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The Effect of Demographic Trends on Competitiveness

A Methodological Experiment to Calculate the Loss of Human Capital

The paper provides an overview of global demographic trends, including a brief description of the situation in the European Union and Hungary. It is important not only to monitor these processes, but also to identify their causes and consequences. This is also the focus of the study, which highlights the general link between current demographic trends and competitiveness. In particular, it focuses on measuring the loss of human capital due to emigration and attempts to quantify the loss of human capital in Hungary due to the youth and skills drain in the central regions.

The study is a desk study based on published national and international sources (databases, studies). The authors of the study calculated the loss of human capital using a proprietary methodology in order to draw attention to the fact that in ageing societies, the competition for young and skilled workers intensifies and undermines the competitiveness and economic performance of the countries concerned.

Keywords: demography, demographic processes, ageing societies, competitiveness, emigration, brain drain, human capital

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Introduction

The population of a region, a country or a municipality is determined by four factors: the number of births and deaths, emigration and immigration. The size of the population of a territorial community has consistently been a significant criterion, as the number and age composition of the inhabitants of a specific geographical unit exert a pivotal influence on the economic and, when applicable, military strength of the region. An excess of the population can result in food shortages and social unrest, whereas a deficiency in population numbers and an unfavourable age structure can jeopardise the economic and military stability of the area.

At the time of the emergence of demography as a discipline, international migration was less prevalent, and population trends were typically determined by births and deaths. In the contemporary era, migration has also emerged as a pivotal determinant of population trends, given the notable expansion in the potential for migration, or the propensity to migrate.

The processes of demography are typically gradual, with changes occurring at a slow pace. However, the discipline of demography is not solely concerned with monitoring change; it is also concerned with identifying the underlying causes and consequences of such change.⁵ It is also important to consider the impact of current demographic processes on other fields, including technology, the economy and culture. These processes are already affecting the performance and competitiveness of individual industries and markets. This study focuses on the latter, examining the impact of current demographic processes on competitiveness and the challenges that decision-makers must address. The authors of the paper attempt to calculate the loss of human capital in Hungary due to the current increasing migration potential.

Methodology

The study is a desk research project based on a comprehensive review of published national and international sources, including databases and studies. A number of databases were utilised throughout the course of the study. The UN population data and projections published in 2022 were employed as a point of departure, while for the European Union and the domestic outlook, Eurostat's most recent data, from either 2022 or 2023 depending on the dataset, were used for the purposes of comparability and continuity. In order to calculate human capital, the number of Hungarians residing abroad on a long-term basis was also based on data from the UN database. As the database provides data in five-year increments, trend calculations were employed in certain instances to extrapolate the data.

In addition to the databases, the authors drew upon national and international publications, which provided the foundation for the direction of the research. As demonstrated by Zsolt Spéder's⁶ research, the adverse trends that have been observed in Western Europe for an extended period of time are even less pronounced in Hungary.

⁵ KAPITÁNY 2015.

⁶ SPÉDER 2021.



However, in recent decades, the age at which mothers give birth has been gradually increasing in Hungary, and the proportion of childless mothers in the 35-year age group has reached a historical peak. For an extended period, Hungary has been spared the elevated rates of childlessness that have long been prevalent in Western Europe, particularly in German-speaking countries. The country remains among those with lower rates of childlessness, but the trend is unmistakably negative.

As posited by Áron Drabancz and Éva Berde,⁷ the combination of economic growth and evolving social circumstances has resulted in a decline in fertility rates across all European countries by the advent of the 21st century, with the rates falling below the replacement level. In their view, current trends make it increasingly improbable that fertility will experience a meaningful upward trajectory. Furthermore, Drabancz and Berde highlight that Eurostat (2022) has developed a series of population projection scenarios for Hungary. The baseline scenario indicates that Hungary's population could decline to 8.93 million by 2070, 7.36 million in the event of a significant decline in fertility, and 10.62 million in the case of a positive turnaround in fertility rates. Nevertheless, in either scenario, the process of ageing will continue, albeit at a slower rate. The ratio of the elderly to the working-age population is set to increase significantly in all three scenarios. By 2070, the baseline scenario projects a ratio of 524 elderly people per 1,000 working-age individuals, while the low fertility scenario anticipates a ratio of 641 and the higher fertility scenario a ratio of 438.

In their analysis of the age structure of the Hungarian population, the authors also considered the findings of Csilla Obádovics and Csaba G. Tóth,⁸ which similarly confirm that the dependency ratio is deteriorating, with a projected 470 elderly people for every 1,000 working-age population by 2050.

In this study, the authors employed data from the Hungarian Central Statistical Office (KSH) to quantify the impact of family support programmes. Their approach aligns with the model proposed by Drabancz–Berde,⁹ which estimates the trajectory of the Hungarian fertility rate between 2011 and 2019 in the absence of family support programmes introduced since 2011. This estimation is based on linear and polynomial trends. The linear model would have resulted in an average of 25,000 fewer children per year, whereas the polynomial model would have resulted in almost 12,000 more children being born in Hungary. As the polynomial model predicts an increase in the total fertility rate, it can be compared with the data released by the KSH. Despite discrepancies in the data, the polynomial model lends support to the KSH calculations.

The authors' calculations are further validated by the research of Szabolcs Pásztor,¹⁰ who investigated the relationship between the total fertility rate and the average maternal age at birth based on Walker's neoclassical model. Given the salience of the fertility rate decline in Hungary, the study is of particular interest. In his study, Pásztor highlights the relationship between the propensity to have children and changes in earnings and tax rates. Specifically, he asserts that well-considered economic policy decisions,

⁷ DRABANCZ–BERDE 2021.

⁸ OBÁDOVICS–TÓTH 2021.

⁹ BERDE–DRABANCZ 2022.

¹⁰ PÁSZTOR 2017.



personal income tax, and employee transfers can encourage childbearing. Conversely, the rise in maternal age is not typically attributable to financial considerations.

In examining the influence of declining fertility on pension systems, the authors have referenced the work of László Árva,¹¹ who offers a historical analysis of the interconnections between demographic trends and the long-term viability of pension systems. His primary contention is that the demographic trough has precipitated the imminent collapse of pension systems.

In calculating the loss of human capital, the authors have taken the statement in the Competitiveness Report of the Hungarian National Bank¹² as their point of departure, namely that an economy is competitive only if it makes optimal use of its resources. Among numerous other factors, favourable demographic trends represent a pivotal element of a competitive economy. It is challenging to envisage long-term economic growth without an active and high-quality stock of human capital in the labour market.

