

Population Dynamics, Macroeconomic Risks, and the Future of Pensions in Finland

Arto Kovanen¹

¹ Kovanen Macroeconomic Policy Advising, L.L.C., USA

Correspondence: Arto Kovanen, Principal, Kovanen Macroeconomic Policy Advising, Alexandria, VA, USA.

Received: March 15, 2022

Accepted: April 15, 2022

Available online: April 18, 2022

doi:10.11114/aef.v9i2.5533

URL: <https://doi.org/10.11114/aef.v9i2.5533>

Abstract

The hybrid pay-as-you-go system currently in use in Finland could become increasingly untenable in the longer run, should macroeconomic developments turn out weaker than expected. Unfavorable population trends would amplify the effects of adverse macroeconomic shocks on the Finnish pension system and its financial health. Although Finnish government has demonstrated willingness to respond to challenges facing the pension system and has been successful in building consensus for necessary pension reforms, a more strategic approach would serve policymakers and retirees (current and future) better in the longer run. This study focuses on risks to productivity and investment returns and how they would impact the longer-term health of the Finnish pension system, given unfavorable population dynamics. In order to protect the longer-term finances of the pension system, government should transition away from the pay-as-you-go model to an arrangement where pensions are fully funded from investment returns instead of being dependent on the contributions of current working-age population. We suggest alternative options to achieve that but at the same time emphasize that the authorities need to be mindful of burden-sharing between workers and pensioners in their considerations, as pension cuts would hurt retirees while contribution rates are already quite high.

Keywords: pensions, pension financing, investment returns, population ageing, employment, productivity

JEL Classifications: H55 (Social security and public pensions)

E6 (Macroeconomic policy and aspects of public finance, and general outlook)

1. Introduction

At the end of 2020, 1.6 million individuals, representing 30 percent of Finland's population, received some form of pension. Two-thirds of the pensions were earnings-related, while other pensions were granted, partially or fully, on terms that were not based on earnings (such as old-age and disability pensions). Earnings-related pension outlays were 29.7 billion euros in 2020. Other pension outlays totaled 3.6 billion euros. All pension outlays represented 14.4 percent of Finland's gross domestic product (GDP) in 2020.

Current pension system in Finland is a hybrid pay-as-you-go system where both existing contributions from current employees and employers and investment returns on pension investments are used to finance current pension outlays. Figure 1 shows the evolution of pension outlays since the 1970s and illustrates a relatively fast transition from a system dominated by government-funded, resident-based pension system to the system in use today where about 90 percent of pension outlays are linked to earnings and financed by earning-related contributions. However, despite the dramatic reallocation of the fiscal burden from government to employees and employers, Finnish pension system still remains largely as a pay-as-you-go arrangement where only a relatively small portion of pension outlays is financed from investment returns. Dependency on current contributions to pay for pension outlays represents a vulnerability for the pension system's longer-term financial health and is directly impacted by the country's adverse population trends (shrinking total population, declining labor force and rapid ageing) and macroeconomic developments.

How pension assets are invested plays a critical role in the financing of pension expenditures where the size of pension assets and their composition vary greatly across countries. According to Organization for Economic Co-operation and Development (OECD, 2021), the pension assets of OECD member countries exceeded USD 35 trillion at the end of 2020, representing two-thirds of these countries' combined GDP. In a few countries, pension assets exceeded their

respective GDP in 2020 (the Netherlands (210 percent), Iceland (194 percent), Switzerland (149 percent), Australia (129 percent) and the United Kingdom (119 percent)), according to OECD. On the other hand, pension assets were relatively limited in Austria (7 percent), France (3 percent), Germany (8 percent), and Sweden (4 percent). However, limited asset levels in some countries do not yield a complete picture because many countries have other vehicles that are being used to accumulate pension savings (e.g., provisions in employers' books, pension insurance contracts, and vehicles managed by banks, investment firms, and other entities). When these are accounted for, Denmark has the highest level of pension assets relative to GDP (239 percent), according to OECD. Among OECD countries, pension assets were primarily invested in equities and bonds, which at the end of 2020 represented three-quarters of the total. Equity investments represented a substantial portion of pension assets in some countries, such as Poland and Lithuania, whereas pension assets were more evenly distributed between equity and bond holdings in other countries. See also OECD (2019), which examines pension legislations among OECD countries.

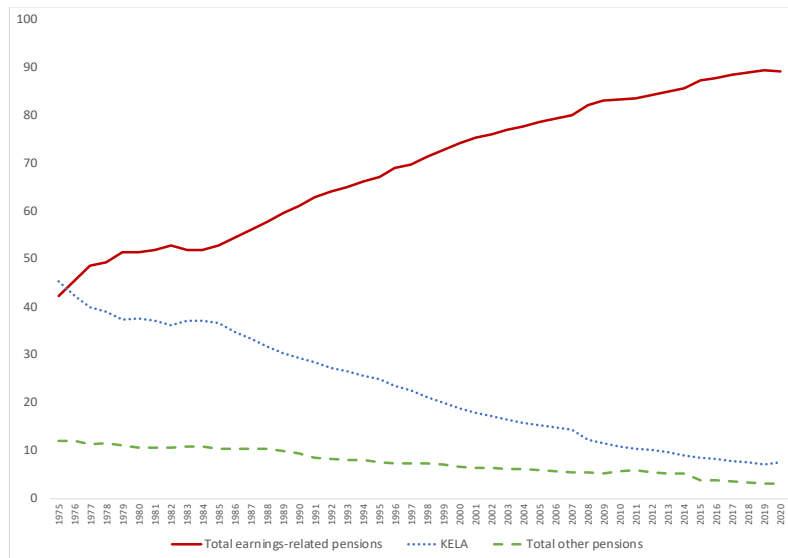


Figure 1. Total pension outlays by pension type in Finland (1975–2020)
(In percent of total pension expenditures)

Sources: Social Insurance Institution of Finland (Kansaneläkelaitos, KELA) and the author.

Unfavorable demographics (rapid ageing and declining population) are challenging Finland's pension system and its long-term health. Given these trends, not only in Finland but around the world, difficult policy decisions are needed to safeguard the sustainability of old-age pension systems. A particular constrain for Finland is the limited size of the pension assets, which were less than 100 percent of GDP at the end of 2020. In the pay-as-you-go system pension financing relies heavily on the contributions from current employees and employers. According to the Finnish Centre for Pensions (Eläketurvakeskus, 2021), Finland's pension assets returned 10 billion euros in 2020. Of this amount, 6 billion euros were allocated to pay for current pension outlays, which represented about one-fifth of the total outlays, while 4 billion euros were reinvested (Hägele & Kesälä 2021, provide further details about the funding of Finnish pensions).

Over the years, Finnish authorities have demonstrated remarkable willingness to modify the national pension system and review the parameters of the system in response to demographic changes and other developments. More extensive changes to the national pension system have been done less frequently, most recently in 2017. The national pension system, which covers the entire population, was created in 1939. Initially the earnings-related pension system provided benefits to some workers who had reached a certain age and in the case of disability. As the society changed, pensions, their conditions, benefits and their financing were amended. The coverage was extended to several directions in the subsequent period and retirement was made more flexible and portable. The earnings-related pension system covering all employees became effective in 1962. The current pension system is based on reforms that started in 2005, which, among other things, unified the rules covering all earnings-related pension schemes. A guaranteed minimum pension was introduced in 2011 (as a general rule, workers accumulate pension rights at 1.5 percent rate of their earnings). The accrual of pensions was extended to periods of unemployment, childcare, sick leave and studying in the 2017 pension reform, which also linked retirement to life expectancy (i.e., the retirement age rises for younger generations due to higher projected life expectancy) (Note 1). The accruals of pension rights are indexed to wages and consumer prices with 80/20 weights, respectively, during working years. Following retirement, pensions are adjusted to wages and

consumer prices with 20/80 weights. Further details about pension reforms and the pension system are available on the website of the Finnish Centre for Pensions (www.etk.fi).

