Topical Research and Highlights

## Macroeconomic Effects of Demographic Changes in Bulgaria

BULGARIAN NATIONAL BANK

Macroeconomic Effects of Demographic Changes in Bulgaria

Demographic processes are gaining increasing significance for the economic development of Bulgaria. As a result of low fertility, high mortality rates and emigration, Bulgaria's population has been persistently declining (Chart 1) and ageing (Chart 2) in the recent three decades, and this trend is expected to be retained in the medium-term horizon.

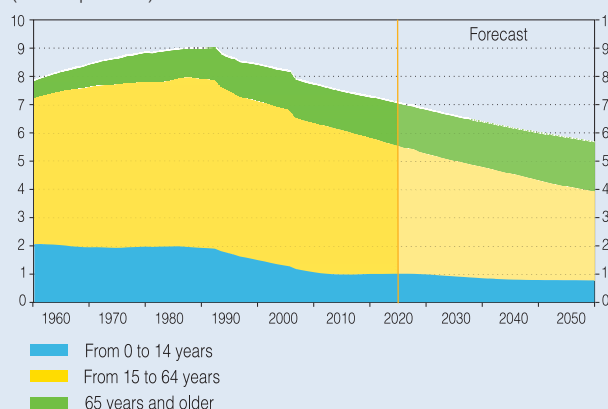## Chart 1. Contributions to the Population Change in Bulgaria

(per cent; percentage points)

- Population
- Mechanical change of the population (births – deaths)
- Net migration
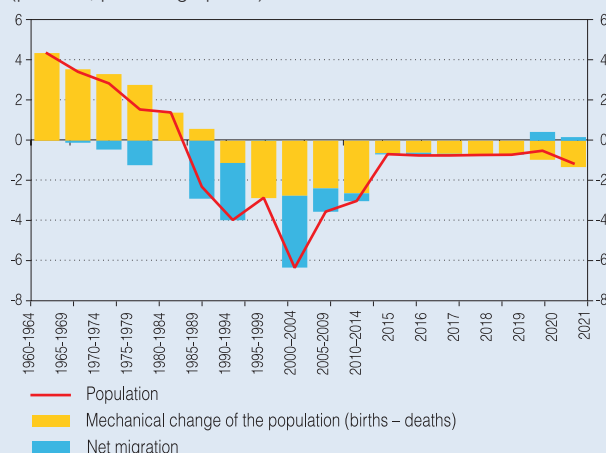
Source: Eurostat.

Chart 2. Population Dynamics by Age Group

(million persons)

- From 0 to 14 years
- From 15 to 64 years
- 65 years and older

Note: The reported data cover the period 1960–2021 inclusive.
Source: Eurostat.

Trends towards a steady decline and ageing of Bulgaria's population have started since early 90s of the 20th century, driven by a number of economic, political and social factors. As a result of these developments, Bulgaria is the country with the fastest-shrinking population in the EU (Chart 3). Concurrently, the median age[1] of Bulgaria's population in 2021 is above the average for the EU and the highest compared with the rest Central and Eastern European countries (CEE)[2] (Chart 4).
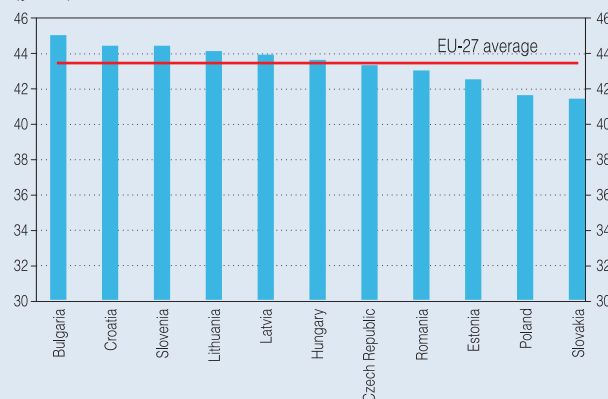
Chart 3. Population Dynamics

(index, 1975 = 100)

- EU-27
- CEE countries (Bulgaria excluded)
- Bulgaria
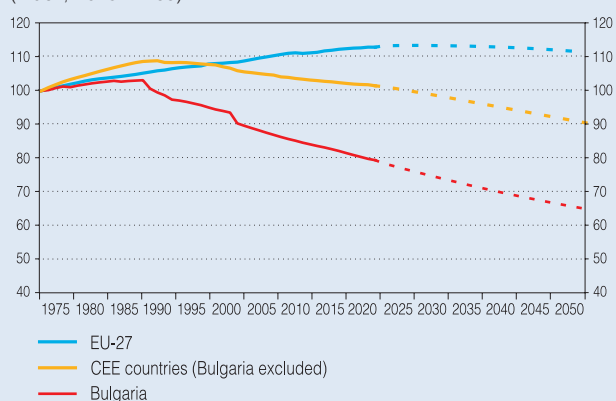
Source: Eurostat.

Chart 4. The Median Age of the Population in 2021

(years)

Source: Eurostat.

The purpose of this topical research is to highlight the main macroeconomic channels through which the population ageing and decline are expected to impact the economic growth, fiscal sustainability and price developments in Bulgaria.

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[1] The median age divides population into two equal parts: half of the country's population is under this age and the other half is older.

[2] The EU Central and Eastern European countries in the current analysis include Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

Effects on Potential Economic Growth

The decline in population and its ageing limit the economic development of Bulgaria over the longer-term horizon both on the supply side – through changes in production factors – and on the demand side – through changes in the household behaviour regarding consumption and savings and through deterioration in Bulgaria's fiscal position.

The decline and ageing of the population affect negatively the potential growth of the Bulgarian economy as they lead to declines in labour force due to a smaller number of the persons entering the labour market compared to the exit of cohorts, as well as to an increased share of the cohorts with lower productivity. For the 1990–2021 period, the working age population (15–64 years) in Bulgaria decreased by 1.4 million people, and the cumulative drop is expected to deepen to around 2.6 million in 1990–2050.

According to the 2021 Ageing Report of the European Commission[3], unfavourable demographic developments in Bulgaria will reflect in a negative 1.2 percentage points contribution of labour, measured by hours worked, to the potential economic growth in 2050, from a positive contribution of 0.2 percentage points in 2019. This estimate reflects only the direct effect of the population decline on potential economic growth.

In addition to this effect, emergence of additional negative effects on potential economic growth may be expected in terms of lower labour productivity resulting from changes in the age structure of the population. According to Skirbekk (2003[4]), labour productivity is found to decrease from around 50 years of age, particularly strong for professions where speed in decision-making, learning and adaptation to a changing environment are needed, while its influence is smaller in jobs where experience and verbal abilities are important. Unfavourable demographic developments in Bulgaria entailed a significant change in the structure of population over the last 30 years. Whereas in 1990 persons in the 10–19 age group had the largest share of Bulgaria's population, in 2020 the largest share was occupied by the 40–49 age group. According to the Eurostat's forecast, in 2050 the 60–69 age group will have the highest share followed by 70–79 group (Chart 5), which suggests slowdown in the growth of labour productivity over the long term in line with the results of the Skirbekk's study (2003).