Results

Population trends in the world

The global population reached one billion people by the early 1800s, a figure that was reached in less than a century and a half. The global population exhibited exponential growth until recently, experiencing a significant surge during the 20th century. By 1930, the global population had reached two billion. By 1959, it had increased to three billion, and by 2011, it had reached seven billion. In a period of slightly over ten years, the global population increased by a further one billion, reaching eight billion by 2023. According to projections by the United Nations, the global population is expected to exceed 10 billion by the 2080s, after which it may begin to decline at a gradual rate.¹³

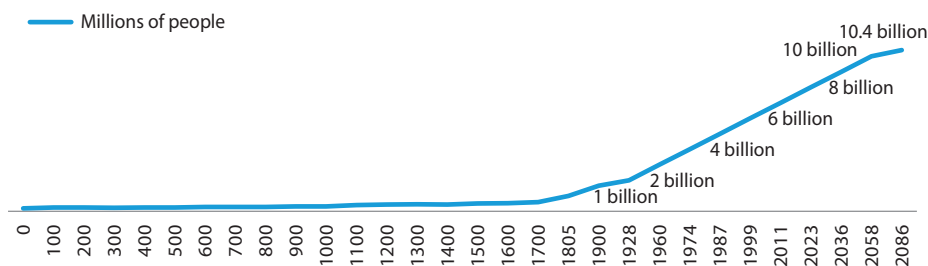


Figure 1: World population (estimates, facts and projections 0–2086, millions)

Source: UN [s. a.c]

¹¹ ÁRVA 2019.

¹² Magyar Nemzeti Bank 2023.

¹³ UN s. a.c.



The contemporary demographic landscape is characterised by a decelerating population growth rate, exhibiting a disparate pattern of decline and expansion. In developed countries, the decline in births is precipitous, whereas in Africa, the population continues to expand at a considerable rate. In 2023, the global total fertility rate is projected to be 2.3, a significant decline from the 4.7 rate observed in the 1960s. In 2023, Niger exhibited the highest total fertility rate, with an indicator of 6.6. In close succession, Chad exhibited a fertility rate of 6.1 per woman, while Somalia demonstrated a total fertility rate of 6.09. These rates indicate that, on average, a woman in these countries will give birth to at least six children over the course of her lifetime. In 2023, the countries with the lowest fertility rates were Macao (0.66), Hong Kong (0.71) and South Korea (0.72). In these countries, a woman of childbearing age has a relatively high probability of having one child. However, it is notable that many women in these countries choose not to have children, a conscious decision that is influenced by various socio-cultural factors.¹⁴

Currently, 54% of the world's countries have a total fertility rate below 2.1, indicating that the number of children being born is insufficient to maintain population levels over the medium term. The United Nations projects that the global total fertility rate will decline from 2.3 in 2023 to 2.1 by 2050.¹⁵

If we narrow the analysis to the European Union, we find that the number of live births has been falling steadily since the 1960s. While in 1964, 6.4 million children were born in today's EU Member States, in 2022 only 3.88 million will be born. The total fertility rate is also falling: while in the 1960s it was above 2.1 in all current Member States, in 2022 it was below 2.1 in none, with an average fertility rate of 1.46. In 2022, France had the highest total fertility rate among EU Member States (1.79), followed by Romania (1.71) and Bulgaria (1.65). In contrast, the lowest total fertility rates in 2022 were recorded in Malta (1.08), Spain (1.16) and Italy (1.24). For Hungary, the total fertility rate was 1.56 in 2022, according to Eurostat.¹⁶

Despite a decline in global fertility rates, life expectancy at birth has increased as a result of economic growth and advances in medicine and public health. While in the 1800s no country had a life expectancy at birth of more than 40 years, in just 150 years the gap between countries has widened significantly. In 1950, for example, life expectancy in Norway reached 72 years, while in Mali it was only 26 years.¹⁷ The highest global indicator was recorded in 2019 with the world average life expectancy at birth reaching 73.1 years. Over the course of the 2000s, the indicator increased by six years. Following the advent of the SARS-CoV-2 pandemic, the figure declined to 72.5 years; however, the trajectory has since exhibited a positive shift.¹⁸

¹⁴ Earthly Data 2023.

¹⁵ Earthly Data 2023.

¹⁶ Eurostat 2024a.

¹⁷ ROSER 2018.

¹⁸ WHO [s. a.].



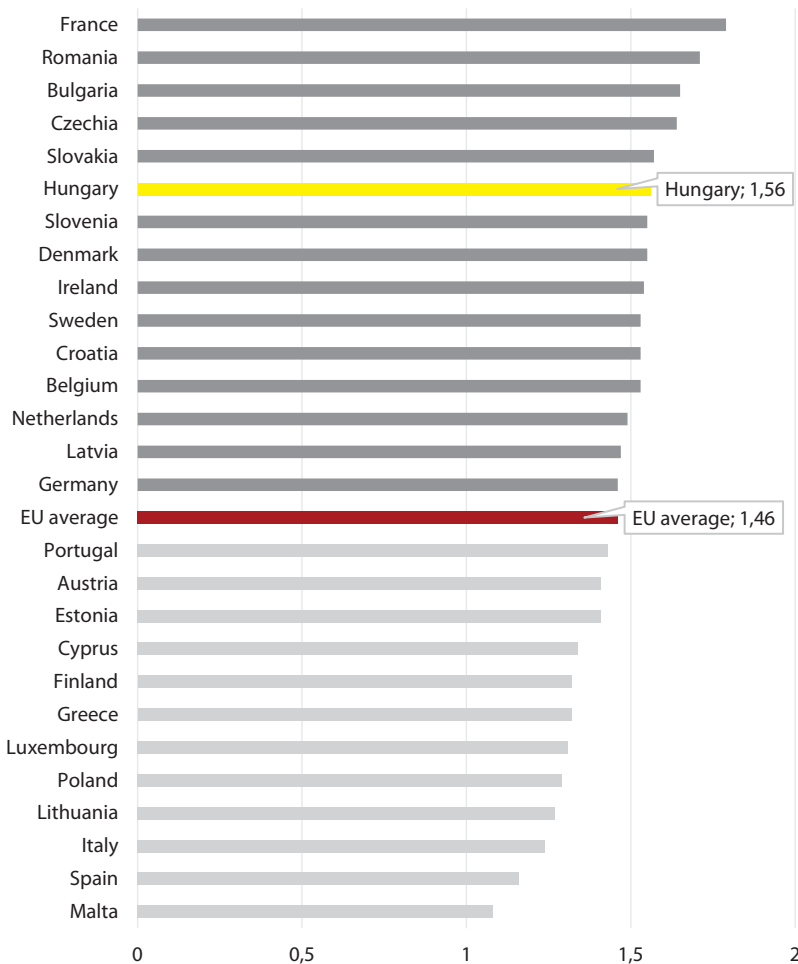


Figure 2: Total fertility rate in European Union Member States (2022)

Source: Eurostat 2024a

As life expectancy at birth rises and fertility rates decline, the proportion of the population comprising older individuals is increasing. The United Nations projects that the number of individuals aged 65 and above worldwide will reach 1.6 billion by 2050. By 2030, the number of individuals aged 65 and above in Europe will exceed the number of individuals under the age of 20. A similar trajectory is anticipated in Australia and New Zealand, as well as in East Asia, by 2050. The current median age of the global population is 30 with a projected increase to 36 by 2050. The median age is highest in Monaco, where it is over 56, while the youngest age is observed in Niger, Africa, where it is less than 15. By 2050, three-quarters of countries, representing 87% of the global population, will be classified as 'old' or 'ageing'. While life expectancy is increasing in all countries, the number of young people is also increasing in many developing countries as a consequence



of elevated fertility rates and a considerable reduction in infant mortality. A total of 82 countries have experienced a notable rise in the number of individuals within the 15–24 age bracket. In these countries, the number of individuals within the working-age population is projected to increase by 151 million by 2050, with Africa accounting for 73% of this growth.¹⁹