2. Literature Review and the Plan of Study

Recent studies have explored the Finnish pension system, its policy design and financing. Valkonen (2020) highlights several longer-term issues for the Finnish pension system and notes that the main challenges for the Finnish pension system include population ageing and declining fertility, low growth of employment and wages, and return to pension investments. These developments are critical for the longer-term health of the Finnish pension system. Sorsa and Swan (2021) evaluate the longer-term stability of the Finnish pension system and credit the governance and institutional cultures in Finland for supporting the implementation of pension reforms. Lassila and Valkonen (2018) examine the longevity adjustment that was introduced for pensions in 2017 (i.e., younger generations have higher retirement age, which effectively forces them to remain in the labor force longer). The authors conclude that longer working lives might not be sufficient alone to finance higher expenditures associated with longer life spans and ageing. Nivalainen, Tenhunen, and Jännefelt (2020) review recent pension reforms in Finland. They note that the 2005 pension reform emphasized individual choice (i.e., provided “carrots”), by offering financial incentives to pensioners to encourage them to stay in the labor force longer while simultaneously allowing more flexibility in the retirement age (ranging from 63 to 68 years of age, compared to the 65-year fixed limit prior to the 2005 reform). On the other hand, the 2017 pension reform relied more on mandates (“sticks”), by increasing the minimum age of eligibility for old-age pension and linking it to individual’s life expectancy, while modifying accrual rates for pensions. The authors conclude that the 2005 pension reform failed to encourage people to remain employed for longer. By raising the age-eligibility of retirement and forcing people to retire later, the authors are hopeful that the 2017 reform could be more successful in achieving its intended goals. Barr (2013) underscores that pension systems often have multiple objectives (such as consumption smoothing over lifetime, insurance, redistribution and poverty relief), which may be difficult to achieve at the same time. The author cautions that transitioning from the pay-as-you-go pension system to a framework where pensions are funded from investment returns may not be welfare improving, once costs, risks, and distributional effects are accounted for.

The Finnish Centre for Pensions produces longer-term projections for the Finnish pension system on regular intervals, spanning 60–70 years into the future, which inform the policymakers, as well as the public, about possible trends in pension outlays, levels of benefits and their financing. The latest report was published in February 2019 (authored by Tikanmäki et al., 2019). Population forecasts are extended from the projections prepared by Statistics Finland until 2085. For the purpose of analyzing future pension outlays and their financing, the authors make assumptions about employment, labor market participation rates and retirement ages, among others, and incorporate approved legislative changes into their forecasts of future pension trends. Forecasting macroeconomic developments is essential for the projections of earnings (productivity), inflation, and return to pension investments. Tikanmäki et al. (2019) notes that unfavorable demographics place upward pressure on the contribution rates, which need to rise substantially in the second half of the forecasted period (Note 2).

Labor productivity plays a crucial role in the longer-term determination of pensions and funding because productivity affects earnings growth, contributions, and pension levels. Recent studies highlight the challenges Finland faces in maintaining high productivity growth. Fornaro, Kuosmanen, Kuosmanen, and Maczulskij (2021) analyze the impact of labor and capital reallocation and structural changes on labor productivity using industry-level data for 2000–2018 and several decomposition techniques. The authors underscore the high degree of variations in productivity between industries and across decomposition methods. They argue that reallocation of resources within individual firms is the main driver of aggregate productivity, particularly during economic upturns. During recessions, the reallocation of resources between firms becomes more important, driven in part by creative destruction. The impact of structural changes on labor productivity has been generally negative in Finland and inefficiencies in the reallocation of resources between industries have contributed to the low productivity. André and Chalaux (2016) point out that technological innovations, the introduction of new business models and improved allocation of resources were the main drivers of total factor productivity in Finland prior to the Global Financial Crisis. They argue that slowdown in productivity after the Global Financial Crisis has also affected competitiveness, as slower productivity has not been matched by slower earnings growth. Increased research spending, reform of the tax system, and removal of obstacles that discourage productivity improvements are needed by enhance productivity. See also OECD (2020).

The current study contributes to the research of the Finnish pension system by examining the implications of adverse macroeconomic shocks for the health of the Finnish pension system. Finnish pension system might be capable of weathering the anticipated demographic changes with minor modifications in the rules and contribution rates affecting the pension system, provided that macroeconomic developments remain supportive. Weaker macroeconomic trends, as suggested by historical outcomes, would make it more difficult to withstand the combination of shocks (adverse

demographics and macroeconomic trends) without a comprehensive reform of the pension system.

Tikanmäki et al. (2019) provide a useful point of entry for our analysis. We take the population assumptions used in their report as given since we do not have resources to develop our own projections. In the baseline scenario, we also incorporate the macroeconomic assumptions used in their report, which allows us to reproduce the baseline projections in Tikanmäki et al. (2019). After establishing the baseline scenario, we analyze two alternative scenarios, which enable us to assess how the Finnish pension system would respond to adverse macroeconomic developments not considered in Tikanmäki et al. (2019). These scenarios point to more profound weaknesses in the Finnish pension system in response to adverse macroeconomic developments. See Appendix for the details of data and projections.

The study has been organized as follows. Section 3 reviews population trends globally, which provide an illustration of worldwide trends in ageing and population decline, including in Finland. Section 4 discusses longer-term population trends in Finland where we use the population projections in Tikanmäki et al. (2019). In this section, we also discuss assumptions in our baseline scenario for earnings, pension outlays and investment returns, which are identical to the baseline in Tikanmäki et al. (2019) (discussed in Section 4 of their report). However, our baseline differs from Tikanmäki et al. (2019) due to the inclusion of more up-to-date data (until year 2020) and rebasing of the projections to reflect newer data. Section 5 is the main section of our study. It analyzes the effects of macroeconomic shocks on pensions and the sustainability of pension funding, drawing on Finland's historical outcomes. We demonstrate that historical trends during the past 10- and 20-year periods point to weaker longer-term outcomes than suggested in Tikanmäki et al. (2019), in particular for productivity growth, which has stagnated since the Global Financial Crisis. Weaker macroeconomic developments are aggravated by unfavorable population trends (in particular, the projected decline in employment levels, which accelerates towards the end of the forecasted period). In Section 6, we examine possible policy options to strengthen the longer-term financial health of the Finnish pension system. We suggest that the Finnish government should dismantle the current pay-as-you-go system and eliminate the dependency of pension payments on employees and employers' contributions. Section 7 concludes the study.

3. Population Dynamics

3.1 Global Population Trends

World's population is getting older, everywhere. This is not unique to Finland, but common to advanced, emerging and developing countries (Figure 2). According to OECD (Note 3), ageing trend is most apparent in Japan where more than one quarter of the population is currently 65 years or older. A comparable figure for Japan was just 5 percent in 1955, which illustrates how rapid demographic change has been in Japan. A similar trend, albeit less dramatic, is also taking place in the European Union (EU-27) countries where one-fifth of EU's population is already 65 years or older. Finland has followed the EU trend, but recently the share of elderly in Finland has expanded faster and is presently 2.5 percentage points higher than the EU-27 average. In the neighboring Sweden, the share of elderly population has stabilized, possibly due to immigration and the resulting higher fertility rate (Figure 3). The share of elderly population in the United States is rising, but it remains slightly below the average for the OECD countries (Note 4).

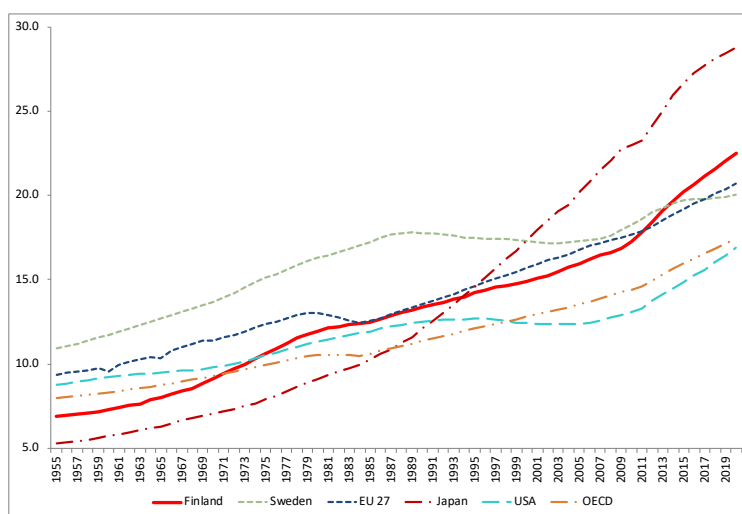


Figure 2. Elderly population in selected countries (1955–2020)
(Percent of total population)

Sources: OECD and the author.

Both declining fertility and lower old-age mortality are contributing to longer average life spans and ageing. Fertility rates have fallen across countries (Figure 3). In advanced countries fertility rates have been below replacement rates (i.e., less than 2) for some time, but fertility rates are also falling among emerging market countries and are nowadays closer to those in advanced countries in Europe and North America. For instance, the average number of children in China was 5.8 in the 1960s but it has fallen to 1.7 in 2019 where it has stayed since the mid-1990s. While China's "one child" policy contributed to the rapid decline in the fertility rate from the 1960s to mid-1990s, a similar, albeit more gradual downward trend is apparent in India, which did not adopt the "one child" policy. In 1960, at 5.9, fertility rate in India was comparable to China's fertility rate, but it has fallen to 2.2 in 2019. Similar trends are also evident in other emerging market countries (e.g., South Korea, Mexico, Brazil, and Saudi Arabia). The fertility rate in Finland was 2.7 in 1960. It stabilized around 1.7 during the 1970s, after a sharp decline following the post-Second World War "baby boom". In 2020, it had fallen to 1.4, which is similar to Japan's fertility rate, but lower than in Sweden and the average for EU and OECD countries.

