Aging: New Challenges for the Economy and Society[1]

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Demographic trends are characteristics of paramount importance to any economy and society. The age structure of the population in developed and moderately developed countries is changing dramatically. Older people are increasingly making up a growing proportion of the population. This trend, which has extremely wide-ranging implications, is known as aging.

For related domestic literature published in recent years, see Halmai 2014, 2023, 2024, Kovács 2024, Kovács – Varga 2019, Reiff – Simonovits 2022, Simonovics 2024, Spéder 2025.

It has been present for decades, but it will truly unfold in the coming decades.

The closing event of the bicentennial, science festival month of the MTA's Department of Economics and Law, held on February 26, 2026, to great interest, addressed exceptionally timely topics based on the initial findings of the National Research Program of the same name.

The event was co-organized by the Hungarian Economic Association. The Lecture Hall at the MTA Headquarters was full, while those unable to attend could also join the conference via livestream.

The morning session of the conference reviewed the demographic and macroeconomic challenges of aging, while the afternoon session examined various areas of pension research. The presentations delivered at this conference are briefly summarized below.

I would like to thank the conference organizers and speakers for their assistance in compiling this text. Hopefully, the presentations given will soon be available in written form as well. The full proceedings of the conference are available at the following links: **https://www.youtube.com/watch?v=LvzUyTp8amM&t=8941s** and **https://www.youtube.com/watch?v=Ce9O5XJirXY&t=1955s**

Lajos Bálint (University of Pécs, KSH KKI): In his presentation titled „Mortality in Old Age in Hungary: The Leaders and the Laggards," he highlighted that despite improvements following the transition to a market economy, persistent and growing regional disparities in adult and elderly mortality can be observed in Hungary. The presentation examined the subregional (county-level) polarization of Hungarian mortality using the examples of the leading region, Budapest, and the lagging region, Borsod-Abaúj-

1 This study was prepared as part of the National Program of the same name.

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Zemplén, between 1980 and 2024. Although life expectancy increased in both regions, the disparities also widened. The presentation used a contour decomposition method to break down the difference into initial (heritage) and trend components, disaggregated by age and causes of death. Initial disparities and divergent development trajectories lie behind these differences. Among men, improvements observed in younger age groups supported Borsod County's catching up, while mortality in old age significantly widened the gap. Among women, the divergence proved to be markedly trend-driven and was not limited solely to old age. By cause of death, cardiovascular and neoplastic diseases were the determining factors in the development of the differences. Cardiovascular mortality contributes significantly to the differences in both sexes, particularly in older age groups. The role of neoplastic mortality is prominent in the development of divergence among women. In younger age groups, certain causes of death (primarily external and respiratory causes) contribute to a narrowing of the gap. The results show that the dynamics of regional inequalities are strongly age- and cause-of-death-specific. Overall, the trend in mortality is not a simple process of convergence, but a complex divergence linked only partially to chronic mortality in old age.

Róbert Gál (Corvinus University of Budapest, KSH KKI) presented in his lecture titled „An Aging Society Without an Increase in the Proportion of the Elderly": over the past two and a half decades, Hungary's population has aged significantly. The median age has risen (from 37.2 years to 43.2 years), and the proportion of people aged 65 and older in the population has increased (from 14.7 percent to 20.5 percent). However, within this aging population, the proportion of people considered elderly has not increased because the boundary between the active phase of life and old age has shifted significantly upward. The latter is measured by the average age of those leaving the labor market permanently in a given calendar year (in other words: the effective retirement age or average exit age). The effective retirement age rose from 55.5 years to 63.3 years between 1998 and 2023. That is an increase of 7.8 years over 25 years, an average of 3.7 months per year, or 7.5 hours per day. All this means that the average person of working age has aged by 24 hours in a day, but has moved only 16.5 hours closer to the average retirement age. To such an extent that life expectancy at the current effective retirement age not only failed to increase but actually decreased (from 25.0 to 22.6 years). Although the proportion of people over 65 has risen, the proportion of those older than the current effective retirement age has even decreased slightly. The labor market practically entirely absorbed the general increase in life expectancy at older working ages. These processes took place at a time when the educational composition of those reaching retirement age changed significantly. Those retiring today are significantly better educated than those who retired two and a half decades ago, as today's 55–64-year-olds spent considerably more time in school than those who were 55–64 years old a quarter-century ago.