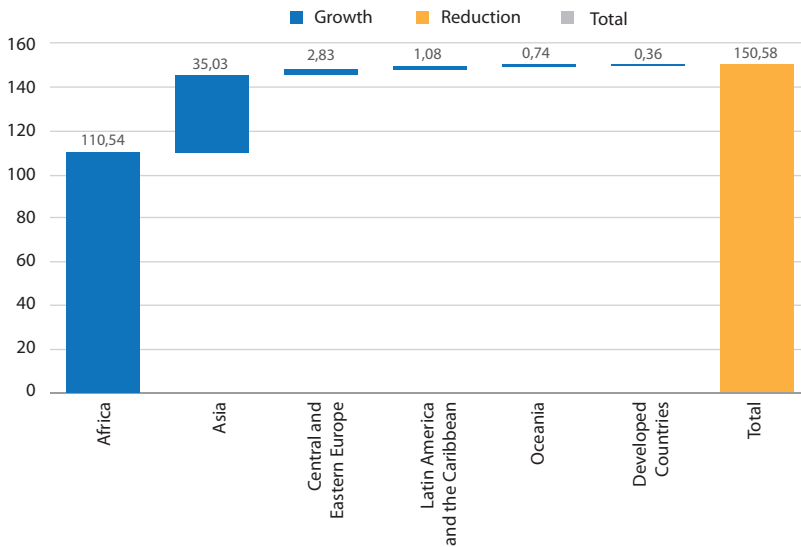


Figure 3: Projected growth in the 15–24 age group 2020–2050, by region

Note: Oceania excludes Australia and New Zealand, and the Developed countries category includes North America, Western European countries, Israel, Japan, South Korea, Australia and New Zealand.

Source: UN DESA 2023

In the European Union, over 20% of the population is aged 65 or over. Furthermore, the proportion of people aged 80 and over has almost doubled over the past two decades, while the number of people under 20 is falling. The countries with the highest proportions of people aged 65 and over are Italy (24%), Portugal (24%), Bulgaria (23.5%), Finland (23.3%), Greece (23%) and Croatia (22.7%). In contrast, Luxembourg (14.9%) and Ireland (15.2%) have the lowest proportions.

In the European Union, the median age is more than 14 years higher than the current global average of approximately 30 years, reaching 44.5 years in 2023. The country with the highest median age is Italy (48.4 years), while Cyprus has the lowest (38 years). The median age in the EU has increased by an average of 2.3 years over the last 10 years. However, there are Member States where the median age has increased by 4 years or more. The countries in question are Italy, Slovakia, Spain, Greece and Portugal. The exceptions to this general trend are Sweden and Malta, where the median age has decreased rather

¹⁹ UN DESA 2023.



than increased over the last decade. It is also important to note that countries where the median age has either decreased or increased only slightly have a high number of babies born in the country to non-EU immigrant mothers.²⁰

The third determinant, migration, is an integral part of human history. It is a phenomenon that is itself highly complex and multifaceted with numerous theories attempting to explain the underlying causes of migration processes. The United Nations Department of Economic and Social Affairs (UNDESA) Population Division estimates that the global number of international migrants reached 281 million as of 1 July 2020, marking a significant increase in migration globally. The proportion of the global population that is constituted by international migrants has increased from 2.8% in 2000 to 3.5% in the present era, and from 2.3% in 1980.²¹

Additionally, the number of migrants arriving in the European Union has increased, with a notable surge occurring in 2022. This influx can be attributed, at least in part, to the refugee crisis precipitated by the war between Russia and Ukraine.

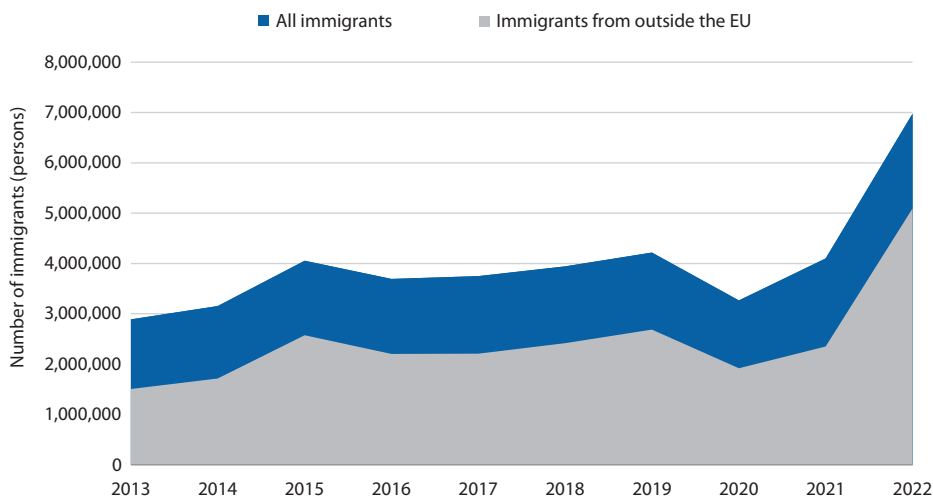


Figure 4: Number of immigrants to EU Member States 2013–2022

Source: Eurostat [s. a. d]

As of 1 January 2023, the European Union was home to 448.8 million individuals with over 42 million of these being born outside the EU. In the year 2022 alone, 5.1 million individuals who were not citizens of the European Union migrated to the European Union.²²

²⁰ Eurostat data.

²¹ UN DESA 2023.

²² European Commission 2024.



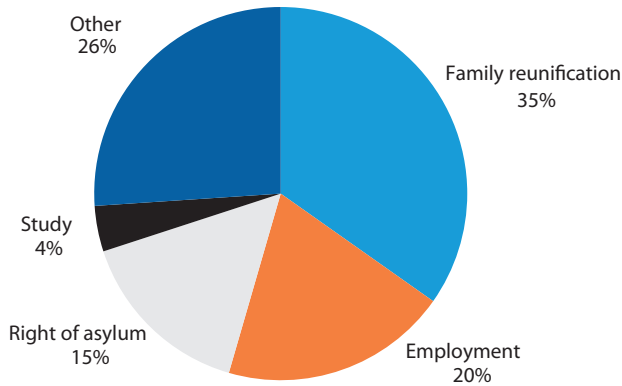


Figure 5: Grounds for residence permits issued in the European Union until 31 December 2022

Source: European Commission 2024

The rising number of immigrants in EU countries has resulted in an uptick in the number of children born to mothers who were either born in another EU country or in a country outside the EU. In 2022, the proportion of children born to foreign mothers reached 22%, with two-thirds of foreign-born mothers hailing from countries outside the EU.²³