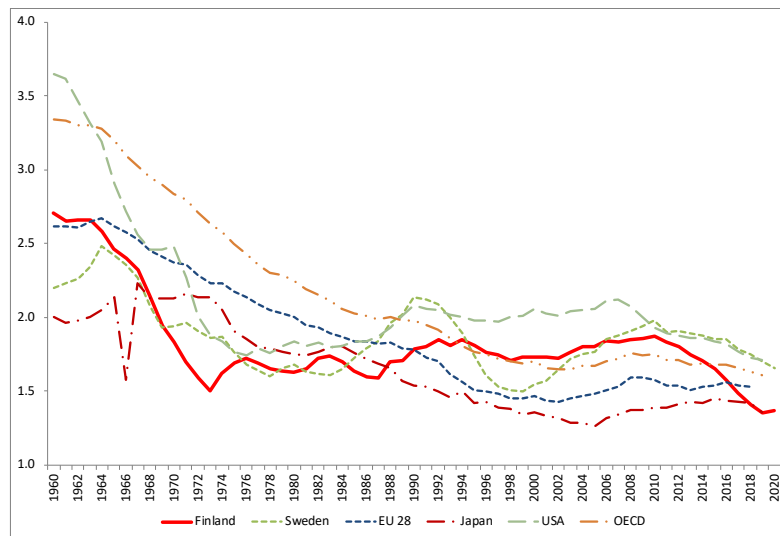


Figure 3. Fertility rates in selected countries (1960–2020)
(Number of children per women)

Sources: OECD and the author.

Falling fertility rates affect the share of youth population, which eventually limits the growth of the working-age population (defined as individuals between 15 and 64 years of age). The share of working-age population has been on a downward trend in recent years in advanced and many emerging market countries (Figure 4). Because of its starkly different demographics, Japan has seen the sharpest decline in its share of working-age population, which nowadays is less than 60 percent. This is 10 percentage points lower than in the 1980s and at the level in the beginning of the 1950s, albeit for different reasons (Note 5). Finland and Sweden have experienced much sharper declines in their working-age populations than other EU and OECD countries. In Finland, working age population peaked at 68 percent in mid-1980s and was 61.8 percent in 2020, which is at the level not seen since the 1950s. The decline in the working-age population in Finland has accelerated since 2009 when the share was around 66.5 percent and similar to the levels in other OECD countries, including the United States. The share of working-age population in China has declined for some time and was 70.3 percent in 2020. In India, on the other hand, the share of working age population continues to rise, reflecting a smoother trend decline in fertility, as mentioned earlier, and India's sizeable youth population. In 2020, it was 67.3 percent.

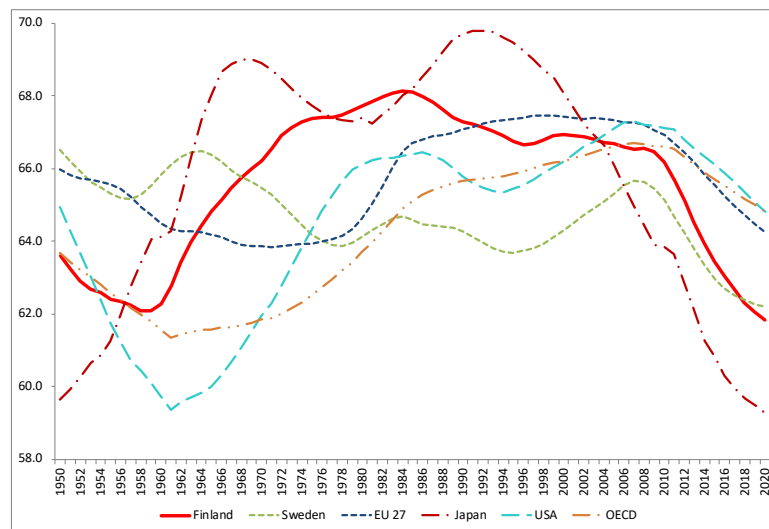


Figure 4. Working-age population in selected countries (1950–2020) (Percent of total population)

Sources: OECD and the author.

3.2 Future Population Trends in Finland

Figure 5 shows possible future trajectories for various population groups in Finland. Historical data for period 1865–2020 are from Statistics Finland while future projections are generated from Tikanmäki et al. (2019) where population projections are extended until 2085 (differences to our projections are due to updated data and rebasing). Consistent with the trends already evident in Finnish data, the share of youth population (defined as individuals below 15 years of age) is projected to fall further in the future. The youth population peaked at 1.35 million in 1959, which at the time represented 30 percent of Finland's population (green dotted line in Figure 5). By 2020, which is the latest actual data point, youth population had already fallen to 0.87 million (to 15.7 percent of total population). The projections suggest that youth population would fall to 0.58 million by 2085, representing only 11.3 percent of the total population, which is below the share of youth population in Japan in 2020.

Another notable trend in Finland's population dynamics concerns the working-age population (individuals between 15 and 64 years of age), which peaked at 3.55 million in 2009 (representing about two-thirds of the population) but has fallen to 2.42 million in 2020 (blue dashed line in Figure 5). Working-age population is projected to decline during the forecasted period by an additional 0.67 million compared to the level in 2020 and accelerate towards the end. In 2085, working-age population is expected to total 2.74 million and represent only 53.4 percent of Finland's population. This is an important development, which influences employment and earnings, and have ramifications for the financing of pensions. Employment as a share of working-age population is projected to rise during the forecasted period, provided that government policies are successful in encouraging employment growth while individuals postpone their retirements and stay longer in the labor force (in part, facilitated by the 2017 pension reform where life expectancy raises individual's retirement age and forces people to stay in the work force longer). In 2009, about 62.1 percent of the working-age population was employed (equal to 2.2 million), which increased to 67.9 percent by 2020 (2.3 million). Employment as the share of working-age population is projected to rise to 72.3 percent by 2085 (at that point, almost 2 million individuals would be employed, which is still less than in 2020), provided that macroeconomic developments remain supportive.

As the population of Finland becomes older, the share of individuals 65 years and older naturally rises both in absolute and relative terms. In 2020, about 1.26 million were at least 65 years old, representing 22.7 percent of the population. Elderly population would expand to 1.81 million by 2085 and represent 35.3 percent of total population (red dotted line in Figure 5). It is worth pointing out that towards the end of the forecasted period, elderly population is projected to start shrinking in absolute terms, due to fall in the working-age population that would effectively limit the number of individuals entering retirement. The envisioned increase in the elderly population is substantial compared to the current levels (the increase is almost 13 percentage points). Although the Finnish government has steadily raised the minimum retirement age and expects that individuals postpone their retirement (as mentioned above), the number of people qualified for retirement would still rise due to ageing of the population (red solid line in Figure 5). As some retirement options are not tied to the age of individuals (e.g., disability and other early-pension schemes), the number of individuals who are classified as retired (red solid line) continue to exceed the number of individuals who are at least 65 years of age (red dotted line). The projections suggest that this would continue to be the case in the future, albeit the

difference between retired and elderly population is expected to narrow during the forecasted period. At the end of the forecasted period, the total number of retired and employed people would be almost identical and together represent three-quarters of the total population of Finland in 2085. This is a remarkable outcome, which is projected to take place during a relative short period of time (twice as many people were employed than retired in 1980, which means that the old-age service ratio (the ratio of employed to retired) would be halved within a century).

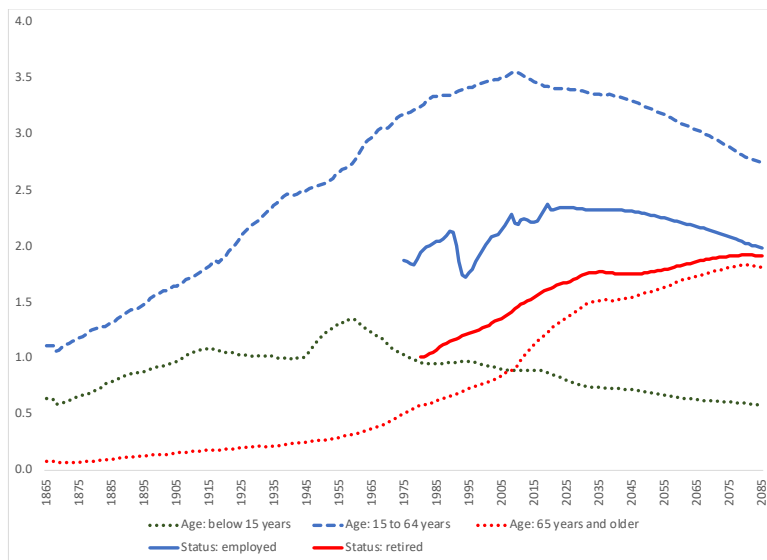


Figure 5. Actual and projected population trends in Finland (1865–2085)

(In millions; projections from 2021 onwards are rebased from Tikanmäki et al., 2019)

Sources: Statistics Finland, Tikanmäki et al. (2019), and the author.