In its 2021 Ageing Report, the European Commission assesses the potential growth of the Bulgarian economy by the contributions of labour (measured by hours worked) and labour productivity (covering the contributions of total factor productivity and capital deepening). According to the European Commission forecast, the contribution of labour productivity to the potential growth in Bulgaria will continue to increase: from 1.9 percentage points in 2019 to 2.5 percentage points in 2030, and then to slow down to 2.2 percentage points in 2050 in line with a deepening population ageing process when the 60–69 and 70–79 age groups will have the largest share of the total population.

To assess the effect of a change in labour productivity on potential economic growth in some theoretical and empirical models, a variable is used to measure the accumulation of human capital in the economy (Mankiw and co-authors, 1990[5]). According to the human-capital theory, the increase of investment in the form of education and health of an individual results in a rise in his productivity (Becker, 1964[6]). In the study of Mankiw and co-authors (1990), a variable is added to Solow's neoclassical growth model,[7] representing the share of working-age population enrolled in secondary

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[3] European Commission, The 2021 Aging Report, *Institutional Paper* No 148/May 2021.

[4] Skirbekk, V. (2003), Age and Individual Productivity: A Literature Survey, *MPIDR Working Paper WP 2003–028*.

[5] Mankiw, N., G., D. Romer, D. N. Weil (1990), A Contribution to the Empirics of Economic Growth, *The Quarterly Journal of Economics*, Volume 107, Issue 2, May 1992, pp. 407–437.

[6] Becker, G. S. (1964), Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education, University of Chicago Press, Chicago.

[7] Solow's model of growth assesses the long-term economic growth on the basis of changes in the growth of population, savings and technological progress.

Chart 5. Population Structure by Age Group

(age group)
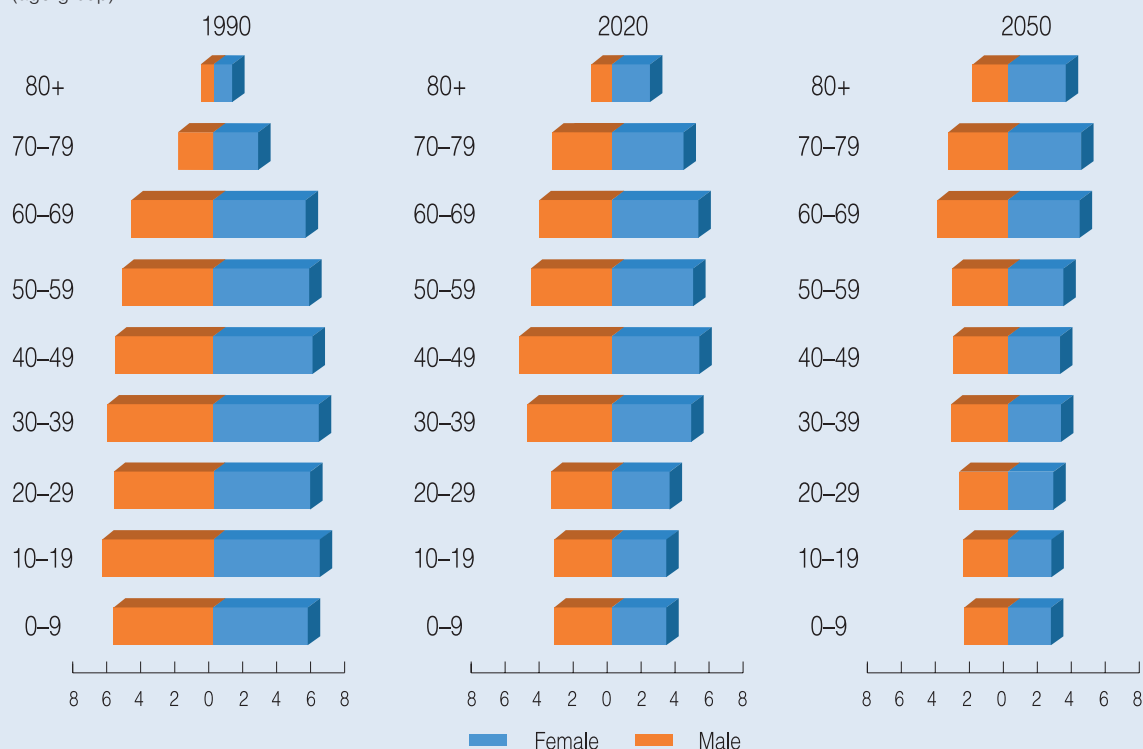
Note: A unit of the horizontal coordinate represents 100 thousand people.
Source: Eurostat.

school by which accumulation of human capital in the economy is measured. Their model using panel data explains about 80 per cent of the variation in income *per* capita in individual countries, and almost half of this variation is explained by the variable measuring human capital. In a study for Bulgaria covering the 1949–2005 period, Ganeva (2006[8]) finds a positive relationship between the accumulation of human capital measured by various indicators of the educational level in the country and income *per* capita.

Despite a broad consensus in the literature concerning the positive effect of accumulation of human capital on economic growth, difficulties in its measurement caused by its qualitative characteristics represent a challenge to its reliable assessment. Various sources showing assessments of human capital accumulation in individual countries, such as the data base of Barro and Lee[9] on the average number of years of education or the common data base of the Penn World Table[10], register a sustainable accumulation of human capital in Bulgaria after 1990.

Data on the educational level of population and life expectancy in Bulgaria (Charts 6 and 7) confirm the above results, along with a steady increase in the share of population with higher education and a gradual rise in life expectancy.[11] This suggests that in the last 30 years the accumulation of human capital in Bulgaria was due to the positive effects of the increased educational level and life expectancy which had exceeded the negative effects of decreased working-age population and lower labour productivity in some professions, reflecting the ageing of the population.

[8] Ganeva, R. (2006), The Impact of Human Capital on the Economic Growth (Bulgaria, 1949–2005), *MPRA Paper* No. 37244.

[9] Barro, R. and Jong-Wha Lee (2013), A New Data Set of Educational Attainment in the World, 1950–2010. *Journal of Development Economics*, vol 104, pp. 184–198. Data are available on: http://www.barrolee.com/.

[10] Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), The Next Generation of the Penn World Table, *American Economic Review*, 105(10), pp. 3150–3182. Data are available on: http://www.ggdc.net/pwt.

[11] An exception of this trend was 2020 due to the spread of COVID-19.

Chart 6. The Share of the Working-Age Population (15–64) with a Higher Educational Level
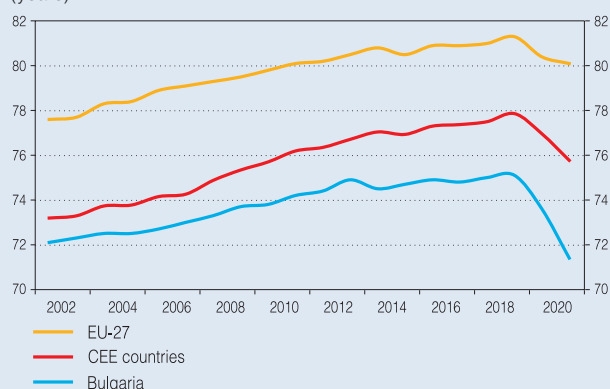
(per cent)

- EU-27
- CEE countries
- Bulgaria
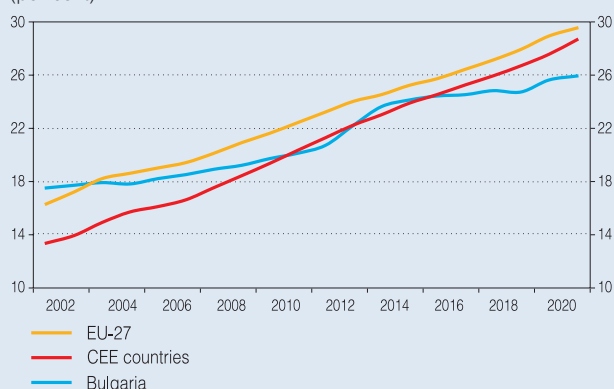
Source: Eurostat.

