded non-financial defined-contribution model, the Irish system with a conventional pay-as-you-go defined-benefit model as well as the Danish system where private institutions are tasked with providing the bulk of pension benefits. The highest-ranking systems all transfer the burden of obligatory contributions to a large extent onto the private sector as well as offering numerous additional options for old-age saving. Protecting pension systems from longevity risk is a complex challenge, requiring the implementation of comprehensive systems bringing together all those involved in the pension system, including public institutions, private entities and future beneficiaries. Using life expectancy tables and error-free forecasts will go a long way towards reducing longevity risk. The research related in this paper shows that it is necessary to apply dynamic models taking into account fluctuations in death rates over time. While eliminating longevity risk from pension systems is impracticable due to their nature, it is possible, however, to diversify and distribute that risk among entities within the pension system in such a way as to ensure that system's long-term stability.

The paper concludes with a list of characteristics of a pension system that is the most stable in terms of longevity risks, e.g. multi-tiered, involving private institutions in the financing of obligatory contributions, numerous additional pension plans, defined-contribution arrangements; automatic mechanisms for adjusting the retirement age or the amount of pay out to life expectancy; using dynamic life expectancy tables.