Immigration is frequently mentioned as one of the instruments that would help realign future population trajectories, but so far immigration has not succeeded in making a meaningful impact. While the share of individuals with foreign backgrounds, as a percent of total population, has increased ten-fold during the past three decades (1990–2020), from 0.8 percent, to 8 percent or to 444 thousand in 2020 (according to Statistics Finland), higher immigration has provided a relatively limited contribution to the population growth (its contribution has risen from 0.15 percent in the 1990s to about 0.35 percent during the past decade; red dashed line in Figure 6). More importantly, immigration has merely offset the shrinking of the native (Finnish-born) population since 2014 (blue solid line in Figure 6). This suggests that more substantial immigration would be needed to make a meaningful dent in the longer-term population dynamics.

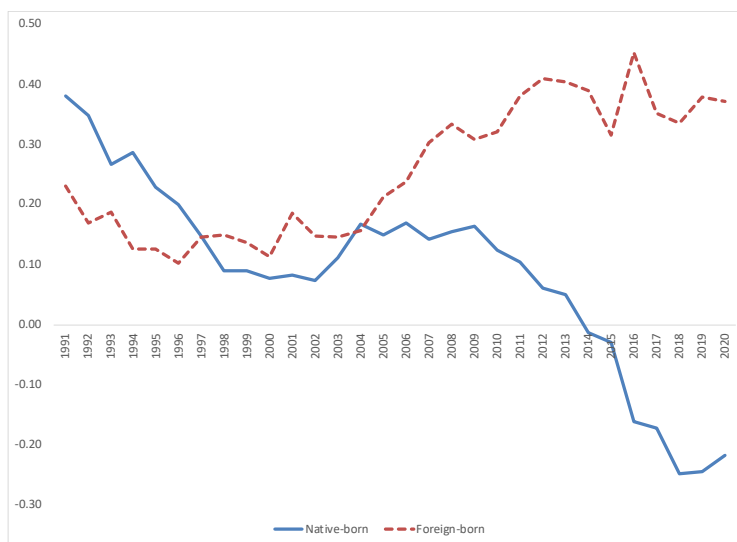


Figure 6. Contributions of natives and foreign-born to population growth in Finland (1991 – 2020)

(Changes as a percent of beginning-of-period population)

Sources: Statistics Finland and the author.

4. Baseline Projections

4.1 Projections for Population, Employment and Pensioners

Population projections are shown in Table 1 for the baseline scenario, encompassing total population, employment, and number of people receiving pensions (Note 6). As mentioned earlier, we take Tikanmäki et al. (2019) population projections as given. Differences are mainly due to rebasing and the incorporation of more recent actual data (data is updated to 2020) (Note 7).

Table 1. Projections for population, employment and pensioners (2020 – 2085, in millions of individuals)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Population (in millions)						
Current study (baseline)	5.53	5.58	5.60	5.56	5.40	5.14
Tikanmäki et al. 2019	5.54	5.59	5.61	5.57	5.41	5.15
Tikanmäki et al. 2016	5.60	5.69	5.77	5.89	6.02	6.07
Employment (in millions)						
Current study (baseline)	2.32	2.34	2.33	2.31	2.18	1.98
Tikanmäki et al. 2019	2.37	2.40	2.38	2.36	2.23	2.03
Tikanmäki et al. 2016	2.30	2.35	2.39	2.46	2.44	2.41
Pensioners (in million, all pensioners, residing in Finland and abroad)						
Current study (baseline)	1.62	1.67	1.74	1.75	1.86	1.90
Tikanmäki et al. 2019	1.50	1.56	1.62	1.63	1.73	1.78
Tikanmäki et al. 2016	1.50	1.55	1.62	1.64	1.78	1.87

Sources: Statistics Finland, Tikanmäki et al. (2016) and (2019), and the author.

The inherent difficulty in forecasting longer-term population trends is evident in Tikanmäki et al. (2019) where the authors have made notable reassessments of the population trends compared to Tikanmäki et al. (2016) during the forecasted period (for population, employment levels and the number of pensioners). The total population in 2085 in Tikanmäki et al. (2019) has been lowered by 0.92 million compared to Tikanmäki et al. (2016), which is a 15 percent fall in population. Instead of projecting Finland's population to stabilize at around 6 million people by the end of the forecasting period, as in Tikanmäki et al. (2016), Tikanmäki et al. (2019) assume that total population would begin to decline after 2030 and never reaches 6 million.

Population forecasts enable us to calculate the so-called service ratio, which we define as the ratio of working-age population to youth and elderly population. Our definition is more comprehensive than the definition in Tikanmäki et al. (2019), which is defined as old-age service ratio that compares working-age population to elderly population. We believe that our definition, by being broader, highlights better the burden assumed by the working-age population for the country's young and elderly, who depend on them. At 1.6 (i.e., there is 1.6 working-age individuals per youth and elderly), the actual ratio in 2020 is already much lower in Finland than in other advanced countries in Europe, including Sweden (Figure 7). The declining trend has been apparent in the Finnish data for some time where the service ratio peaked in mid-1980s at 2.14 (i.e., there were more than two workers for the young and elderly). The service ratio is projected to drop to 1.15 by 2085, which means that the ratio would be halved from its peak in about a century.

The service ratio is currently at the level it was in the early 1950s, but due to starkly different reasons. In the post-Second World War period, the low service ratio was due to the "baby boom" and a high birth rate (as shown in Figure 3), which led to the sizeable youth population, while the share of elderly in the population was low (Figure 2). In the subsequent period, this contributed to the favorable population dynamics where the service ratio rose rapidly as the youth entered the labor force and the birth rate fell. In Finland, this trend lasted until mid-1980s. In terms of funding for future pensions, it could be argued in hindsight that this period represented a golden but missed opportunity to accumulate pension assets ahead of the time when "baby boomers" got older and began entering retirement. The share of working-age population has declined since mid-1980s, first gradually but lately at an accelerated rate, leading to the current situation where the low service ratio reflects the high share of elderly population and low share of young (caused by rising longevity and low birth rate). In the absence of appropriate policy reforms to replenish the working-age population (e.g., through higher immigration or sustained increases in the birth rate, which have not materialized), unfavorable demographics would cause the service-ratio to decline further in the future and create a vicious circle for pension funding (i.e., a combination of rising pension outlays and falling funding base).

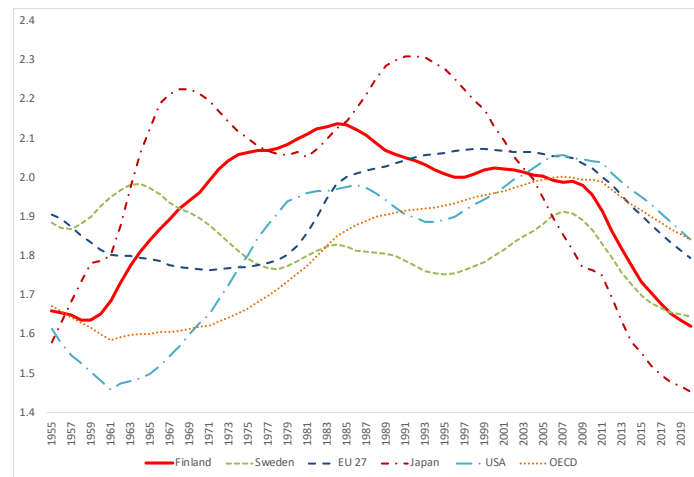


Figure 7. Service ratio in selected countries (1955–2020)
(Ratio of working-age population to youth and elderly population)

Sources: OECD and the author.

As the service ratio continues to decline in Finland, and possibly accelerates, as has happened in Japan, due to falling working-age population and increased longevity, it will have significant implications for the government’s ability to protect pensions and other public services. That is, a smaller working-age population is expected to assume a larger responsibility to absorb the burden of public services, which has implications for taxes and other contributions (e.g., social security and pension contributions). To limit the fiscal burden on the working-age population, while continuing to ensure adequate level of services to the young and elderly, government needs to be strategic and forward-looking in its decision-making. The Finnish pension system needs to find a way to accumulate adequate savings to finance future pension outlays rather than using the contributions of current working-age population to accomplish it. That is not the case at present and it represents a significant risk to the pension system and a policy challenge for the Finnish government, which we will analyze further below.