Chart 7. Life Expectancy

(years)


- EU-27
- CEE countries
- Bulgaria

Source: Eurostat.

The increased share of population with higher education in the literature is associated with a rise in labour productivity, but when taking into account the effects of this channel, it should also be noted the quality of the education system. The results of the OECD's Programme for International Student Assessment – PISA (Chart 8), which present assessments of the functional literacy of students in various countries worldwide and their skills to apply knowledge into practice, have indicated a decline in the quality of Bulgaria's education system in recent years, with results for Bulgaria worsening compared with the average level for OECD countries and remaining at a comparatively low level. The continuation of this trend over a long-term horizon is a prerequisite for a decline in the quality of higher education, and hence for weakening of the positive effect of the long-term increase in the share of working-age population with higher education on labour productivity.

Chart 8. Average PISA Scores of 15-Years-Old Students in Bulgaria

(scores)
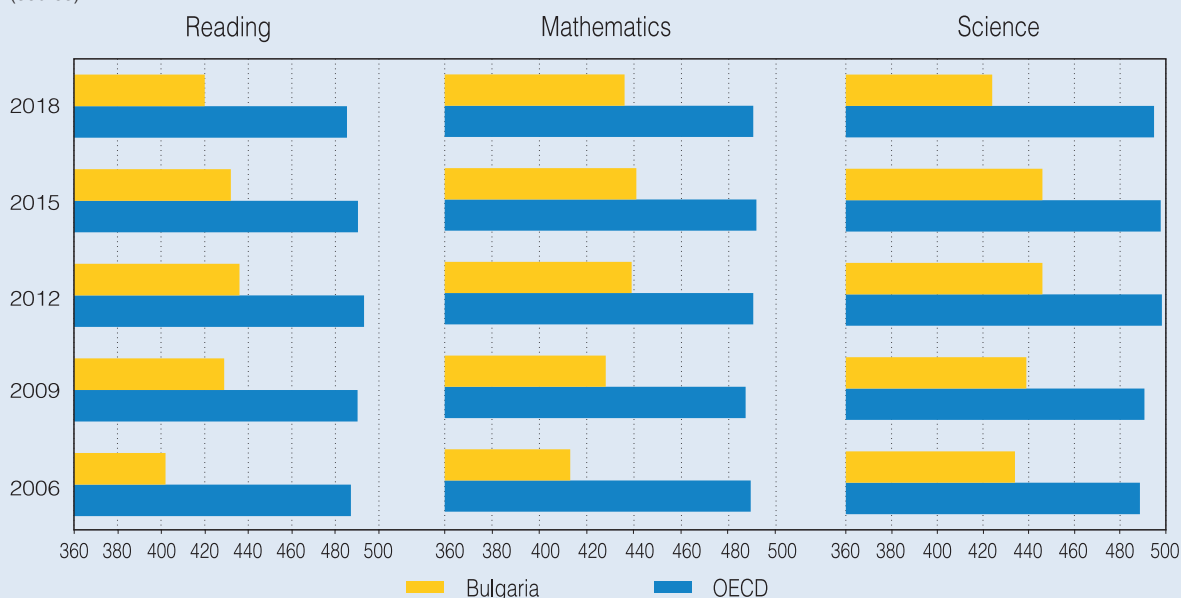
- Bulgaria
- OECD

Source: the OECD.

As regards production factors, in addition to the effects of lower hours worked and lower productivity, negative demographic developments are likely to limit the potential economic growth of Bulgaria over the long term and in terms of lower investments. The ageing of the population is likely to result in an increase of the physical capital intensity and to stimulate investments in a medium-term horizon, but with the progress of the negative demographic trends, it may be expected that eco-

nomic growth will slow down and household savings will decline, thus limiting Bulgaria's investment capacity.

Effects on the Savings Rate and Household Consumption

According to the life-cycle hypothesis developed by F. Modigliani and R. Brumberg in the 1950s, individuals seek to smooth consumption over the course of a lifetime – borrowing in times of low income and saving during periods of high income in order to ensure their consumption during the retirement (Ando and Modigliani, 1957[12], Deaton, 2005[13]). This hypothesis suggests that young and old people save less since their income is usually lower. This observation corresponds to the so-called hump-shaped labour income profile by age groups, described by Mincer (1974[14]). According to it, earnings increase rapidly in the initial stage of the professional experience of an individual (to the maximum value for the group of 30–39 years in the case of Bulgaria) thereafter starting to slowly decrease. Research studies explain decreased labour earnings after 40–50 years by such factors as lower productivity, switching to part-time employment and lower activity in the labour market.[15] As a result, the total savings rate tends to decrease in societies with a high old-age dependency ratio.[16] At a macro level, lower savings lead to lower investments, thus affecting negatively the accumulation of physical capital.

Several studies test empirically the reliability of the life-cycle hypothesis but there are no unambiguous empirical evidence if the savings rate changes significantly with the change of the age profile of the population. Higgins and Williamson (1997[17]) study the effect of the demographic transition on the saving and investment behaviour in some Asian countries during the 1950–1992 period and find that the aggregate savings rate is usually lower in the countries with a higher age dependency ratio. Using panel data on OECD countries for 1950–1980, Meredith (1995[18]) presents estimates that a 1 percentage point increase in the age dependency ratio leads to a 0.86 percentage point decrease in the savings rate. In another study about Japan, Muhleisen and Faruqee (2001[19]) establish that with the ageing of the population, the savings level declines but other aspects of demographic changes, such as a lower share of young people (who have a high consumption rate and low levels of savings) and increased life expectancy (which suggests accumulation of precautionary savings for the post-retirement period), could compensate partially the negative effects on total savings in the economy. The motive for leaving an inheritance to the younger generation is another factor which is considered to limit the decrease in the savings rate of elderly people (Meredith, 1995).

Results of the studies on the effects of ageing on household consumption are not unambiguous as well. Lee and Mason (2007[20]) find that the increase in the share of the elderly population reduces income *per* capita of all generations and leads to a net decrease in total household consumption. According to the authors, motives for leaving an inheritance to the younger generation cut additionally consumption of elderly cohorts. According to other authors, the ageing population changes to some extent preferences of households and the structure of their consumption, but not the level

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[12] Ando, A., and F. Modigliani (1957), Tests of the life cycle hypothesis of savings: Comments and suggestions, Oxford Institute of Statistics Bulletin 19: pp. 99–124.

[13] Deaton, A. (2005), Franco Modigliani and the Life-Cycle Theory of Consumption, *BNL Quarterly Review*, 2005, vol. 58, issue 233–234, pp. 91–107.

[14] Mincer, J. (1974), Schooling, Experience, and Earnings, NBER.