The impact of demographic trends on competitiveness

The issue of competitiveness, whether at the level of individual companies or national economies, has become a significant concern in the contemporary era. There is no single, universally accepted definition of competitiveness. The term is open to interpretation, and its meaning is often subject to differing interpretations by economists, researchers, and research institutions. In the context of firms, competitiveness is primarily conceptualised in terms of profitability. This can be defined as the capacity of a firm to produce goods or services that customers are willing to purchase at a price that ensures the desired returns and growth for the owners. In the context of national economies, the OECD definition is the most widely used. It defines competitiveness as the extent to which a country can produce goods and services under free and fair market conditions that are in demand on the international market, thereby increasing the real income of its inhabitants in a sustainable manner. While the two definitions are largely analogous, the crucial indicator for national economies is the increase in the real income of the population. Cohen's (1984) definition differs from that of the OECD in that it is not real incomes, but the continued rise in the welfare of the population, that is an important indicator of the competitiveness of national economies. This latter definition is also similar to that presented in the EU Competitiveness Report 2000, which states that an economy is competitive if it is able to raise the standard of living of its population and ensure high employment in a sustainable

²³ Eurostat 2023.



manner, that is to say, without endangering the well-being of future generations.²⁴ One of the principal novelties of the concept of competitiveness in the international literature is the incorporation of the capacity to innovate and renew, in addition to the capacity to change and adapt, at the analytical level.²⁵

The competitiveness of a national economy is contingent upon the effective utilisation of the resources at its disposal. In addition to natural, physical and financial resources, the role of human resources is becoming increasingly significant in light of current demographic trends. As with all resources, it is of the utmost importance that human resources are available at the optimal time, in the optimal place, in the optimal quantity and of the optimal quality. This can be optimally achieved by increasing productivity and competitiveness. However, it is precisely in the case of this resource that the current demographic trends are bringing about changes.

In developed countries, the dual demographic pressures of low birth rates and ageing societies are exerting an increasing influence. The combined effect of these factors is becoming increasingly evident in the labour market, where the age composition of the population affects both labour supply and productivity. The economic growth of a nation is influenced by a number of factors, including labour market participation, birth rates, the age of workers, and their skills and qualifications. The demographic profile of a population can be a significant determinant of its economic growth potential. However, it is not necessarily the case that high population growth will lead to economic growth. Rather, it is the education and skills of the workforce that matter most.²⁶ The phenomenon of increased longevity has created a set of opportunities and challenges. These dual demographic pressures are giving rise to substantial shifts, while the persistently low fertility rates observed across the majority of countries are already engendering significant challenges. The competitiveness of ageing societies is being negatively affected by a decline in the working-age population and an increase in old-age dependency ratios. This is closely related to rising health and social costs, which are placing an increasingly unsustainable burden on pension systems. The question of how to maintain pension or healthcare systems while the working-age population is in decline has become a fundamental question of policy.

The evidence indicates that fertility rates will not increase in developed economies, whereas life expectancy is expected to rise. The number of years spent in retirement is increasing, yet the number of children being born is insufficient to offset the number of older individuals in the population. Furthermore, dependency ratios are expected to decline considerably in developing economies, particularly in Northern Asia and Eastern Europe.²⁷

In its July 2018 report, the UK's Office of Budget Responsibility stated that "demographic change is one of the most significant pressures on public finances".²⁸ The demographic trends that have been identified are exerting an increasing influence on public policy, fiscal and monetary policy, and the labour market.

²⁴ CSATH 2022.

²⁵ CHIKÁN et al. 2019.

²⁶ HAYES 2023.

²⁷ GOODHART-PRADHAN 2023.

²⁸ GOODHART-PRADHAN 2023: 227.



An increase in the size of the working-age population leads to a rise in labour market participation, which in turn drives economic growth and productivity. Those in this demographic are more likely to save a greater proportion of their income, which in turn allows for further investment-led growth and development. A youthful and dynamic population introduces novel concepts and vigour to the economy, thereby stimulating innovation and entrepreneurship. Furthermore, the working-age population serves as a catalyst for consumer demand, stimulating domestic production and creating new employment opportunities. Furthermore, a higher proportion of the working-age population relative to dependants can also serve to alleviate the financial burden on social services and government support systems. It is possible that a larger and better-educated working-age population will result in accelerated economic growth, an improvement in living standards and enhanced global competitiveness. The reduction in the proportion of the population of working age may be linked to the rising costs of healthcare in societies where people are living longer, the growing burden of pension commitments and the effect of shifting patterns of demand on the economy.

Table 1: International competitiveness of ageing and ageing societies

High proportion of working-age, educated population in the total population	High proportion of retirement age population
Mobilising labour reserves can increase the propensity to invest.	The ageing of the working-age population is leading to labour shortages and a reduced willingness to invest.
High entrepreneurship, a young and skilled workforce open to innovation.	Low entrepreneurship, declining innovation potential.
The working age population is the driving force behind consumer demand.	Declining and changing demand structure.
Pension systems are easy to balance.	The sustainability of pension systems is becoming increasingly difficult to ensure.
Pressures on health and social care systems are low.	The pressures on health and social care systems require increasing and additional interventions.
Increasing private and public savings, lower interest rates, easier to balance the budget.	With private and public savings falling, interest rates rising, financing the budget is becoming more expensive.
Less pressure on the budget, lower taxes.	Taxes are also higher because of the pressure on the budget.
INCREASING INTERNATIONAL COMPETITIVENESS	DECLINING INTERNATIONAL COMPETITIVENESS

Source: compiled by the authors

It is evident that the ratio of the active and inactive populations, and the interconnections between them, do not constitute a definitive solution to the issue of competitiveness. The macroeconomic relationship between population ageing and economic growth is inherently intricate. Indeed, other factors, such as education, technology and the institutional system, exert a more pronounced influence on labour productivity than the increase in the age of the workforce. Furthermore, an ageing workforce has a positive effect, as older workers have accumulated knowledge and experience that can contribute to productivity growth.



The overall impact of an ageing population on economic growth and productivity is also contingent upon the response of firms. The digitalisation and automation of processes can lead to increased productivity, with the potential to replace a proportion of the living workforce. However, this depends on the ability of firms to finance the necessary investment and the availability of a skilled workforce that is adept at new technologies.²⁹

Situation in Hungary

Hungary is no exception to the global trend whereby developed countries are facing the challenges of a declining birth rate and an ageing population. The following two age groups demonstrate the evolution of the proportion of individuals belonging to the older age cohort within the total population since 1900.