4.2 Macroeconomic Projections

Longer-term projections for the financial health of the Finnish pension system depend critically on macroeconomic developments during the forecasted period (in our analysis covering period 2021–2085). Key macroeconomic variable used in our study include inflation, output growth and productivity, earnings, pensions, and return to invested pension assets (Note 8). Our baseline scenario replicates the baseline scenario in Tikanmäki et al. (2019), which provides a useful reference point for our analysis. The baseline macroeconomic assumptions are listed in Table 2 and they are identical to Tikanmäki et al. (2019) baseline assumptions (except for 2020 where we have used more up-to-date data).

Table 2. Summary of key macroeconomic assumptions (2020–2085, baseline, annual change in percent)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Real GDP growth (annual percent)						
Current study (baseline)	-2.9	1.5	1.4	1.3	1.1	1.1
Tikanmäki et al. 2019	1.8	1.5	1.4	1.3	1.2	1.1
Tikanmäki et al. 2016	1.4	1.4	1.5	1.5	1.5	1.5
Inflation (annual percent)						
Current study (baseline)	0.3	1.7	1.7	1.7	1.7	1.7
Tikanmäki et al. 2019	1.7	1.7	1.7	1.7	1.7	1.7
Tikanmäki et al. 2016	1.6	1.7	1.7	1.7	1.7	1.7
Wage growth (average wage, 2017 prices, annual percent)						
Current study (baseline)	1.5	1.5	1.5	1.5	1.5	1.5
Tikanmäki et al. 2019	0.8	1.5	1.5	1.5	1.5	1.5
Tikanmäki et al. 2016	1.0	1.0	1.5	1.5	1.5	1.5
Pension growth (average pension, 2017 prices, annual percent)						
Current study (baseline)	2.6	1.0	0.8	1.0	1.4	1.4
Tikanmäki et al. 2019	0.9	1.0	0.8	1.0	1.4	1.4
Tikanmäki et al. 2016	1.1	1.0	0.8	1.0	1.4	1.4
Return to pension investment (nominal, annual percent)						
Current study (baseline)	4.2	4.2	5.3	5.3	5.3	5.3
Tikanmäki et al. 2019	4.2	4.2	5.3	5.3	5.3	5.3
Tikanmäki et al. 2016	4.6	4.6	5.3	5.3	5.3	5.3

Sources: Statistics Finland, Tikanmäki et al. (2016) and (2019), and the author.

The above macroeconomic projections enable us to calculate the levels and growth rates of earnings and pensions for the forecasted period. Figure 8 shows the projections for earnings and pensions in our baseline model, which overlap fully with the projections of Tikanmäki et al. (2019), except for the early years due to more up-to-date data. As shown in Figure 8, Tikanmäki et al. (2019) allow some fluctuation in the average wage growth from year to year around the 1.5 percent rate, which we keep fixed during the forecasted period (blue dotted line in Figure 8). This does not have significant implications for the longer-term projections. Tikanmäki et al. (2019) project pension outlays to grow at a slower rate than earnings until the middle of forecasted period, which enables the pension system to build reserves for the future periods (as earnings and pension contributions would grow faster than pensions). They explained it with the internal dynamics of the Finnish pension system, arising from the rapid ageing of population, rising retirement age and falling average pension relative to average wage (Section 4 of Tikanmäki et al., 2019). Furthermore, there are built-in “automatic adjustors” in the Finnish pension system, which modify the linkage between average pension and average wage growth over time (Mielonen, Risku, Vidlund, & Väänänen, 2020, compare “automatic adjustors” across selected countries). In Finland, the most important is the longevity multiplier, which discounts pension levels for future generations. Lowers pensions relative to wages is also driven by ageing of pensioners (as “baby boomers” become older), in part because the indexation of pensions to productivity is smaller for pensioners than for workers (as noted above). In the second half of the forecasted period, all pensions are projected to grow on average at the rate of productivity in both baseline scenario (as shown in Table 2). In our baseline scenario, we maintain these features in order to reproduce the baseline in Tikanmäki et al. (2019). We distinguish between average and earnings-related pensions in Figure 8, as is done in Tikanmäki et al. (2019), reflecting differences in the adjustment methodologies (e.g., unlike earnings-related pensions, old-age, disability and other statutory pension provisions of the government that provide minimum pensions for individuals despite their employment history, are adjusted for productivity and cost-of-living indexes separately from adjustments used for earnings-related pensions).

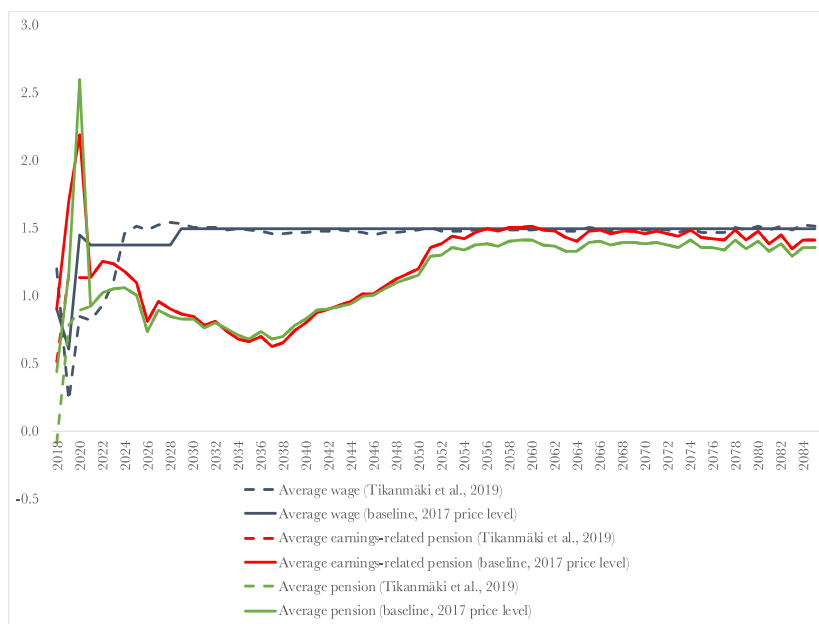


Figure 8. Projected growth rates of wages and pensions (period 2018 – 2085)
(In percent of annual change)

Sources: Statistics Finland, Tikanmäki et al. (2019) and the author.

Table 3 displays projections for wages and pensions using the above macroeconomic assumptions and compares them to the projections in Tikanmäki et al. (2016) and (2019). Differences between our projections and Tikanmäki et al. (2019) are marginal and due to more updated data and rebasing. All variables are reported in inflation-adjusted terms (indexed to the 2017 price level). We conclude that average inflation-adjusted pensions are projected to more than double during the forecasted period. Since inflation-adjusted average earnings are projected to grow even faster (Table 2), the proportion of average pension to average wage is expected to fall from about one-half to two-fifths (this in part reflects longer life expectancy of future retirees). However, the share of retirees increases from 35 percent in 2020 to 40 percent in 2085. Together with shrinking employment levels, pension outlays as a share of the wage bill would still rise towards the end of the forecasted period.

Table 3. Summary of key economic projections (2020–2085, baseline, levels in 2017 prices)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Wage bill (at 2017 prices, billions of euros)						
Current study (baseline)	90.6	98.0	104.5	129.7	164.5	201.8
Tikanmäki et al. 2019	91.2	97.7	104.9	129.9	164.5	201.6
Tikanmäki et al. 2016	89.9	98.5	108.1	140.3	188.0	251.2
Average wage (at 2017 prices, per month)						
Current study (baseline)	3,253	3,483	3,739	4,674	6,296	8,479
Tikanmäki et al. 2019	3,203	3,399	3,668	4,582	6,160	8,287
Tikanmäki et al. 2016	3,255	3,496	3,772	4,759	6,432	8,694
Pension outlays (at 2017 prices, all pensions, billions of euros)						
Current study (baseline)	32.5	35.3	38.2	43.5	59.6	80.3
Tikanmäki et al. 2019	31.6	34.4	37.2	42.5	58.2	78.5
Tikanmäki et al. 2016	33.0	35.9	39.0	45.0	63.5	88.9
Average pension (at 2017 prices, all pensions, per month)						
Current study (baseline)	1,674	1,760	1,834	2,070	2,677	3,516
Tikanmäki et al. 2019	1,756	1,838	1,913	2,167	2,799	3,679
Tikanmäki et al. 2016	1,829	1,930	2,011	2,288	2,970	3,956

Sources: Statistics Finland, Tikanmäki et al. (2016) and (2019), and the author.

4.3 Projections for Pension Funding

Table 4 incorporates the above macroeconomic and population projections into our baseline analysis of the Finnish earning-related pension system (this includes all earnings-related pensions, but not pensions that are not linked to the individual earnings, such as pensions paid by the Social Insurance Institution of Finland (Kansaneläkelaitos, KELA), special provision pensions, and voluntary supplementary pensions). This illustrates how changes in macroeconomic assumptions (to be discussed in the subsequent section) impact the dynamics of pension outlays and their finances.