[15] For further information on the factors driving decisions of individuals to participate in the labour market, see the paper: Ventsislav Ivanov, Kristina Karagyozova-Markova, Gergana Markova, Andrey Vassilev, Zornitsa Vladova (2022), 'Determinants of Labour Force Participation in Bulgaria: Empirical Evidence from Micro Data', Discussion Papers, BNB.

[16] A ratio of the population aged 65 years or over to the population aged 15–64.

[17] Matthew Higgins and Jeffrey G. Williamson (1997), Age Structure Dynamics in Asia and Dependence on Foreign Capital, *Population and Development Review,* Vol. 23, No 2 (Jun., 1997), pp. 261–293 (33 pages).

[18] Meredith, G. and U. Baumgartner (1995), Saving Behavior and the Asset Price Bubble in Japan, *IMF Occasional Papers.*

[19] Hamid Faruqee and Martin Miihleisen (2001), Population Aging in Japan: Demographic Shock and Fiscal Sustainability, IMF Working Paper.

[20] Lee, S.H. and A. Mason (2007), Who Gains from the Demographic Dividend? Forecasting Income by Age, *International Journal Forecast*, 23, pp. 603–619.

of aggregate consumption (Walder and Döring, 2012[21]). In its study, Merette and Georges (2009[22]) ascertain that the ageing of the population causes sector changes in demand: demand for health services increases, while that for housing services declines as the rate of household formation slows. In a study for Germany, Stöver (2012[23]) also establishes that ageing of the population has no significant effect on aggregate consumption but has a strong effect on its components, with the share of healthcare costs increasing and that of food expenses decreasing.
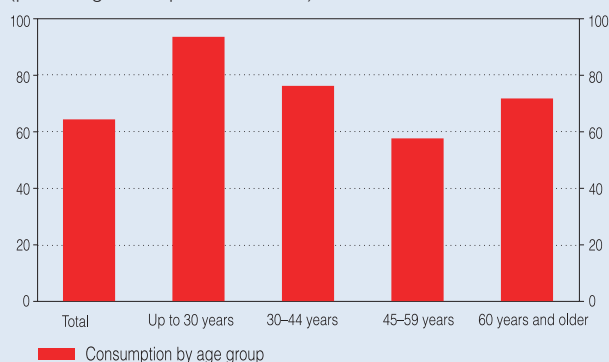
Chart 9. Median Savings by Age Groups

(percentage of disposable income)

Savings by age group
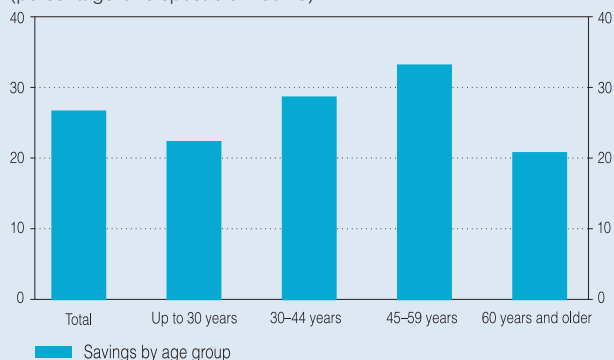
Chart 10. Propensity to Consume by Age Groups

(percentage of disposable income)

Consumption by age group

Note: Data represent the average values of the years 2010 and 2015 which are available for Bulgaria. The Chart 'Median Savings by Age Groups' represents new savings as a share of disposable income, but not all accumulated savings over the life cycle.
Source: Eurostat's Experimental Statistics.

On the basis of data for Bulgaria, a conclusion can be drawn that the life-cycle hypothesis is partially confirmed, with a higher propensity to save in Bulgaria observed during the life cycle immediately prior to retirement (Chart 9). The lower savings rate of the persons in the 30–44 age group when labour income is the highest can be explained by the childcare life cycle and relevant additional expenditure.[24] In line with the life-cycle hypothesis, individuals under the age of 30 have the highest propensity for consumption which decreases over time until retirement age when savings from previous life cycles are consumed (Chart 10). However, it should be borne in mind that the higher consumption rate of the persons over the age of 60 also reflects the lower levels of disposable income in this group. At the same time, according to Eurostat's data, individuals spend less of their disposable income on consumption with increasing of their educational qualifications and labour income. With regard to the expenditure structure, data for Bulgaria show that as consumers grow older, they spend more of their disposable income on food products, utility services and healthcare. In almost all other goods and services, a lower consumption propensity is observed for elderly people, with this being the most pronounced in expenditure on clothing, restaurants and hotels, transport and communications (Chart 11).

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[21] Walder, A.B. and T. Döring (2012), The effect of population ageing on private consumption – a simulation for Austria based on household data up to 2050. *Eurasian Economic Review*, 2, pp. 63–80.

[22] Merette, M. and P. Georges (2009), Demographic Changes and the Gains from Globalization: An Overlapping Generations CGE Model, *Department of Economics Working Papers* No 0903, University of Ottawa.

[23] Stöver, B. (2012), The Influence of Age on Consumption, *GWS Discussion Paper*.

[24] According to NSI data, the average mother's age at first birth for seven of the largest regions of the country on average (Blagoevgrad, Burgas, Plovdiv, Rousse, Sofia, Varna and Veliko Tarnovo), which make up more than 50 per cent of the population, increased from 26.5 years in 2010 to 28 years in 2021. On average for the country, the average age of a mother at first birth rose from 26.2 years in 2010 to 27.5 years in 2021.

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Chart 11. Structure of Consumption Expenditure by Commodity Groups and Services According to the Age in Bulgaria
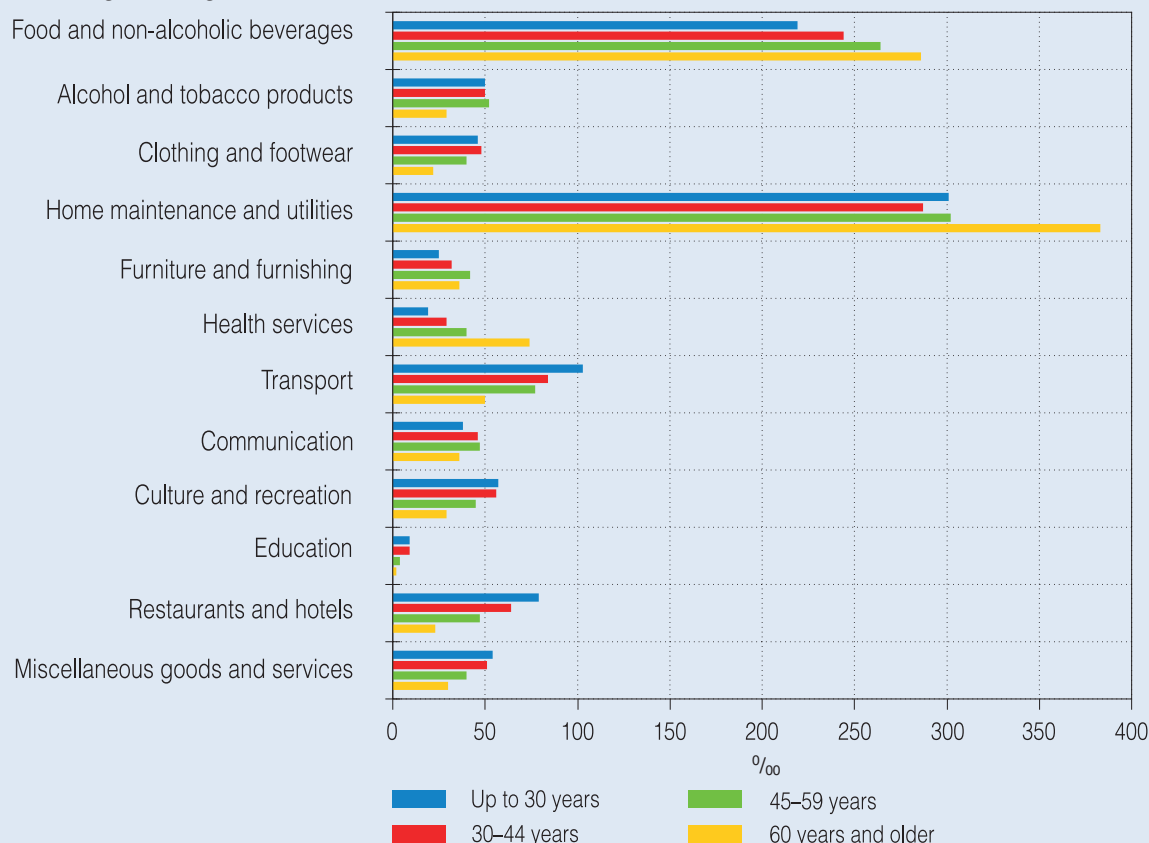
Note: Data represent the average values for the years 2005, 2010, and 2015, which are available for Bulgaria.
Source: Eurostat.