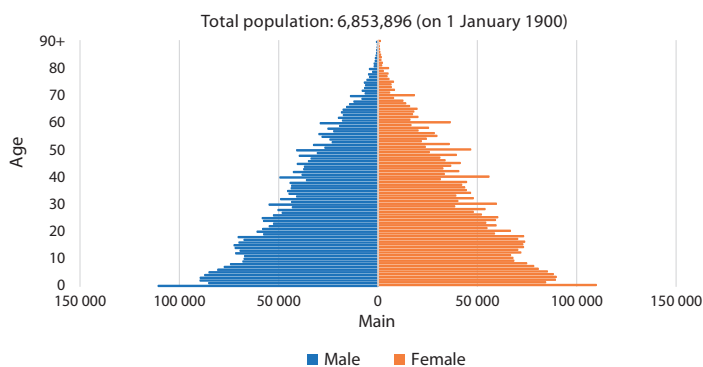


Figure 6: Population of Hungary by sex and age on 1 January 1900

Source: compiled by the authors based on KSH data

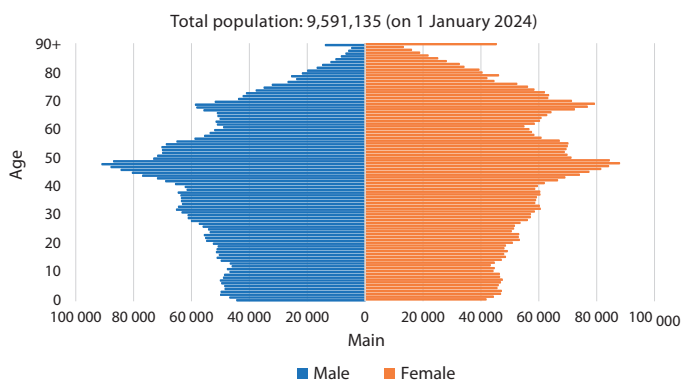


Figure 7: Population of Hungary by sex and age on 1 January 2024

Source: compiled by the authors based on KSH data

²⁹ UN DESA 2023.



The family policy measures implemented over the past decade have contributed to a reduction in the demographic pressure. However, according to the Central Statistical Office of Hungary (KSH), if the total fertility rate had remained at the 2011 level (1.23), there would have been 178,000 fewer births between 1 January 2011 and 1 January 2023. Hungary is situated at an intermediate position within the European Union with regard to both the proportion of the population aged 65 and over and the median age. The proportion of the population aged 65 and over is below the EU average, at 20.5%. The median age is 44.2 years.

Despite Hungary having one of the lowest dependency ratios in the European Union, the proportion of elderly people is increasing, which is leading to a corresponding rise in the dependency ratio. The ratio is projected to increase from 3.1 elderly dependants per working-age person in 2023 to 2.1 in 2050, representing a rise from 31.9% in 2023 to 45.5% in 2050.³⁰

As is the case with other developed or developing countries, Hungary is also experiencing the effects of dual demographic pressure. However, as is also the case with other Eastern European countries, emigration and brain drain are also a complicating factor. As has become evident from the aforementioned analysis, the demographic challenges that have emerged have now assumed the form of a competitiveness challenge, which is also faced by the Member States of the European Union. The accession of Hungary to the European Union in 2004, together with nine other countries, has gradually opened up the labour markets of developed countries, among many other opportunities. Since Hungary's accession to the European Union in 2004, there has been a notable increase in migration within the European Union. The ageing societies of developed countries are experiencing a significant labour shortage, and the economic centres are experiencing a labour drain that is affecting millions of people, including those in Hungary. EU accession has not only opened up new prospects for the labour market in the new Member States, but has also provided the opportunity for the former Member States to recruit new workers in order to alleviate labour shortages. Those states offering higher wages and more attractive job opportunities have been responsible for the emigration of labour from the Member States that joined in 2004 or afterwards. While emigration is a problematic phenomenon, as countries of origin are losing young people who are fit for work, it is also important to consider that some of those who emigrate do not return. Consequently, their children no longer contribute to the population and dependency ratios of the country of origin. Nevertheless, even if they do return, their economic performance is not reflected in the country of origin for a period of time that may be either longer or shorter. The countries affected by emigration suffer multiple losses. Firstly, they lose the capital invested in the 'production' of human capital. Secondly, their economies lose output and competitiveness due to labour shortages. Thirdly, their tax burden increases. Finally, the lost labour has to be replaced.

³⁰ Eurostat 2024b.



In Hungary, the factors that increase the willingness to work abroad are as follows: young age, high level of foreign language skills, higher education, especially a university degree or a master's degree, family ties and the absence of children, and the expected higher income.³¹

In regional terms, Hungary is one of the countries with relatively low rates of net emigration in terms of population.

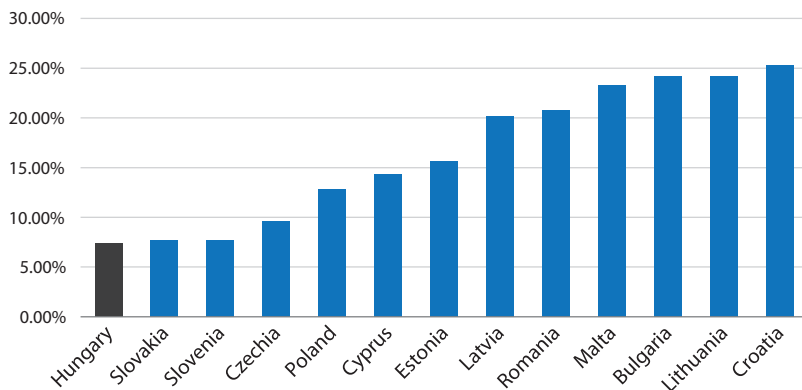


Figure 8: Emigration rates as a share of population in EU Member States that joined after 2004 (2020)

Source: UN Our World in Data

Additionally, the reduction in out-migration has resulted in notable challenges for the economy. Employers are encountering difficulties in identifying individuals with the requisite skills, and labour reserves have been diminishing since the late 2010s. While employment in the EU continued to grow in 2023, reaching over 70% (15–64 age group), the expansion compared to 2011 was nearly 8 percentage points. In Hungary, both the employment rate and the number of people in work increased by more than the EU average between 2011 and 2023. The employment rate reached close to 7%, representing an increase of more than 17 percentage points. For the 20–64 age cohort, the rate is even higher, at 75.3% in the EU and 80.7% in Hungary.³²

In some countries, the negative balance of labour migration also contributes to the depletion of labour reserves, which has the potential to negatively impact economic growth and development. Human capital is as integral to a nation's wealth as its material and natural resources. However, while the latter are relatively straightforward to quantify, measuring human capital represents a significant challenge. Article 38 of the Fundamental Law states that: The management and protection of national property must serve the public interest, meet common needs, preserve natural resources, and consider the needs of future generations.³³ If human capital is considered a form of national wealth, it is necessary to assign a monetary value to the loss of human capital

³¹ HÁRS 2020.

³² See: <https://ourworldindata.org/migration>

³³ The Fundamental Law of Hungary, Section 38.



due to emigration, at a minimum. In light of this line of inquiry, the authors of this paper have devised a methodology to attempt to quantify this loss.