Table 4. Baseline projections for all earnings-related pensions: funding and assets (2020–2085, various metrics)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (baseline)						
Inflows (% of wage bill)	39.7	38.5	40.8	42.0	46.2	48.0
Contribution rate (% of wage bill)	29.0	29.0	29.0	29.0	29.0	29.0
Investment returns (% of wage bill)	10.8	9.6	11.8	13.0	17.2	19.0
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-33.0	-30.2	-33.1	-36.9
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-14.8	-13.3	-10.2	-10.2
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	7.8	11.9	13.1	11.1
Excl. contributions (% of wage bill)	-21.2	-22.8	-21.2	-17.1	-15.9	-17.8
Assets December 31 of the year (% of GDP)	97.4	93.9	92.4	103.4	135.4	148.5

Sources: Statistics Finland, Tikanmäki et al. (2019) and the author.

Key conclusions from the baseline analyses are as follows. In the analysis, we have kept the contribution rate fixed at 29 percent of the wage bill (consistent with actual contribution rates in 2020, which were 24.6 percent for employees and employers and 4.4 percent for the government). Although pension contributions are linked to earnings, pension outlays are not directly linked to them (Finnish pension system is a defined-benefits scheme) or based on the returns to the invested pension assets (as is the case with defined-contribution systems, such as the Individual Retirement Accounts (IRAs) and employer-provided retirement accounts (401Ks) in the United States). Instead, pension outlays reflect annual adjustments in the earnings-related pension index and changes in the number of pensioners. Earnings-related pension outlays were 32 percent of the wage bill in 2020 (latest actual figure) and are projected to increase to 36.9 percent of the wage bill by 2085 in the baseline scenario (Table 4).

Investment returns are calculated using information about beginning-of-period assets acquired by the pension system on a rolling basis. The end-of-period assets are influenced by flows into the pension system (pension contributions and returns to pension investments) and outflows from the pension system (pension payments, transfers, and other net expenses; Table 2). Higher share of investment returns relative to the wage bill in Table 4 reflect rising nominal returns, as assumed in Tikanmäki et al. (2019), the growth of pension assets, and the shrinking of the wage bill. Pension assets are projected to rise from below 100 percent of GDP in 2020 to almost one and a half times Finland's GDP in 2085 in the baseline scenario (see line "Assets December 31 of the year" in Table 4). This is similar to the projections in Tikanmäki et al. (2019) where differences are largely due to differences in GDP, arising from the lower starting point in 2020 (see Appendix Figure A.1). Consequently, some build-up of invested assets is being envisioned in the longer-term

projections, provided that the macroeconomic and population projections materialize as expected. When investment returns are excluded, only limited progress is envisioned in reducing the dependency of pension outlays on pension contributions (i.e., one-half of the pension outlays would still be financed from pension contributions in 2085). This is an important outcome and underscored the continued exposure of the Finnish pension system to current contributions, which unfavorable population dynamics would exacerbate.

5. Sensitivity Analysis

Sensitivity to changes in macroeconomic developments is critical for the longer-term dynamics of the pension system, which Tikanmäki et al. (2019) quantify with two alternative scenarios (labeled as pessimistic and optimistic) (Note 9). Assumptions in their alternative scenarios are shown on the left-hand side of Table 5 for period 2029–2085. We believe that the longer-term macroeconomic assumptions for period 2029–2085 in Tikanmäki et al. (2019) are overly optimistic, even in their pessimistic scenario (Note 10). For the period until 2028, we continue to use baseline macroeconomic assumptions. Given available historical data (highlighted in the right-hand side of Table 5 for the past 10- and 20-year periods, each ending in 2020), more conservative assumptions are warranted, particularly related to labor productivity. We maintain the assumptions included in Tikanmäki et al. (2019) for the number of retirees, total employment, which is projected to fall 0.3 percent per annum (see the last line in Table 5 and Tikanmäki et al., 2019), and for returns to pension investment (we are unable to independently re-evaluate their projections). In our sensitivity analysis, we modify macroeconomic assumptions for productivity and inflation to reflect historical trends.

Table 5. Alternative macroeconomic assumptions (2029–2085, annual percentage changes)

	Tikanmäki et al. (2019) Scenarios (2029 - 2085)			Our Scenarios (2029 - 2085)		
	Baseline	Pessimistic	Optimistic	Baseline	Last 10 years	Last 20 years
Inflation (annual)	1.7	...	...	1.7	1.2	1.4
Productivity growth	1.5	1.0	2.0	1.5	0.1	0.5
Earnings growth (adj. for inflation)	1.5	1.0	2.0	1.5	0.1	0.5
Earnings growth (nominal)	3.2	...	...	3.2	1.3	1.9
Return to pension assets (adj. for inflation)	3.5	2.5	4.5	3.5	2.5	2.5
Return to pension assets (nominal)	5.3	...	...	5.3	3.7	3.9
GDP growth (real)	1.2	0.7	1.7	1.2	-0.2	0.2
Employment growth	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3

Sources: Tikanmäki et al. (2019) and the author.

We draw the following conclusions from Table 5. Past inflation performance has been somewhat lower than assumed in the baseline of Tikanmäki et al. (2019). On the other hand, Tikanmäki et al. (2019) overstate the rate of productivity growth by a wide margin in their assumptions, compared to the historical trends, which begs the question how higher productivity growth would be achieved in the future (see discussion in the literature review section)? What is assumed on productivity has implications for real earnings and pensions. Lower productivity growth reduces output growth (Appendix Figure A.1, and possibly employment and participation rate, which we have not accounted for). We use real returns for pension investments in the pessimistic scenario of Tikanmäki et al. (2019).

The two scenarios analyzed in Tikanmäki et al. (2019) differ in terms of productivity and wage growth and the return to pension investments (employment growth is identical in both scenarios, as shown in Table 5). It is worth pointing out that Tikanmäki et al. (2019) do not specify inflation assumptions in their alternative scenarios (shown in Table 5 as missing values). We modify inflation projections in our alternative scenarios, reflect historical data. The optimistic scenario in Tikanmäki et al. (2019), encompassing faster productivity and earnings growth and higher return on pension investments, would benefit pensioners and make the pension system financially more secure without the need for dramatic changes in the retirement system.

However, historical data suggest that more substantial downside risk cannot be ignored and therefore our alternative scenarios provide a useful contrast to Tikanmäki et al. (2019) for the ability of the Finnish pension system to sustain prolonged economic weaknesses. Past historical trends (for 10- and 20-year periods) suggest significantly different projections compared to the baseline scenario, which have implications for the pension system and its financial sustainability. Unfavorable population dynamics would aggravate the situation further.

Table 6 reports outcomes for two alternative scenarios, which highlight the implications of a weaker macroeconomic environment for longer-term pension funding (Table 5). We have kept the contribution rate unchanged to facilitate the comparison with the baseline scenario while we have adjusted average pension levels to reflect lower productivity and earnings growth (Note 11). Alternative macroeconomic assumptions and adjustments to the pension levels would

impact forecasts from period 2029 onwards (for period 2021–2028, we continue to use the baseline macroeconomic assumptions).

Both scenarios highlight the dramatic effects of adverse macroeconomic developments for the Finnish pension system. Due to population dynamics (i.e., higher number of retirees and lower employment), the ratio of pension outlays to the wage bill would rise rapidly in both scenarios. At the end of the forecasted period, the ratio would be 6 percentage points higher than in the baseline, which in terms of its size is comparable to the baseline scenario in Tikanmäki et al. (2019). Compared to the actual ratio in 2020, the ratio would be 11 percentage points higher, which is quite dramatic (Appendix Figure A.2). These results point to the need to increase the contribution rate in order to offset higher pension payments.

Because we keep the contribution rate constant in our alternative scenarios, increases in the pension outlays relative to the wage bill would lead to the accelerated depletion of pension system assets towards the end of the forecasted period (Appendix Figure A.3). As invested pension assets fall, reliance on contributions rises, which risks the financial health of the pension system. Whether weaker macroeconomic projections would materialize or not, they nonetheless underscore the need to examine their implications for the Finnish pension system to safeguard future pensions against such outcomes.