The increase in the age dependency ratio can therefore lead to lower savings over the long term, which will be somewhat limited by an anticipated increase in life expectancy[25] and a lower share of young people, which are with the highest consumption rate. At the same time, changes in the household consumption structure can be expected over the long term, resulting in an increase of the shares of food, utilities and healthcare expenditure. Such a shift in spending towards services, such as healthcare, which are largely provided by the state, will have lasting negative fiscal effects through higher public expenditure.

Effects on Fiscal Sustainability

The ageing, decrease and change in the age structure of the population in Bulgaria have a direct impact on the tax and social security base of the state budget and on expenses on pensions, healthcare and long-term care. Higher social expenditure and lower tax revenue stemming from these demographic changes lead to a deterioration in the budget balance, an increase in public debt and a negative impact on the sustainability of public finances in the long term (Aguila, 2011[26],

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[25] According to the forecast presented in the European Commission's 2021 Ageing Report, as of 2070 the average life expectancy will increase to 85 years, from 75 years in 2019.
[26] Aguila, E. (2011), Personal Retirement Accounts and Saving. *American Economic Journal*: Economic Policy, 3, pp. 1–24.

Elmeskov, 2004[27], Tosun, 2003[28]). Hock and Weil (2012[29]) find that regularly accumulated budget deficits due to higher current government expenditure related to the population ageing lead to accumulation of public debt or higher tax rates, which would ultimately lead to a loss of household disposable income and lower potential growth. According to the authors, these negative effects are more pronounced in countries with a predominant share of pay-as-you-go (cost-covered) pension systems, as is the case in Bulgaria.[30]

A possible way of reducing the pressure on public finances stemming from the ageing population is to raise the retirement age so that it can correspond to the rising life expectancy. According to Finch (2014[31]) however, this solution is not very popular from political point of view. In support of Finch's statement (2014), Bloom (2011[32]) examined the relationship between life expectancy and retirement age in 43 countries and found a low correlation between them. In an overlapping genera-tions model (OLG) for Bulgaria, Karagyozova-Markova (2015[33]) notes that the increase in the retire-ment age laid down in the preliminary texts of the 2015 pension reform[34] is not sufficient to offset the negative effect of the population decline on economic growth, but significantly mitigates the impact of the population ageing on public expenditure.

Some authors, including Eiras and Niepelt (2012[35]) and Lisenkova, Merette and Wright (2013[36]), examine other channels for limiting the effects on government spending, other than raising the retirement age. According to their analyses, higher public expenditure related to the population age-ing can be financed by a decrease in education and infrastructure costs as a result of a decline in the proportion of people using these services. The net effect of such redistribution of expendi-ture may be neutral for the country's fiscal position, but will be negative for its potential economic growth due to the adverse impact of lower education and infrastructure expenses on the accumula-tion of physical capital in the economy. Other authors, such as Blake and Mayhew (2006[37]), argue that the steady flow of immigrants to the countries with an ageing population can to some extent mitigate the pressure on the labour market and, consequently, on the public sector income from social security contributions. This argument is mainly applicable to more developed countries with a

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[27] Elmeskov, J. (2004), Aging, Public Budgets, and the Need for Policy Reform, *Review of International Economics*, 12, pp. 233–242.

[28] Tosun, M. S. (2003), Population Aging and Economic Growth: Political Economy and Open Economy Effects. *Economics Letters*, 81, pp. 291–296.

[29] Hock, H. and D. N. Weil (2012), On the Dynamics of the Age Structure, Dependency and Consumption. *Journal of Popula-tion Economics*, 25, pp. 1019–1043.

[30] According to the Social Security Code, employees in the third employment category, which account for more than 90 per cent of the employees in Bulgaria, are subject to the following social security obligations: for those born before 1 Janu-ary 1960: 100 per cent of the contributions due are transferred to the so-called first pillar of the pension system, which is administered by the State Social Security; for those born after 31 December 1959: about 80 per cent of the contributions due are transferred to the first pillar, and the remaining about 20 per cent to the accounts of universal pension funds, where the raised funds are personal and hereditary.

[31] Finch, N. (2014), Why are Women More Likely than Men to Extend Paid Work? The Impact of Work-Family Life History, *European Journal of Aging*, 11, pp. 31–39.

[32] Bloom, D. E., D. Canning, G. Fink (2011), Implications of Population Aging for Economic Growth, *NBER Working Paper* No 16705.

[33] Kristina Karagyozova-Markova (2015), Population Ageing and Long-Term Sustainability of Public Finances in Bulgaria, Sofia University 'Saint Kliment Ohridski' Faculty of Economics and Business Administration, Department of Economics, dissertation.

[34] The author has worked with the preliminary texts on the amendment of the Social Security Code, which foresee a gradual increase in the retirement age to reach 65 years for men and 63 years for women. Subsequently, a final version was adopted whereby the retirement age of men and women equals to reach 65 years by 2037, after which no statutory mechanism was approved for an increase in the retirement age.

[35] Eiras, G. M., D. Niepelt (2012), Aging, Government Budgets, Retirement, and Growth' *MPRA Paper* No 44218.

[36] Lisenkova, K., M. Merette, R. Wright (2013), Population Aging and the Labour Market: Modelling Size and Age-Specific Effects, Economic Modelling, 35 (2013), pp. 981–989.

[37] Blake, D., L. Mayhew (2006), On the Sustainability of the UK State Pension System in the Light of Population Aging and Declining Fertility, *The Economic Journal*, 116, pp. 286–305.

comparatively constant inflow of immigrants due to higher remunerations offered (Lee, Mason and Cotlear, 2010[38]).