Zsolt Spéder (University of Pécs, KSH KKI): In his presentation titled „Subjective Age Threshold: The Consequences of Defining the Age of Old Age," he explores the question of „how old societies are" and proposes the introduction of a new threshold for old age: the subjective age threshold. The method used is related to widely adopted methods that employ other subjective assessments, such as subjective health status or subjective poverty. The subjective age threshold (SZIK) is based on respondents' perceptions and

macrosocial conditions characteristic of each country (life expectancy, retirement age, average age of retirement, etc.). Data from the 2018 European Social Survey (ESS) were used to determine the SZIK. Their analytical results were compared with other well-established, widely used aging indicators, providing new insights into aging societies. A total of 45,304 respondents from 30 countries answered the question „At approximately what age do women/men reach old age?" collected by ESS2018. The subjective age of old age was estimated using multilevel linear v models.

The results showed that gender, age, education, relationship status, labor market status, subjective health status, and life satisfaction significantly increase the subjective age of old age. For comparison, key indicators from the Eurostat database for the same year were calculated: the proportion of people aged 65 and older and the proportion of older adults based on life expectancy – the three approaches defined populations of different sizes. There are significant differences in the proportions of the elderly population across mortality tables (prospective) and subjective age thresholds. The population proportions based on the subjective age threshold and life expectancy-based definitions were closer to each other than those for the elderly population calculated using the conventional age of 65. When comparing European countries, the following key differences can be observed: In Austria, the proportion of women aged 65 and older is 20.9%, while in Hungary it is 22.6%. Based on the subjective age threshold, the proportion of older women is 12.9% in Austria and 21.2% in Hungary. In Croatia, the proportion of women aged 65 and older is 23.2%, which is slightly lower than the Italian figure (24.9%). Based on subjective assessment, however, the proportion of older women in Croatia is 26.0%, while in Italy it is lower (17.7%). The subjective age threshold, which takes the population's opinion into account, offers a new perspective on the aging process. While it does not call into question traditional approaches to the topic, it raises the need to refine them. However, further research is needed to determine the relevance of defining the thresholds for old age.

In his presentation titled „The Macroeconomics of Aging," Péter Halmai (Budapest University of Technology and Economics, National University of Public Service) explained that the process of aging exerts its effects through complex economic mechanisms. The main dimensions of these are economic growth, public finances, and the evolution of the broader economic policy framework.

The key long-term structural factors determining economic growth (more precisely, its equilibrium path, or potential growth) are the quantity and structure of the available labor supply, as well as the evolution of total factor productivity. From a labor market perspective, aging may lead to a decline in the number of active workers, which could result in a labor shortage. In addition to the quantity of the labor supply, its composition is of fundamental importance. Parallel to aging, the growing proportion of older workers is becoming increasingly significant; provided those involved are in good health, this can significantly offset the negative economic impacts. In the long term, total factor productivity (TFP) is a decisive factor in the growth potential of European countries as well. Structural factors (labor supply, TFP) are the determining factors for the sustainable dynamics of growth potential. Fundamental related questions to be explored: how might the productivity of the older workforce evolve; what impact will these changes have on

innovation – a central factor in productivity – and on older workers; what role might the government play in this regard through retraining programs; and what role might working from home and remote work play during the aging process. Another dimension of productivity is capital accumulation and the growth based on capital intensity (capital deepening). Within the dynamics of capital accumulation, it is also necessary to analyze the impact of aging on interest rates and savings. Changes in the age structure of society can negatively affect a given national economy's savings levels and capital accumulation rate, and may also affect the investment rate. (It can also fundamentally affect the natural rate of interest.) At the same time, in open economies, the ability to attract capital across borders is decisive beyond the internal accumulation potential of national economies. From the perspective of the recipient economy, the development of total factor productivity is also decisive in the longer term. (This is not to deny the prominent role of the investment climate, including the stability of the economy and the legal system.)