Table 6. Alternative projections for all earnings-related pensions: funding and assets (2020–2085, various metrics)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (historical 10 years)						
Inflows (% of wage bill)	39.7	38.5	37.5	37.6	37.0	31.4
Contribution rate (% of wage bill)	29.0	29.0	29.0	29.0	29.0	29.0
Investment returns (% of wage bill)	10.8	9.6	8.5	8.7	8.0	2.4
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-33.4	-33.9	-38.2	-43.0
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-14.7	-14.7	-17.8	-18.2
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	4.1	3.7	-1.2	-11.6
Excl. contributions (% of wage bill)	-21.2	-22.8	-24.9	-25.3	-30.2	-40.6
Assets December 31 of the year (% of GDP)	97.4	93.9	92.9	94.5	85.7	21.6
	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (historical 20 years)						
Inflows (% of wage bill)	39.7	38.5	37.8	37.4	35.5	29.0
Contribution rate (% of wage bill)	29.0	29.0	29.0	29.0	29.0	29.0
Investment returns (% of wage bill)	10.8	9.6	8.9	8.4	6.5	0.0
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-33.4	-33.9	-38.2	-43.0
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-14.8	-15.5	-23.1	-24.1
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	4.5	3.5	-2.7	-14.0
Excl. contributions (% of wage bill)	-21.2	-22.8	-24.5	-25.5	-31.7	-43.0
Assets December 31 of the year (% of GDP)	97.4	93.9	92.1	87.1	65.2	0.0

Sources: Tikanmäki et al. (2019) and the author.

Of course, some macroeconomic shocks are more important than others, and in the longer run, one “bad year” is not going to make a dent in the longer-term outlook, but prolonged, structural underperformance would cause problems. When examining the impact of alternative macroeconomic shocks to the baseline projections in isolation, we would conclude the following. Inflation in the baseline scenario, at 1.7 percent per annum during 2029–2085, is a bit higher than actual inflation during past 10- and 20-year periods (averaging 1.2 and 1.4 percent, respectively). In Table 7.a, we incorporate the historical 20-year inflation into the baseline scenario for 2029–2085 period while keeping all other assumptions as in the baseline analysis. Our impression is that errors in forecasting longer-term inflation trends would not impact qualitatively the forecast compared to the baseline.

Table 7. a. Sensitivity analysis for all earnings-related pensions: funding and assets (2020–2085, various metrics)
(Baseline scenario with 20-year historical inflation)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (baseline with historical 20 years inflation rate)						
Inflows (% of wage bill)	39.7	38.5	40.0	41.1	44.8	46.2
Contribution rate (% of wage bill)	29.0	29.0	29.0	29.0	29.0	29.0
Investment returns (% of wage bill)	10.8	9.6	11.0	12.1	15.8	17.2
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-33.0	-30.2	-33.1	-36.9
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-14.8	-13.4	-10.3	-10.3
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	7.1	10.9	11.7	9.4
Excl. contributions (% of wage bill)	-21.2	-22.8	-21.9	-18.0	-17.3	-19.6
Assets December 31 of the year (% of GDP)	97.4	93.9	92.3	102.6	133.1	143.6

Sources: Tikanmäki et al. (2019) and the author.

On the other hand, developments in productivity have more far-reaching consequences for the economy and pensions. Table 5 shows that productivity growth in Finland has been dismal for some time and significantly below the baseline projections. Lower productivity affects output and earnings growth, and consequently contributes to lower payments to the pension system (even if the contribution rate remains unchanged). We have adjusted the growth rate of average pension to equal the growth rate of earnings (both in inflation-adjusted terms). The implications of lower productivity growth are illustrated in Table 7.b. While maintaining the other macroeconomic assumptions as in the baseline, lower productivity growth would increase the share of pension outlays as a percent of the wage bill, for reasons discussed, and it would become harder for the pension system to protect its assets in the longer-term, which underscores the importance of maintaining conservative assumptions about productivity growth.

Table 7.b. Sensitivity analysis for all earnings-related pensions: funding and assets (2020–2085, various metrics)
(Baseline scenario with 20-year historical productivity growth)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (baseline with historical 20 year productivity growth)						
Inflows (% of wage bill)	39.7	38.5	40.9	42.5	44.7	42.2
Contribution rate (% of wage bill)	29.0	29.0	29.0	29.0	29.0	29.0
Investment returns (% of wage bill)	10.8	9.6	11.9	13.5	15.7	13.3
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-33.4	-33.9	-38.2	-43.0
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-14.7	-13.8	-12.8	-12.9
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	7.5	8.6	6.5	-0.8
Excl. contributions (% of wage bill)	-21.2	-22.8	-21.5	-20.4	-22.5	-29.7
Assets December 31 of the year (% of GDP)	97.4	93.9	94.0	106.3	122.2	100.8

Sources: Tikanmäki et al. (2019) and the author.

Lower returns to pension assets have significant implications for the longer-term sustainability of the pension system and its finances. While maintaining other assumptions of the baseline scenario (including for pension levels because investment returns only impact pension financing), lower returns on pension investments would dramatically weaken the financial health of the Finnish pension system, leading to financing shortfall and increased dependency on current contributions. As mentioned earlier, we do not have resources to adequately evaluate future returns for Finnish pension investments and therefore we use the pessimistic projections in Tikanmäki et al. (2019) for the inflation-adjusted returns in our alternative scenario (as shown in Table 5, inflation-adjusted return to pension fund investments is 2.5 percent annually, which is one percentage point lower than in the baseline). Uncertainty and volatility of investment returns make them inherently difficult to forecast. Even a small reduction in the long-term returns (in our example by a percentage point) has significant implications for the pension system and its longer-term sustainability (Table 7.c).

Table 7.c. Sensitivity analysis for all earnings-related pensions: funding and assets (2020–2085, various metrics)
(Baseline scenario with Tikanmäki et al. (2019) pessimistic asset returns)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (baseline with lower asset returns)						
Inflows (% of wage bill)	39.7	38.5	38.3	37.7	37.9	34.7
Contribution rate (% of wage bill)	29.0	29.0	29.0	29.0	29.0	29.0
Investment returns (% of wage bill)	10.8	9.6	9.3	8.7	8.9	5.7
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-33.0	-30.2	-33.1	-36.9
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-15.0	-15.1	-15.7	-15.9
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	5.4	7.6	4.8	-2.2
Excl. contributions (% of wage bill)	-21.2	-22.8	-23.6	-21.4	-24.1	-31.2
Assets December 31 of the year (% of GDP)	97.4	93.9	90.5	85.7	86.6	53.2

Sources: Tikanmäki et al. (2019) and the author.

It is clear that macroeconomic developments matter for the financial health of the Finnish pension system and therefore longer-term macroeconomic assumptions should be calibrated carefully. Some developments are more important than others. We have shown that lower productivity growth and investment returns have substantial consequences for the longer-term projections. There are other uncertainties we have not considered, which may need to be accounted for in the future, such as the longer-term macroeconomic implications of the Covid-19 pandemic and the unsettled situation in Eastern Europe, which could have significant macroeconomic consequences.

6. Policy Options

The above analysis suggests that the current pay-as-you-go pension system is vulnerable to both population dynamics and adverse macroeconomic shocks. It is therefore essential to address the potential downside risks with an appropriate longer-term strategy. To cushion against macroeconomic vulnerabilities, authorities need to reduce dependency on current contributions for the financing of pension outlays. In our alternative scenarios, inflows into the pension system (comprising contributions and investment returns) remain lower than in the baseline scenario due to weaker economic environment, which reduces earnings and investment returns during the forecasted period. Earnings-related pension outlays would increase both in absolute terms and relative to the wage bill during the forecasted period in both scenarios, despite the fixing of the share of average pension to average wage, as the number of pensioners would continue to rise while lower employment would reduce the wage bill and pension contributions. Consequently, adverse population trends work against the sustainability of the pay-as-you-go arrangement. These trends are aggravated by unsupportive macroeconomic developments.

We believe that best way to shield the Finnish pension system from downside risks associated with population and macroeconomic dynamics is to dismantle the pay-as-you-go system and eliminate the dependency of pension outlays on pension contributions. The continuation of the present system, where workers make substantial transfers to current pensioners, which could be argued to represent a misuse of their contributions (they should fund future, not current pension outlays), would endanger the longer-term health of the pension system and the provision of future pensions, a key promise of the Finnish government to workers and pensioners. Reforms must take into account burden-sharing between employees and retirees in terms of the costs of securing pension funding for future generations.

As already mentioned, several OECD countries have amassed substantial pension assets. But financial sustainability depends on a number of factors, including population and labor market dynamics, the structure of the pension system, and returns to invested pension system assets, which are expected to differ across countries and over time.

Eliminating the dependency of the pension system from contributions represents a fundamental shift in the thinking of the role of current workers and pensioners in the pension system. It is a reasonable long-term policy goal that could be achieved over time by: (1) raising the contribution rate sufficiently at an early stage, with burden falling on current employees, (2) limiting the growth of pension outlays, by capping average pensions or eliminating pension indexation, with burden falling entirely on pensioners, or (3) a combination of the two. Given the importance of ensuring that the purchasing power of pensions is protected, particularly at the lower levels of pensions, we do not consider a reduction in the cost-of-living indexation for pensions in the analysis (at least not explicitly).