In the case of Bulgaria, the negative demographic trends have significant fiscal consequences, as the number of contributors to the pension and health system is expected to continue decreasing in the long term compared to the number of recipients of these services, in view of the projected dynamics of the age dependency ratio in Bulgaria (Chart 13).

Despite the gradual increase in the retirement age which started in 2016, income from social security contributions under the Pensions Fund of the State Social Security (SSO) in Bulgaria remains insufficient for the pension expenditure, with the remainder (more than half of all pension payments in 2021) financed by transfers from the state budget (Chart 12). This negative trend was exacerbated by the onset of the COVID-19 pandemic, when non-contributory pension supplements were paid. Additional government transfers, that have the character of temporary social assistance in response to health or economic crises but are paid through the basic pension, create expectations of durability of the funds received and cannot be easily abolished.[39]

Chart 12. The Share of Pension Expenditure Paid with Non-Insurance Revenue and Newly Granted Individual Pensions

(per cent)   (thousand of people)
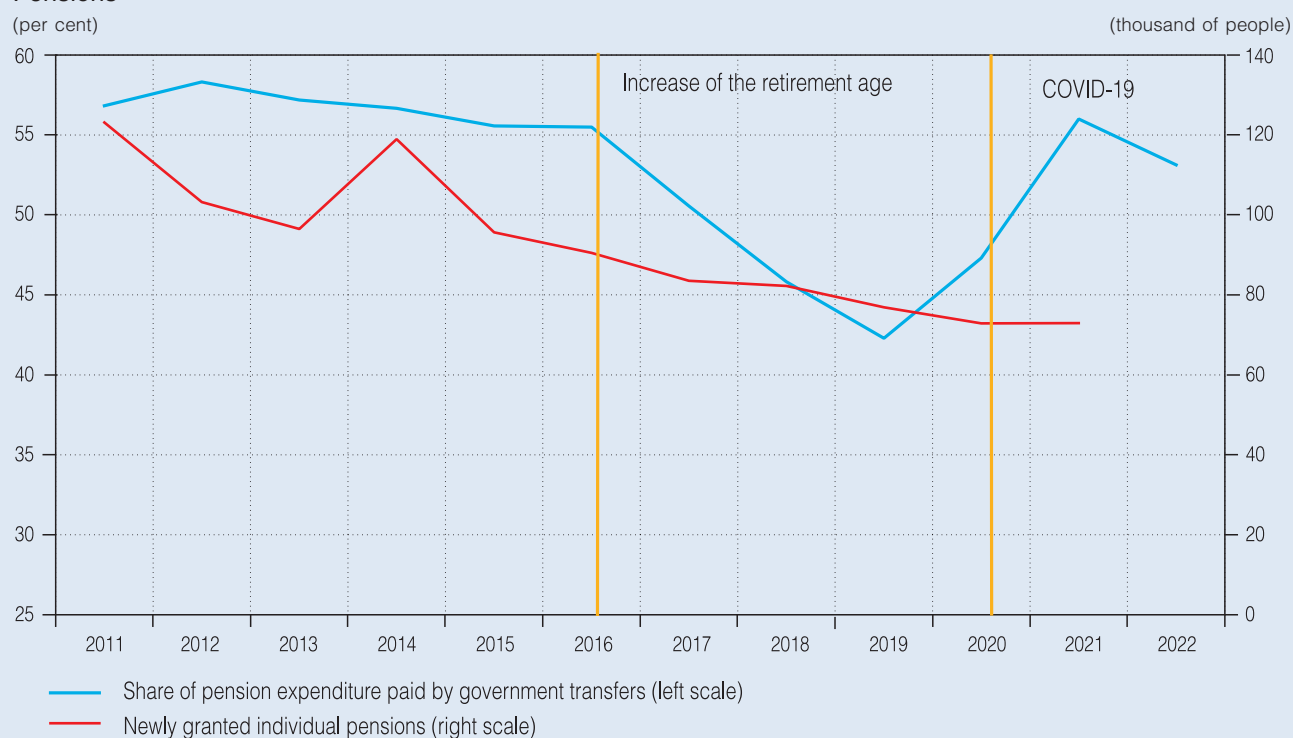
Note: Data on pension expenditure paid with social contributions for 2022 are in line with the Law on Amendment of the State Social Security Budget of July 2022.
Source: the NSSI.

The increase in the age dependency ratio (Chart 13) measured by the ratio of the population over 65 to the population aged 15 to 64, as well as the projections of a continuing increase of this ratio to 52.5 per cent by 2070 will be a factor for a sustained rise in government expenditure on pensions, healthcare and long-term care. At the same time, it can be expected that the decline in labour force will be reflected in lower tax-insurance revenue, which, in the context of an increasing share of persons at retirement age, would lead to a significant increase in the budget deficit of
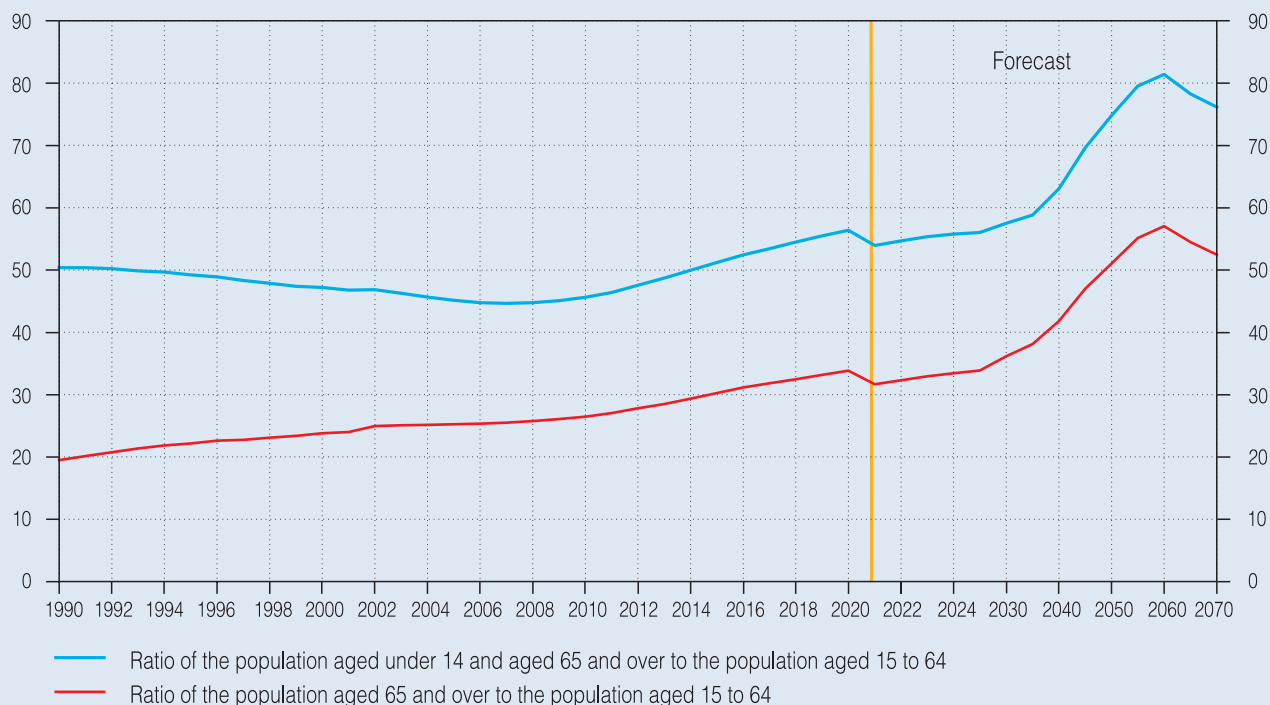
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[38] Lee, R., A. Mason and D. Cotlear (2010), Some Economic Consequences of Global Aging: A Discussion Note for the World Bank, *Health, Nutrition and Population (HNP) Discussion paper*; The World Bank.
[39] COVID-19 pension allowances paid from August 2020 to July 2022 were included twice in the amount of the basic pension: in December 2021 and July 2022, respectively.

the State Social Security, which is already on an expansion trend in recent years and is projected to reach 4 per cent of GDP by the end of 2022 (compared with 3.1 per cent at the end of 2019). Other things being equal, this would lead to an increase in transfers from the state budget in order to maintain the sustainability of the pension system.