When reviewing the effects of aging on growth, particular attention must be paid to possible connections to secular (long-term) stagnation. The productivity slowdown in developed countries has manifested as an almost unstoppable trend in recent decades. Despite outstanding innovations, the productivity paradox summarizes these phenomena. Adverse demographic trends and the moderation of productivity dynamics together can inevitably lead to a slowdown in growth. Building on the above, the impact of aging on potential growth trajectories can be examined. Throughout this process, a key focus is the analysis of the economic, social, and environmental sustainability of growth, with particular emphasis on economic sustainability.

In addition to economic growth, examining the impact of aging on public finances is central. The expected increase in the old-age dependency ratio is a key determinant of the latter. Particular attention must be paid to a thorough analysis of the pension system, focusing on sustainability, and to reviewing possible system-level solutions. At the same time, trends in healthcare, elder care, and education expenditures are also closely linked to the aging process. The effects of changes in these areas must be identified to assess the future trajectory of public finances. An important task is to present the so-called sustainability gap and options for addressing it within the public finance system.

Increasing labor force participation, extending the working life, and boosting productivity are key elements of the economic policy response to the challenges of aging. Harnessing the potential of the „silver economy" and implementing structural reforms to promote it are central to rebuilding growth and fiscal buffers amid demographic headwinds.

Vivien Czeczeli's (National University of Public Service) presentation, titled „Aging and Public Finances," covered one of the most critical macroeconomic dimensions of the topic. Existing economic structures and public finance models are optimized for sustained population growth, so the demographic shift fundamentally calls their sustainability into question. Population decline worsens growth prospects by reducing aggregate demand, altering consumption patterns, and reducing willingness to invest, thereby jeopardizing fiscal balance. This is exacerbated by the deteriorating trend in fiscal indicators across Europe, even independently of aging.

On the revenue side of the budget, the shrinking working-age population is narrowing the tax base. Offsetting this with other types of taxes is not a clear-cut solution either: taxing capital income could discourage investment and innovation, while shifts in consumption patterns limit the effectiveness of consumption-based taxes. A source of tension is that, according to forecasts, expenditures will persistently diverge from revenues and from GDP growth. The fiscal trade-off arising from the inevitable rise in healthcare and pension expenditures, coupled with scarce resources, forces a choice: whether to finance the well-being of current generations or the development of the future (education and innovation). Persistent fiscal deficits signal concerns about debt sustainability.

When analyzing public debt, priority must be given to implicit indicators to ensure transparency about future obligations. The key to debt sustainability lies in the relationship between the growth rate (g) and the interest rate (r). Since research confirms that growth is expected to slow down faster than interest rates ($g<r$), there is a risk of a snowball effect. Based on this, the deficit, driven by welfare demands, and the interest burden may rise in a self-reinforcing manner. Budget stabilization in the coming period may therefore require maintaining primary surpluses and a significant rethinking of existing structures.

In his presentation titled „Aging and Productivity," Ádám Marton (National University of Public Service) highlighted the importance of sectoral structural, innovation, and fiscal channels. That is to say: the relationship between aging and productivity is not limited solely to the two traditional factors, labor and capital productivity. Labor productivity is also affected by changes in the age structure of society through shifts in the composition of the labor force and changes in labor supply. Nevertheless, assessing labor productivity at the individual (and thus aggregate) level is uncertain, as it is influenced by numerous factors, such as the nature of the job, work experience, health status, existing skills, and the employee's complementarity. Capital productivity may be influenced not only by changes in the structure of savings but also by changes in capital quality (and, consequently, changes in risk-taking propensity) and a moderation in capital deepening. According to the latest research, the effects of aging can be partially offset by technological progress. Changes in innovation activity may manifest to varying degrees across sectors. However, the impact on sectoral transformation may already begin with changes in consumption patterns, leading to structural changes in the national economy and shifts in resource allocation across sectors. Through the various mechanisms of these channels, the productivity effects of aging – particularly at the macroeconomic level – can be properly examined within a complex framework, including the role of technology.