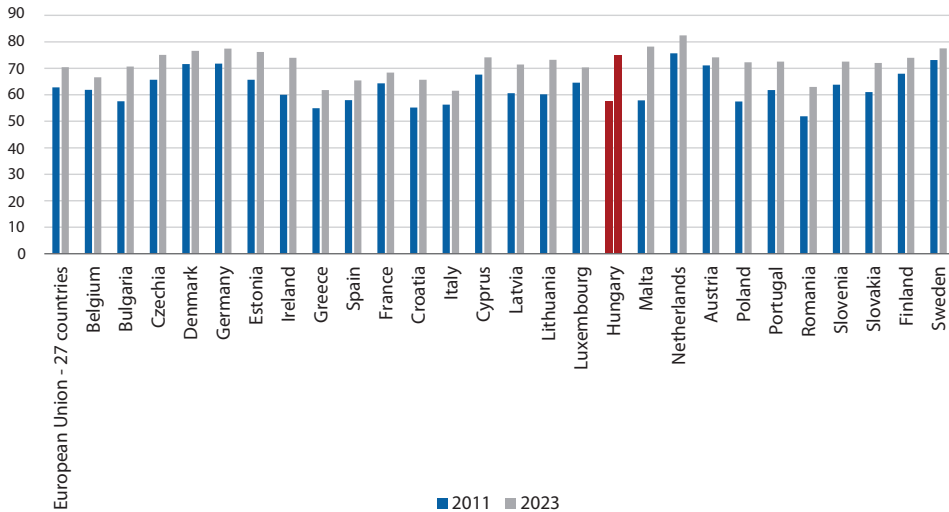


Figure 9: Employment rate of 15–64-year-olds in EU Member States

Source: Eurostat

The measurement of human capital and its calculation for the state

The term ‘human capital’ is used to describe the productive capacity, talent and knowledge of an individual. It is also known as a relevant factor of production and a key factor in the economic growth of a country. As a result, it has become a priority area for macro-level studies. The role of human capital can be examined from a historical perspective, namely in terms of the accumulated human capital over a given period of time, which is a determinant of output growth. Alternatively, one may consider changes in the stock of human capital, which represents an important input factor of production. In the context of emigration, both approaches are significant when considering the value of human capital. It is essential to develop a methodology that enables the estimation of the loss incurred by the country of origin as a result of emigration, as well as the gains realised by the destination country. It is essential that the methodology incorporates monetarily quantifiable indicators to demonstrate to both the public and decision-makers the financial loss incurred by the country of origin, in this case Hungary, as a consequence of emigration, and the financial gain for the host country.

Theoretical approaches to the measurement of human capital can be divided into two distinct groups. The first is an income and cost-based approach, or a combination of the two, according to which the value of human capital can be expressed in monetary terms by the market. The second approach does not focus on the monetarisation of



human capital, but rather employs an education-based indicator that considers related outcomes.

The cost-based method begins with the cost of ‘producing’ human capital. Engel (1883) was the first to estimate the financial burden on parents to raise their children to the age of 25. Engel’s calculation methodology, primarily based on the cost of education and schooling, was adopted and refined by other researchers. Judson (2002) was the first to include government expenditure on education. The cost-based method is primarily concerned with the financial outlay on education and seldom incorporates other costs associated with the upbringing of the child, such as medical expenses and other educational costs.³⁴

The authors of the study have conducted a detailed examination of the costs associated with the production of human capital from the perspective of the state, rather than from that of parents. The calculation of the human capital balance in the context of emigration represents a significant challenge for the state, given the lack of validated methodologies from open sources, the presence of uncertainty in the data employed, and the absence of reliable data on certain costs.

- The same difficulties that have arisen in the calculation of parents’ expenditure, for which a methodology exists, have also manifested in the case of state expenditure. These include the question of what to include in the costs, the availability of data, the inability to take into account depreciation of human capital, the lack of sufficient data to calculate the future value of past expenditure, and the necessity of making assumptions in many cases.
- The initial basis for calculating the fundamental costs of education and training was the existing family and other allowances, given that the replacement of emigrants is currently being borne by the state, even if the costs of emigrating human capital were incurred in an earlier period.
- The numbers of people emigrating and then returning to their country of origin are largely unaccounted for. There is no single, wholly reliable statistical source that provides comprehensive data on this phenomenon. Furthermore, there is a lack of information on the proportion of all emigrants who return and re-emigrate, the number of individuals who have taken employment in their destination country, and whether those individuals have done so in a position that matches their qualifications. It was thus decided that the top 10 destination countries would be included in the analysis, on the assumption that all emigrants are potential workers in those countries.
- The contribution of Hungarian emigrants to value added in the destination country is calculated using real GDP per capita. However, this figure is likely to be biased downwards, given that the ratio of active to inactive emigrants may be positively biased compared to the total population of the country.
- In order to eliminate the former uncertainty, a calculation was performed using the more likely and more accurate average income as a measure of income contribution.

³⁴ T. Kiss 2012.



- In light of these considerations, it can be posited that the data yielded by the methodology are adequate for quantifying the loss of human capital due to emigration.

The financial obligations of the state include the provision of family allowances, which are considerable given that in recent years the Hungarian government has allocated substantial sums to families at the EU level. Additionally, the state bears the financial responsibility for the per capita amount of normative allowances for nursery and primary school, healthcare, and other benefits and subsidies provided by the state, including public meals, school books, travel allowances, language exams and driving licences. These constituted the fundamental costs on which the expenses associated with vocational training and higher education were based. This enabled the estimation of the cost to the state of a blue-collar and a white-collar worker up until graduation. In the case of blue-collar occupations, the training costs of skilled construction workers and social care workers were employed; in the case of white-collar occupations, the costs of bachelor's and master's degrees were also used for the following occupations: doctor, IT specialist, engineer, economist, tourism and catering professional. In order to obtain data regarding the professions included in the study and calculations, open-source data were used for Hungarian workers abroad. The proportion of blue-collar and white-collar workers was estimated primarily on the basis of LinkedIn data and secondarily on the basis of Facebook data. Accordingly, the proportion of blue-collar workers was estimated to be 78%, while the proportion of white-collar workers was estimated to be 22%. Subsequently, an average was calculated for both blue-collar and white-collar workers, resulting in an average cost to the state of HUF 38.75 million for a skilled worker and HUF 44.96 million for a tertiary graduate.

In order to ascertain the countries to which the greatest number of Hungarian workers are migrating, data on international migration from the UN's Our World in Data database was employed. The Central Statistical Office database was not selected for analysis as it records the number of emigrants and returnees for permanent residence purposes, which is markedly distinct from the number of individuals engaged in foreign employment. The majority of individuals do not pursue permanent residence abroad, but rather undertake temporary employment in another country, even if they do not relocate their residence but commute between the two.

According to the latest data from the UN Our World in Data, by 2020, 714.4 thousand³⁵ people born in Hungary will have emigrated to live permanently in another country.

³⁵ This figure does not include the number of Hungarian workers commuting to Austria, which was 39.8 thousand in 2020 according to the Austrian Ministry of Labour.