Chart 13. Age Dependency Ratios in Bulgaria

(per cent)

Ratio of the population aged under 14 and aged 65 and over to the population aged 15 to 64

Ratio of the population aged 65 and over to the population aged 15 to 64

Source: Eurostat.

On a comparable basis, over the 2005–2020 period, the share of expenditure on pensions and healthcare increased both in Bulgaria and at EU level and in Central and Eastern European countries, with the increase in healthcare expenses being the strongest in 2020 due to the COVID-19 pandemic. The comparison of the share of pension expenditure in Bulgaria with the corresponding share in the countries of Central and Eastern Europe shows that already in 2015 pension expenditure in Bulgaria was higher as a percentage of GDP, and this was retained in 2020 (Chart 14). At the same time, the ratio of income from social and health insurance to GDP, which finances
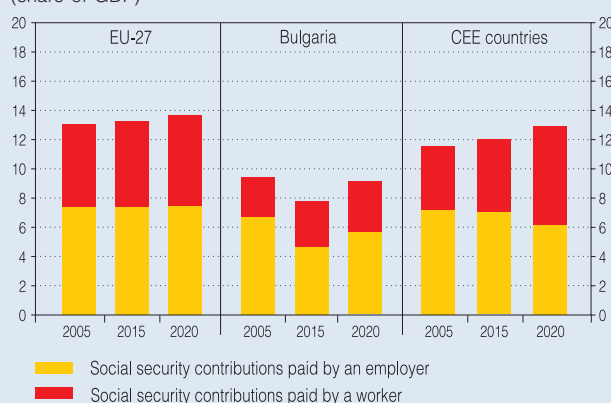
Chart 14. The Share of Public Expenditure on Pensions and Healthcare

(share of GDP)

Healthcare
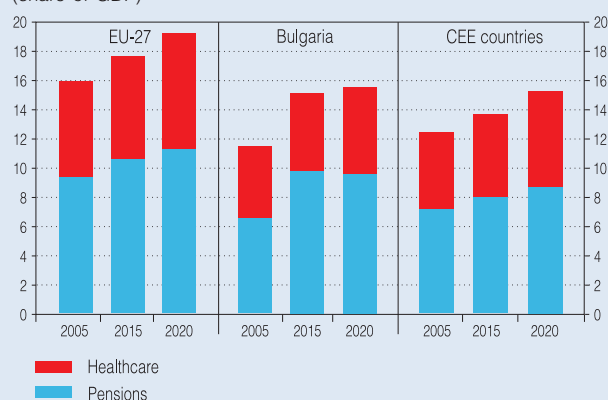
Pensions

Source: Eurostat.

Chart 15. Social Contributions Revenue

(share of GDP)

Social security contributions paid by an employer

Social security contributions paid by a worker

Source: Eurostat.

pension and healthcare expenditure, fell slightly in Bulgaria, while the overall EU and Central and Eastern European countries registered an increase (Chart 15). Income from social security contributions is not sufficient for the maintenance of social systems in any of the groups of countries under consideration, but this shortfall is strongly expressed in Bulgaria which is characterised by the most negative demographic trends.

In the medium term, it can be expected that demographic processes will further increase the tax wedge on labour[40] in a context of underfunding of the pension system. This in turn can lead to a deterioration of the competitiveness of the Bulgarian economy and a decrease in its long-term growth potential. In the longer term, the ageing of the population will be a factor for increasing transfers from the state budget to the budgets of the State Social Security and the National Health Insurance Fund (NHIF). In the period after 2027 and 2029, when the pensionable years required for entitlement to a pension for men and women cease to rise, and the retirement age for men ceases to rise, respectively, the negative fiscal effects on the pension system will intensify. Also in 2037, the required retirement age for women also ceases to increase, thus the ratio between the number of pensioners and the number of insured persons would deteriorate further. The rising share of elderly people in Bulgaria will also result in increased healthcare expenditure of the state[41]. According to the European Commission's 2021 Ageing Report, total public expenditure related to the population ageing in Bulgaria will grow by between 2.1 and 4.1 percentage points of GDP in 2070 compared to 2019. At the same time, the projected decline of the labour force in Bulgaria by just below 1 million and 300 thousand people in the period 2019–2070 will significantly reduce the tax-insurance base of budget revenue. Possible financing of the social system with excessive accumulation of public debt will pose additional risks to the fiscal sustainability of the country. The rapid increase in the speed and amount of assuming public debt will in turn limit the public sector's response in case of significant macroeconomic shocks.

Effects on Inflation

Demographic processes affect inflation through various channels, including changes in relative prices of production factors, changes in household consumption and saving preferences and effects on potential economic growth and fiscal and monetary policies (Anderson and co-authors, 2014[42]). Across different channels, the effects of negative demographic developments can both amplify and weaken the pressure to rise consumer prices, with the net effect depending on the specific structural characteristics of the economy.

Some empirical studies have found a negative correlation between population ageing and core inflation. According to these studies, the negative impact on inflation is the result of weaker aggregate demand due to an ageing population, as well as of the growing political influence of older cohorts in defining economic policies and the redistributive role of the state. On the demand side, population ageing affects inflation in the country due to changes in consumer habits. Older cohorts spend more in relative terms than younger cohorts on services, namely healthcare and long-term care, and housing costs for utilities and maintenance, and less on transport, durable goods and clothing (Bodnar and Nerlich, 2022[43]). Prices of these services are largely regulated, making them more rigid *vis-à-vis* higher demand. As a result, the ageing population can have a limiting effect on price increases in the economy (Bodnar and Nerlich, 2022). Anderson and co-authors (2014) found a

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[40] Minimum and maximum social security thresholds are considered, which are set administratively, on the basis of a political decision and directly affect corporations' costs.

[41] According to Article 40, paragraph 1, item 4 of the Health Insurance Law, health insurance contributions for pensioners by the State Social Security or by a professional pension fund are paid on the basis of the amount of the pension or the sum of the pensions, excluding allowances thereto, and are charged to the state budget.

[42] Anderson, D., D. Botman, B. Hunt (2014), Is Japan's Population Aging Deflationary?, *IMF Working Paper No 14/139*.