Gábor Horváth (Fiscal Council) delivered a presentation titled „Domestic Public Finances and Population Aging," which focused on an exceptionally fascinating topic. The evolution of projections in the Aging Report, published by the European Union over the past two decades, offers two lessons for Hungary. On the one hand, the accuracy of demographic forecasts has been confirmed; on the other hand, it turns out that the social burdens of aging have been partially mitigated by the pension reforms of the 2000s and 2010s, and partly through labor market reforms of the 2010s, which have so

far succeeded in keeping them at a more favorable level than previously forecast. Even with the introduction of the 13th and 14th monthly pensions, which increase pension system expenditures, there remain opportunities within public finances that can serve as preparation even before the next necessary pension reform and curb the erosion of sustainability. One basis for this could be clearer, more consistent earmarking of revenues to cover pension system expenditures, along with broader publication of revenue-to-expenditure ratios. This would also provide technical ammunition for public policy debates and offer a basis for informing the public, potentially increasing acceptance of the sometimes uncomfortable decisions necessary to enhance the system's long-term sustainability. Although there is less room for further employment growth, encouraging it can also contribute to sustainability. These steps would also be welcome to counterbalance the effects of fiscal policy that tends to stimulate consumption. Based on the conclusions of the Galí–López-Salido–Vallés model and Hungarian data, a higher proportion of households with liquidity constraints – those that spend transfers immediately – in society makes government spending aimed at short-term consumption growth – economic growth – more effective, thus providing a greater incentive for policymakers to pursue such measures. Moreover, based on experience, population aging increases the proportion of households like these.

Erzsébet Kovács (Corvinus University of Budapest) addressed the fundamental issues of pay-as-you-go social security pension systems in her introductory presentation for the conference's afternoon session. She pointed out that there is no clear best practice in developed countries regarding financing, sustainability, and equity. Pension systems can be defined by contributions or benefits, regardless of whether they operate on a funded basis or through pay-as-you-go financing. This allows for the distinction of four main theoretical systems. In the Hungarian social security system, there is no capital accumulation on the contribution side, and benefits are calculated based on a formula.

The speaker emphasized that a pension system that is more predictable and transparent for individuals would be beneficial. Recording social security contributions in individual accounts and sending regular updates on this would be a major step forward in increasing financial literacy. This could be implemented even before the comprehensive pension reform, either through a point-based system or by recording contributions in forints.

In his presentation, Ádám Reiff (Corvinus University of Budapest, Eötvös Loránd University KRTK-KTI) outlined the short- and medium-term challenges facing the Hungarian pension system, discussing the assumptions used and the results obtained. At the beginning of the presentation, he emphasized the importance of model-based projections based on disaggregated data for assessing the sustainability of the pension system. The most recent such publicly documented estimate was the projection presented in the Freudenberg-Berki-Reiff (2016, MNB Working Paper) study, whose results have since been frequently cited in professional debates on pension issues. According to the forecast at that time, the system would remain self-sustaining until approximately the mid-2030s, as the deficits and surpluses expected in successive years would largely offset each other.

However, this situation no longer holds today due to changes in conditions, such as the significant reduction in contribution rates and the introduction of 13th- and

14th-month pensions. The pension system is operating with a significant deficit, and reform – assuming there is political will – cannot wait until the mid-2030s. However, implementing major reforms would require social and political consensus, which does not seem realistically achievable in the short term. At the end of the presentation, the speaker outlined several short-term options to improve the situation, even before planning and implementing major changes.

Réka Branyiczki (Tárki, Eötvös Loránd University KRTK KTI) In her presentation titled „Is the current state pension system fair and just according to the adult population in Hungary? In her presentation, she presented the results of a 2024 survey in which respondents determined what they considered a fair monthly state pension (in thousands of forints) and a replacement rate (in percent) for fictional retirees. Respondents also decided which of two fictional retirees should have their 13th-month pension reduced in the event of a forced cutback. The following information was available for the hypothetical retirees: gender, age, years of service, primary occupation during their working years, marital status, number of children, and savings amount.

The driving factor behind the responses was the hypothetical retirees' occupations: the higher a retiree's earnings, the higher the pension respondents considered fair; at the same time, they set a higher replacement rate for retirees with previously low earnings and targeted those in previously higher-paying occupations with mandatory pension reductions. Overall, the presenter found that there is a broad social consensus regarding the legitimacy of the current earnings-related pension system. Yet, there is a need for redistribution within the pension system.