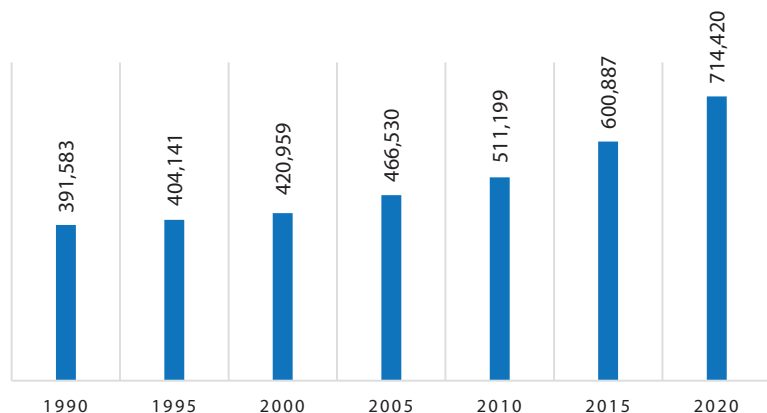


Figure 10: Number of emigrant Hungarians 1990–2020 (persons)

Source: <https://ourworldindata.org/migration>

According to 2020 data, most Hungarians lived in Germany, the UK and Austria. In the case of Austria, nearly 40,000 commuters were also counted, since these workers, even if they are not living in Austria, are not present in the Hungarian labour market and do not contribute to the Hungarian economic performance.

Table 2: Number of Hungarians born in Hungary but residing abroad in the TOP 10 destination countries

Destination country (TOP 10)	Number of emigrant Hungarians (2020) (Austria's results were increased with the number of commuters)
Germany	220,774
the United Kingdom	82,667
Austria	119,005
Switzerland	26,259
Sweden	17,227
the Netherlands	16,746
Italy	13,413
Spain	12,548
France	11,882
Ireland	9,409
Total 529,930	

Source: UN Our World in Data, Austrian Ministry of Labour (G7)

The value of the Hungarian human capital abroad in terms of public expenditure was calculated in monetary terms (in HUF) and in relation to the Hungarian GDP in 2020. This was done for the ten countries with the highest number of Hungarians abroad. The distribution of blue-collar and white-collar workers was also calculated on the basis of the results of the aforementioned social media survey, and the figures shown in the table are calculated with these figures in mind.



Table 3: The value of Hungarian human capital living abroad in HUF and as a share of Hungarian GDP in 2020

Value of Hungarian human capital abroad (2020)					
Destination countries (TOP10)	Number of Hungarians residing abroad (persons)	Hungarian human capital abroad - blue collar (HUF billion)	Hungarian human capital abroad - white collar (HUF billion)	Hungarian human capital abroad - total (HUF billion)	Hungarian human capital abroad (in relation to Hungarian GDP in 2020, %)
Germany	220,774	6,673	2,184	8,857	18.29
United Kingdom	82,667	2,338	1,004	3,342	6.90
Austria (including commuters)	119,005	3,551	1,231	4,781	9.87
Switzerland	26,259	733	331	1,063	2.20
Sweden	17,227	527	163	690	1.42
Netherlands	16,746	529	139	668	1.38
Italy	13,413	478	48	526	1.09
Spain	12,548	384	118	503	1.04
France	11,882	368	107	475	0.98
Ireland	9,409	266	114	380	0.79
Total	529,930	15,848	5,438	21,286	43.96

Source: compiled by the authors based on the calculations of the researchers involved in the development of the methodology, UN Our World in Data and KSH data

The calculations indicate that the human capital cost of Hungarians residing abroad for employment purposes in 2020 was HUF 21,286 billion, representing 44% of Hungary's gross domestic product (GDP) in the same year. As the ten most popular destinations for Hungarian emigration were examined, and as less than 70% of all emigrated Hungarians were found to have migrated to these countries by 2020, it can be inferred that the aforementioned amount and percentage may in fact be higher.

As a consequence of emigration, the country of origin not only forfeits the financial outlay associated with the development of human capital, given that the emigrant's expertise and abilities, acquired within their country of origin, are utilised elsewhere, but the country of origin also experiences a decline in its labour force. In order to gain a comprehensive understanding of the losses incurred by the country of origin, it is essential to consider not only the goods produced by the emigrant in the country of destination but also the goods not produced in the country of origin when the emigrant leaves.

Two approaches were employed to calculate this: firstly, the authors utilised real GDP per capita data for the destination country and the country of origin; secondly, they also conducted a calculation using average gross incomes for the destination country and the country of origin. The latter was justified by the fact that calculations were also made on the value to employers in the destination country of 'acquiring' a worker in a given labour market situation, namely the amount they are willing to spend to find a worker with the requisite skills and abilities. In the present context, where labour shortages represent the most significant competitiveness challenge for EU countries, this indicator is as crucial as GDP per capita.



Utilising authentic gross domestic product (GDP) per capita data and hypothesising that all emigrated Hungarians are prospective employees in the destination country, it can be posited that Hungarians in Germany alone contributed EUR 7.6 billion to the German economy in 2020. The aggregate contribution of emigrant Hungarians to the economic performance of the ten most popular destination countries in 2020 is in excess of EUR 19 billion. Conversely, the outflow of emigrants from the domestic labour market, also based on the assumption that all emigrants are potential domestic workers, will result in a reduction of the domestic economy's output by EUR 6.7 billion. The calculations are based on real GDP per capita in 2020 for each destination country. The calculation of the economic output lost in Hungary is based on real GDP per capita in Hungary in 2020.

Table 4: Economic output generated abroad and lost in Hungary (GDP per capita, 2020)

Destination countries (TOP10)	Number of Hungarians residing abroad (persons, 2020)	Real GDP per capita (EUR, 2020)	Economic performance of Hungarians working abroad (EUR, 2020)	Economic output lost in Hungary due to Hungarians working abroad (EUR, 2020)
Germany	220,774	34,550	7,627,741,700	2,810,453,020
United Kingdom	82,667	32,910	2,720,570,970	1,052,350,910
Austria (including commuters)	119,005	35,390	4,211,586,950	1,514,933,650
Switzerland	26,259	60,190	1,580,529,210	334,277,070
Sweden	17,227	42,910	739,210,570	219,299,710
Netherlands	16,746	40,130	672,016,980	213,176,580
Italy	13,413	24,910	334,117,830	170,747,490
Spain	12,548	22,250	279,193,000	159,736,040
France	11,882	30,630	363,945,660	151,257,860
Ireland	9,409	63,120	593,896,080	119,776,570
Total	529,930		19,122,808,950	6,746,008,900

Source: compiled by the authors based on the calculations of the researchers involved in the development of the methodology, based on UN Our World in Data and Eurostat data

An alternative approach is based on the calculation of average gross earnings. From an economic perspective, wages can be defined as the price of labour, which is itself influenced by the state of the labour market. A recent survey of employers across the EU revealed significant challenges in identifying candidates with the requisite skill sets. This gives rise to competition between countries, with developed Western countries engaging in the transfer of workers from other countries at higher wages. By attracting workers from less developed countries at higher wages, they enhance their own productivity and competitiveness, whereas the economic performance and competitiveness of the countries of origin are undermined as they lose skilled labour. In Germany alone, the hiring of skilled Hungarian workers represents a financial benefit to employers amounting to EUR 9.5 billion, in comparison to the EUR 22.7 billion benefit observed in the top 10 destination countries. The emigration of Hungarian workers has resulted in a loss of EUR 6.2 billion in income-generating capacity within the Hungarian economy.