[43] Bodnar, K., C. Nerlich, 2022, The macroeconomic and fiscal impact of population ageing, *ECB Occasional Paper Series*, No 296.

negative correlation between adverse demographic processes and inflation mainly as a result of lower GDP growth. Bobeica and co-authors (2017[44]) empirically confirm the negative correlation between population ageing and inflation for Germany, the US and the euro area. According to the authors, findings could be explained by the so-called secular stagnation hypothesis[45] under which population ageing leads to a relatively higher increase in aggregate savings than investment.

According to Bullard and co-authors (2012[46]), population ageing leads to persistently lower inflation due to political factors. According to them, as a result of demographic processes, the elderly population becomes the main group of voters. Since adult cohorts rely heavily on their savings for consumption, they prefer low inflation rates. Preferences of the dominant group of voters, in turn, influence the redistributive policy of governments, with inflation having the character of a tool for redistributing resources in the society.

Another part of empirical studies supports the thesis that the population decline and ageing lead to higher inflation. These results are mainly explained by the life cycle hypothesis (Juselius and Takats, 2015[47]; Bodnar and Nerlich, 2022). It has been found that the relationship between the demographic structure and inflation follows a U-shaped relationship: the relatively higher share of dependent young and elderly persons is likely to have an inflationary impact, while the relatively higher proportion of the working-age population is considered to have a disinflationary effect (Bodnar and Nerlich, 2022; Goodhart, C. and M. Pradhan, 2020[48]). The reason for this is that dependents (young and old) consume but do not contribute to the production process, while an ageing population can lead to a shortage of labour supply, thereby depressing the potential output of the economy. If an ageing population is dominated by a low birth rate and a declining share of young people, whereas labour supply is stable or even growing, as seen in the euro area over the past two decades, the impact is usually disinflationary (Bodnar and Nerlich, 2022). By contrast, once the labour force starts to shrink and the share of old age dependents to total population rises more strongly, the disinflationary effects become pro-inflationary (Bodnar and Nerlich, 2022). The shrinking working-age population creates an inflationary pressure also in terms of wage rises as a result of labour shortages, which further reinforces pro-inflationary effects.

In the case of Bulgaria, there is already a materialisation of pro-inflationary effects of labour shortages due to negative demographic developments. According to NSI data, the share of enterprises in Bulgaria that point to labour shortages as a factor that hinders their activity increased steadily in all sectors of the economy in the period 2014–2019 (Chart 16). Although the COVID-19 spread has temporarily halted this trend, since the summer of 2020, this share has started to rise again and continues to rise at rapid rates in the first half of 2022 as well, approaching its historical peak. The limited supply of labour has put an upward pressure on wages, and their growth in recent years has outpaced that of labour productivity. As a result, the share of compensation of employees in value added in Bulgaria increased from below 40 per cent in 2008 to 52.3 per cent in 2021, thus not only reaching the corresponding share in the other Central and Eastern European countries, but also slightly exceeding it at the end of the period (Chart 17). This suggests that the wage costs of enterprises are becoming an increasingly significant component of the total production costs in Bulgaria, and thus their increase in order to attract staff is more likely to be passed on from enterprises to final consumer prices.

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[44] Bobeica, E., C. Nickel, E. Lis, Y. Sun (2017), Demographics and Inflation, *ECB Working Paper No 2006*.

[45] The secular stagnation hypothesis suggests that the post-World War II period, characterised by high birth rates, has stimulated capital accumulation, the rise of labour force and savings. At the retirement of this generation, there was a greater abundance of capital than labour, which led to a decrease in the marginal product of capital.

[46] Bullard, J., C. Garriga, C. J. Waller (2012), Demographics, Redistribution, and Optimal Inflation, *Federal Reserve Bank of St. Luis Review*, 94(6), pp. 419–439.

[47] Juselius, M., E. Takats (2015), Can Demography Affect Inflation and Monetary Policy?, *BIS Working Paper* No 485.

[48] Goodhart, C., M. Pradhan (2020), The Great Demographic Reversal: Aging Societies, Waning Inequality, and an Inflation Revival.

Topical Research and Highlights

Chart 16. Enterprises Experiencing Labour Shortages in Bulgaria

(percentage of enterprises)

Total
Services
Construction
Manufacturing
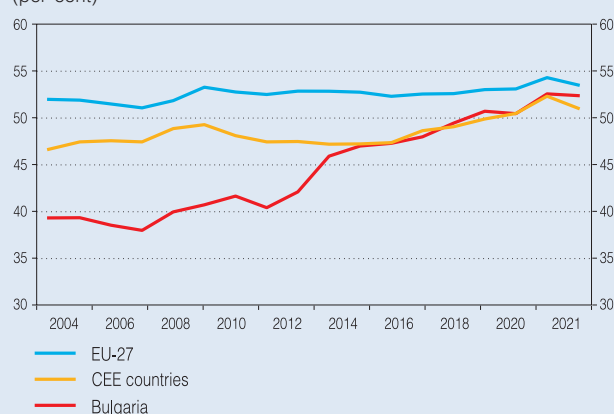Trade
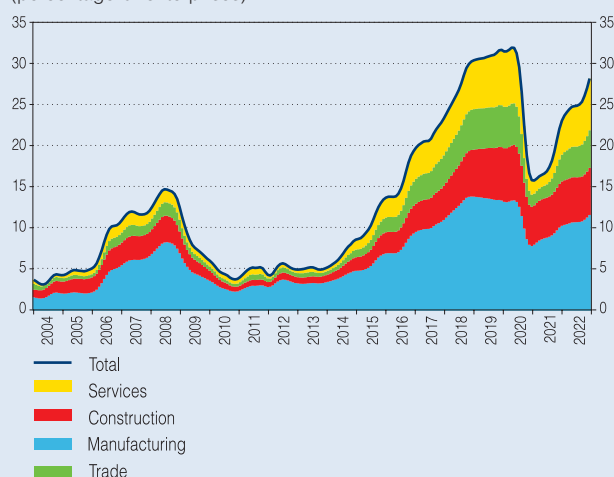
Source: the NSI, BNB calculations.

Chart 17. The Share of Compensation of Employees in Gross Value Added

(per cent)

EU-27
CEE countries
Bulgaria

Source: Eurostat, BNB calculations.

As a result of the historical development and trends for Bulgaria, it can be expected that demographic processes will have a rather pro-inflationary effect in the medium and long term, mainly through the limited labour supply.

Conclusion

In conclusion, described channels of impact of the population ageing and decline, as well as the descriptive analysis for Bulgaria show that demographic processes already have a negative impact on economic activity of the country, while creating risks to the sustainability of public finances. Labour shortages put pressure for wage growth ahead of labour productivity, which creates upward pressures on final consumer prices in the country, while lowering the price competitiveness of the Bulgarian firms in international markets. In the absence of measures to address labour supply constraints, it could be expected that adverse demographic developments will continue to have a pro-inflationary impact over the medium and long-term horizon. In addition, demographic processes in Bulgaria are expected to have a strong negative effect on the country's economic growth through the decline of the working-age population, lower labour productivity that can be expected as a result of the population ageing and the negative effects on exports due to the worsening price competitiveness. Under a hypothesis of unchanged policies, a further increase in the State Social Security deficit can be expected, which poses a significant risk to the sustainability of Bulgaria's public finances in the medium and long term.