András Simonovits (Budapest University of Technology and Economics) gave a presentation titled „Pension Calculation and Indexation in Hungary," in which he described the current implementation of the system and critically analyzed its problems.

He pointed out that in the year each pension was calculated, it was a starting pension, the value of which – for those retiring at the statutory retirement age or under the Women40 program – was the product of the indexed and degressive career earnings and the length-of-service scale. The net average wage index used in indexation is upwardly biased; the contribution base ceiling was abolished in 2013, and the degression thresholds have become relatively meaningless due to wage inflation.

The pension already determined is the indexed value of the previous year's pension, with the two extreme cases being indexation based on wages and prices, and the intermediate case being a combination of the two, known as mixed (Swiss) indexation. The advantage of wage indexation is that the pensioner's income moves in tandem („they cry and rejoice together") with that of workers; the disadvantage is that, for a given scale factor, it costs much more than price indexation.

The speaker concludes that since 2010, price indexation has made the operation of the pension system cheaper, but has also exacerbated differences between younger and older pensioners. The 13th and 14th monthly pension payments only temporarily alleviate tensions; at the very least, the latter should be continued on a degressive basis.

Csaba G. Tóth (Eötvös Loránd University, KRTK-KTI). In his presentation titled „How Much Is the Workforce Worth, or Is Human Capital Net or Gross?", he presented the results of his joint research with Róbert Iván Gál and Pieter Vanhuysse, which

addressed methodological issues related to the accounting of human capital. Most research concludes that the value of human capital significantly exceeds the value of physical capital in an economy. However, while the costs of operating physical capital are generally taken into account, standard estimates of human capital use a „gross" definition that excludes the costs of maintaining the workforce.

The researchers examined how estimates of human capital change when accounted for on a net basis. To do this, they subtract the present value of consumption required to maintain human capital – under several different scenarios – from the present value of expected labor income over the remaining lifetime. Their results indicate that estimates of net human capital are globally 50–80 percent lower than standard gross estimates.

In his presentation, Péter Vékás (Corvinus University of Budapest) introduced a new method for forecasting the combined mortality of multiple populations, which he developed jointly with Gábor Szentkereszti and published in a leading international actuarial journal. He emphasized that mortality forecasting is important for demographers – among other things, for forecasting population size, the number of pension contributors, and the number of retirees – and for actuaries, for more accurate estimation of pension and life insurance liabilities.

He also pointed out that traditional time-series analysis methods, such as ARIMA, do not handle cross-sectional and spatial relationships well when applied to groups of countries. Therefore, panel and spatiometric methods were used to estimate the time-dependent parameters of the widely used Lee–Carter and Li–Lee mortality forecasting models. Their analysis was based on data from 22 European countries covering the period from 1960 to 2019. The results indicate that the proposed methods are more accurate than standard ARIMA models in the vast majority of countries.

In his presentation titled „Taking the Costs of Raising Children into Account in Pension System Reform," József Banyár (Corvinus University of Budapest) emphasized that it would be advisable to examine the pension system on a different time scale than that of human life. The basic unit of time here is not the year, but the generation. For this reason, although it may seem to the individual that the pension system has „always existed," in reality, it was introduced only a few generations ago, making it very young. Historically, it has not yet been proven, so it is by no means certain that it will survive for many more generations. In fact, current events and the characteristics discussed in the other presentations point to increasingly pressing problems.

The seemingly „flowing" nature of time is deceptive here as well: on a human scale, these problems worsen only slightly over a few years, making them appear manageable. However, there is absolutely no sign that these problems will ever ease. In fact, they are likely to worsen because there is a contradiction in the operating principle of today's pay-as-you-go state pension system, which is driving it toward collapse. The essence of the contradiction is that the system rests on the implicit assumption that enough children will always be born. Yet, in reality, this assumption actually encourages fewer and fewer births. Those without children receive a much more favorable pension from the system than those who have one or more children. All of this is taking place in a context where having children is becoming increasingly expensive in the developed world. While there is essentially no economically meaningful benefit to it, at least on

an individual level, as far as parents are concerned, since the „economic benefit" of children has been „socialized" precisely through the pension system.