Table 5: Economic output generated abroad and lost in Hungary (average gross earnings, 2020)

Destination countries (TOP10)	Number of Hungarians residing abroad (persons)	Average earnings (EUR)	Economic performance of Hungarians working abroad (EUR, 2020)	Economic output lost in Hungary due to Hungarians working abroad (EUR, 2020)
Germany	220,774	43,116	9,518,891,784	2,606,899,392
United Kingdom*	82,667	41,049	3,393,397,683	976,131,936
Austria (including commuters)	119,005	46,669	5,553,844,345	1,405,211,040
Switzerland*	26,259	80,586	2,116,107,774	310,066,272
Sweden	17,227	44,084	759,435,068	203,416,416
Netherlands*	16,746	49,970	836,797,620	197,736,768
Italy	13,413	28,275	379,252,575	158,380,704
Spain	12,548	27,743	348,119,164	148,166,784
France	11,882	37,848	449,709,936	140,302,656
Ireland	9,409	48,890	460,006,010	111,101,472
Total	529,930		23,815,561,959	6,257,413,440

Source: compiled by the authors based on the calculations of the researchers involved in the development of the methodology, based on UN Our World in Data, *OECD³⁶ and Eurostat data

The loss of human capital in the Hungarian economy since EU accession

The aforementioned calculations project the losses incurred by the Hungarian economy as a result of emigration over a specified period. Additionally, the researchers sought to examine the cumulative loss of human capital in the Hungarian economy following its accession to the EU between 2005 and 2020. As the UN Migration Database provides data on emigration and immigration on a five-yearly basis, a trend calculation was employed in order to extrapolate the data in order to obtain the number of emigrants for the missing years.

For the 15-year period, the average gross earnings for the specified years were employed to calculate the economic gains of the destination countries from the utilisation of skilled labour, while the identical methodology was utilised to examine the losses to the Hungarian economy from the emigration of skilled labour.

Over the 15-year period under consideration, Hungarian workers in Germany generated EUR 90.7 billion of income, while the Hungarian economy lost EUR 25 billion of income-generating capacity. In these calculations, only the value of the income generated by Hungarian emigrants was taken into account, with the cost of 'producing' human capital excluded. In the case of Hungarians emigrating to Germany in 2020, this cost is estimated at HUF 8.8 billion. The value of the Hungarian forint in relation to

³⁶ In the case of OECD data, the amounts are converted using the European Central Bank's 2020 central rates. 1 GBP = 1.125 EUR (2020), 1 CHF = 0.93 EUR (2020).



the euro was calculated using the average mid-market exchange rate published by the Hungarian National Bank in 2020. This resulted in a figure of EUR 25.3 million, which can be considered a gain for Germany and a loss for Hungary.

Germany is the most popular destination country for Hungarian emigrants, and thus it is to be expected that it will experience the highest gains and that Hungary will experience the highest losses.

Table 6: Economic output generated in Germany and lost in Hungary (average gross earnings, 2005–2020)

Current year	Hungarians emigrated to Germany (headcount)	Average annual German salary (EUR)	Labour costs of Hungarians working in Germany (EUR)	Cost of labour lost in Hungary due to Hungarian emigration to Germany (EUR)
2005	116,809	30,767	3,593,862,503	1,043,571,606
2006	121,275	31,357	3,802,807,632	1,070,854,718
2007	125,740	31,825	4,001,681,865	1,238,415,230
2008	130,206	32,797	4,270,359,623	1,372,499,338
2009	134,671	32,879	4,427,860,961	1,254,733,434
2010	139,137	33,741	4,694,621,517	1,377,317,163
2011	139,870	34,993	4,894,463,911	1,430,588,314
2012	140,603	36,000	5,061,693,600	1,420,226,863
2013	141,335	36,912	5,216,972,285	1,402,047,168
2014	142,068	37,798	5,369,893,824	1,357,319,583
2015	142,801	39,002	5,569,524,602	1,378,458,053
2016	158,396	39,872	6,315,549,363	1,546,574,638
2017	173,990	40,913	7,118,461,053	1,894,753,278
2018	189,585	42,105	7,982,468,004	2,168,470,942
2019	205,179	43,506	8,926,534,976	2,488,826,122
2020	220,774	43,116	9,518,891,784	2,606,899,392
Total			90,765,647,502	25,051,555,842

Note: The table shows the data from the UN database in dark grey and the data from the trend calculation in light grey.

Source: compiled by the authors based on the calculations of the researchers involved in the development of the methodology, based on UN Our World in Data and Eurostat data

In the case of the ten most popular destinations, the value of the labour force attracted by these countries, calculated using the aforementioned methodology, exceeds 240 billion euros over the period under review. Hungary, meanwhile, has suffered a net loss of over 63 billion euros. The financial cost of the human capital produced in Hungary that has emigrated to the ten most popular destination countries is estimated at 21.3 billion forints (equivalent to 60.7 million euros), representing an additional loss.



Table 7: Economic output generated in the TOP 10 countries and lost in Hungary (average gross earnings, 2005–2020)

Country	Price of labour of Hungarians working in a given country (2005–2020, EUR billion)	The cost of labour lost in Hungary due to Hungarians emigrating to the country in question (2005–2020, EUR billion)
Germany	90,76	25,05
United Kingdom*	36,3	9,4
Austria (including commuters)	54,1	14,8
Switzerland*	20,8	3,0
Sweden	10,0	2,5
Netherlands*	7,8	1,8
Italy	5,4	2,0
Spain	3,4	1,4
France	6,0	1,7
Ireland	5,4	1,3
Total	240,3	63,1

Source: compiled by the authors based on the calculations of the researchers involved in the development of the methodology, based on UN Our World in Data, *OECD and Eurostat data

Conclusion

The increasing significance of demographic trends for economic competitiveness is contingent upon the importance of human capital. In the absence of a youthful and proficient workforce, the potential for economic growth is diminished, and labour shortages can impede the advancement and innovation that are essential for sustainable development. Consequently, the improvement of the demographic situation constitutes a genuine economic issue. The authors of the study have identified and analysed a number of factors that influence a country's population, including the phenomenon of migration, which encompasses both immigration and emigration. The methodology employed to quantify the loss of human capital, despite its inherent uncertainties, effectively underscores the significant losses incurred by the outflow of labour, even in countries such as Hungary, where the propensity to emigrate is relatively low in comparison to the overall population. In order to counteract the outflow of labour from central regions, countries are attempting to implement programmes designed to encourage individuals to return to their place of origin. Concurrently, family policies are being introduced with the objective of enhancing the propensity to have children. The influence of demographic trends is inherently challenging to exert and their alteration occurs at a gradual pace. In the absence of a long-term, comprehensive strategy, these trends present an increasingly formidable challenge for national economies. A region or country that does not attempt to mitigate adverse trends may find itself at a disadvantage in the global marketplace.



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