All of this stands in sharp contrast to previous centuries in human history (and the current experience of many developing countries), when having children was typically considered a „profitable venture." This situation, however, is beginning to disappear worldwide. It is therefore not surprising that fertility rates are declining worldwide – albeit starting from different levels. For this reason, a pension system operating on this principle is, in fact, heading toward its own demise. Banyár considers this ongoing trend (the continuous raising of the retirement age, the continuous shrinking of pension levels and duration) to be unstoppable unless the system's fundamental principle is changed so that raising children becomes a profitable investment – specifically, one that pays off in the form of a pension.

The presentations sparked a lively, substantive professional debate. The presentation of the initial results of the recently launched National Program, along with the main directions outlined for further research, rightly attracted significant attention not only among economists but also among the broader community interested in domestic and international socio-economic issues. The subject under examination is of paramount policy significance; indeed, it is a matter of national importance, as it directly affects the sustainability of the socio-economic model, fiscal stability, and intergenerational equity. A key task for researchers in this field is to thoroughly examine these processes and develop scientifically grounded proposals for solutions and pathways forward.

In addition, it is important to emphasize that these issues also represent an increasingly significant strategic challenge for the European Union. Population aging, the sustainability of pension systems, human capital renewal, and labor market restructuring are systemic issues at the EU level that will determine, in the long term, the scope for common economic policy, the stability of the EU budget framework, and the Union's competitiveness.

It is of particular importance for Hungary and the Central European region that these issues be placed on the EU agenda and that potential solutions take shape as common European instruments and policies, including the targeted use of EU funds. The countries in this region face similar demographic trends, labor market challenges, and budgetary constraints; therefore, it is crucial for them that the EU develop frameworks that, based on the common interests of Member States, support the establishment of sustainable pension and welfare systems.

The discussions during the conference clearly indicated that the professional community has both the intention and the capacity to formulate high-quality, evidence-based policy recommendations for decision-makers. One of the most important tasks in the coming years will be to develop responses – through the harmonization of national and European approaches and the targeted use of EU funding opportunities – that ensure the long-term stability of social and economic systems.

Bibliography

1. Péter Halmai (2014) *Crisis and Growth. The European Model, Structural Reforms*, Akadémiai Kiadó, Budapest
2. Péter Halmai (2023) Sustainable Growth, Growth Potential: Tendencies of Potential Growth in the European Union, *Public Finance Quarterly* 69: 1, pp. 46–63.
3. Halmai, Péter (2024) *Sustainability in Economics. Starting Points and Questions to Be Answered*, In: Halmai, Péter (ed.) Sustainability in Economics: Theoretical Foundations, Applications, Budapest, Budapest Metropolitan University, Akadémiai Kiadó pp. 11-46.
4. Kovács, Erzsébet; Varga, Veronika (2019) Data Trends on Health, Aging, and Retirement: Joint Share User Conference and Budapest Pension Seminar, *Insurance and Risk* 6: 4, pp. 42–55.
5. Kovács, Erzsébet (2024) *Longer Life Expectancy: A Blessing or a Risk?* In: Kutasi, Gábor (ed.) Domi esse et in Europa et in mundo: Festschrift in Honor of Péter Halmai on His 70th Birthday, Budapest, Ludovika University Press (2024), pp. 637–642.
6. Reiff, Á; Simonovits, A. (2022) *Social Inequality in Old Age – Pension Inequalities in Hungary*, In: Szabó-Morvai, Á; Pető, R (eds.) Labor Market Mirror 2022: Social Inequality and Mobility, Budapest, HUN-REN KRTK KTI (2023) pp. 190–194.
7. Simonovits, András (2024) The Challenges of Population Aging and Redistribution in the Pension System, *Közgazdasági Szemle* 71: 7-8, pp. 833-849.
8. Spéder, Zsolt (2025) Europe's Fragile Demographic Situation in the Global World, Magyar Tudomány, Issue 10, pp. 1954–1965. **https://doi.org/10.1556/2065.186.2025.10.10**