Table 8.a. Policy adjustment, all earnings-related pensions: funding and assets (2020–2085, various metrics)
(Policy scenario with freezing inflation-adjusted average pensions from 2029 onwards)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (baseline and freezing of average pensions)						
Inflows (% of wage bill)	39.7	38.5	40.8	43.5	56.8	82.9
Contribution rate (% of wage bill)	29.0	29.0	29.0	29.0	29.0	29.0
Investment returns (% of wage bill)	10.8	9.6	11.8	14.6	27.8	53.9
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-32.7	-26.6	-22.2	-18.6
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-14.7	-11.7	-4.2	-4.1
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	8.1	17.0	34.6	64.4
Excl. contributions (% of wage bill)	-21.2	-22.8	-20.9	-12.0	5.6	35.4
Assets December 31 of the year (% of GDP)	97.4	93.9	92.5	117.0	224.2	434.2
	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (historical 20 years and freezing of average pensions)						
Inflows (% of wage bill)	39.7	38.5	37.8	38.3	41.0	44.5
Contribution rate (% of wage bill)	29.0	29.0	29.0	29.0	29.0	29.0
Investment returns (% of wage bill)	10.8	9.6	8.9	9.4	12.0	15.5
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-33.1	-31.2	-31.7	-32.4
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-14.7	-13.9	-10.4	-10.3
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	4.8	7.2	9.2	12.1
Excl. contributions (% of wage bill)	-21.2	-22.8	-24.2	-21.8	-19.7	-16.9
Assets December 31 of the year (% of GDP)	97.4	93.9	92.3	98.2	126.0	162.6

Sources: Tikanmäki et al. (2019) and the author.

Table 8 illustrates two alternative policy scenarios. Table 8.a. shows the impact of freezing average, inflation-adjusted pensions to the 2028 level from 2029 onwards (given the distribution of pensions, this may result in less than full cost-of-living indexation for some pensions) (Note 12). Using the baseline macroeconomic assumptions, the freezing of inflation-adjusted average pensions would lead to a strong increase in the pension system assets, which would grow rapidly (benefitting from higher real earnings and higher contributions) and become more than four-times Finland's GDP in 2085. In many ways, this seems adequate. Pension outlays would fall to 18.6 percent of the wage bill by the end of the forecasted period, which would eliminate pressure to raise contribution rates (Table 8.a.). Pension outlays would be only 4.1 percent of the beginning-of-period assets in 2085, compared to 13.6 percent in 2020, which is a substantial drop. This implies that the freezing of average pensions would protect the pension system and its finances, provided that the macroeconomic environment remains supportive.

However, weaker macroeconomic developments alter the picture (e.g., as illustrated by the historical 20-year trends). As shown in the lower part of Table 8.a., prolonged macroeconomic weakness would dilute the effects of freezing inflation-adjusted pensions. It would make it much harder to accumulate adequate asset levels in the longer-term. Our simulations show that while freezing average, inflation-adjusted pensions provide some degree of protection for the pension system's assets against adverse macroeconomic shocks, which continue to rise, it would be less effective in reducing dependency on current contributions to finance pension outlays, which remains substantial.

The other policy option considered is to raise the contribution rate, which would impose an additional cost on current employees and employers. This is illustrated in Table 8.b. where we have calibrated the contribution rate starting 2029 so that the pension outlays would be fully financed by investment returns in 2085. Using the baseline macroeconomic assumptions, contribution rate to achieve that would need to increase by 3.2 percentage points, to 32.2 percent (27.4 percent contribution rate for employees and employers, compared to 24.6 percent contribution rate in 2020, and 4.8 percent for government, compared to 4.4 percent rate in 2020). This would have a strong positive impact on pension finances while end-of-period assets of the pension system would become almost three times Finland's GDP in 2085. Combined with a weaker macroeconomic outlook, as illustrated in the lower part of Table 8.b. (using the historical 20-year trends), the contribution rate would need to rise substantially more, by 10.8 percentage points, to 39.8 percent of the wage bill in 2085 (33.8 percent for employees and employers and 6 percent for government). Because of the lower output (Appendix Figure A.1), the end-of-period assets would be higher as a percent of GDP.

Table 8.b. Policy adjustment, all earnings-related pensions: funding and assets (2020–2085, various metrics)
(Policy scenario with higher contribution rates from 2029 onwards)

	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (baseline and higher contribution rate)						
Inflows (% of wage bill)	39.7	38.5	44.2	48.4	58.2	69.1
Contribution rate (% of wage bill)	29.0	29.0	32.2	32.2	32.2	32.2
Investment returns (% of wage bill)	10.8	9.6	12.0	16.1	26.0	36.9
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-33.0	-30.2	-33.1	-36.9
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-14.6	-11.5	-6.8	-6.7
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	11.2	18.2	25.1	32.2
Excl. contributions (% of wage bill)	-21.2	-22.8	-21.0	-14.0	-7.1	0.0
Assets December 31 of the year (% of GDP)	97.4	93.9	95.1	129.3	206.6	292.1
	2020	2025	2030	2045	2065	2085
	Act./Proj.	Proj.	Proj.	Proj.	Proj.	Proj.
Current study (historical 20 years and higher contribution rate)						
Inflows (% of wage bill)	39.7	38.5	49.0	55.8	68.0	82.8
Contribution rate (% of wage bill)	29.0	29.0	39.8	39.8	39.8	39.8
Investment returns (% of wage bill)	10.8	9.6	9.3	16.1	28.2	43.0
Earnings-related pension outlays (% of wage bill)	-32.0	-32.4	-33.4	-33.9	-38.2	-43.0
Earnings-related pension outlays (% January 1 assets)	-13.6	-14.2	-14.2	-9.8	-5.3	-5.2
Net inflows, surplus (pos.) or shortfall (neg.), % of wage bill	7.8	6.2	15.7	21.9	29.8	39.8
Excl. contributions (% of wage bill)	-21.2	-22.8	-24.1	-17.9	-10.0	0.0
Assets December 31 of the year (% of GDP)	97.4	93.9	100.9	172.5	299.5	454.4

Sources: Tikanmäki et al. (2019) and the author.

7. Conclusions

Unfavorable population trends in Finland (rapid ageing, declining fertility, and shrinking working-age population) are challenging the Finnish pension system. Adverse macroeconomic shocks are likely to amplify these trends. In light of these downside risks, the current pay-as-you-go model used in Finland, where pensions are largely financed from the contributions of employees and employers and only a small portion is derived from returns to pension system assets, could become increasingly untenable in the longer-term. The Finnish government has demonstrated great willingness to respond to emerging challenges and build consensus for necessary reforms, but a more strategic approach would serve policymakers and pensioners (current and future) better in the longer run.

In this study we have highlighted possible downside risks for the Finnish pension system arising from weaker productivity growth and lower investment returns, as implied by the historical trends. In the absence of appropriate reforms, they could have severe implications for the longer-term health of the pension system. We recognize that our simulations are only suggestive and therefore encourage other researchers to conduct more systematic simulations and assessments that help properly quantify the consequences of these developments for the provision of pensions and their funding.

We propose that Finnish authorities transition away from the current pay-as-you-go system and adopt a system where pensions are fully funded through investment returns. Transition is likely to take time, but it is necessary. We have considered freezing average inflation-adjusted pensions and raising the contribution rate, possibly significantly. Given existing high rates of pension contributions, the authorities need to be mindful of burden-sharing between current and future pensioners in their reform efforts, which would favor a mixed approach.

Acknowledgement

The author likes to thank the editor and an anonymous reviewer for their comments and suggestions. Remaining errors are the responsibility of the author.

Notes

Note 1. Life expectancy affects the minimum retirement age so that for a person born in 1955, the minimum retirement age is 63 years and 3 months. But for a person born in 2000, the minimum retirement age is 68 years and 2 months, which means that the younger person has to remain in the labor force close to 5 years longer (Tikanmäki et al. (2019), Table 4.2.).

Note 2. See further details in Tikanmäki et al. (2019).

Note 3. Retrieved from <https://data.oecd.org/>. According to OECD, elderly population is classified as individuals who are 65 years and older.

Note 4. The 2015 Ageing Report of the European Commission (European Commission, 2014) discusses demographic trends and key policy options for the European Union member countries.

Note 5. After the Second World War, the low proportion of working-age population in Japan was associated with high youth and low elderly populations, whereas nowadays it is associated with low youth and high elderly populations. The ramifications for population dynamics from the latter are quite different compared to the former.

Note 6. Please note that our projections encompass all pension expenditure and pension recipients whereas projections in Tikanmäki et al. (2016) and (2019) exclude certain earnings-related pensions, such as for pension recipients residing abroad (totaling 55 thousand in 2020) and pension recipients who receive only part-time pensions.

Note 7. There are slight differences in the employment level (actual is lower) and the number of pensioners (actual is higher, in part due to differences in the coverage) in 2020 while total population in 2020 is close to Tikanmäki et al. (2019) projections.

Note 8. We take the projections for population, employment and the number of retirees as reported in Tikanmäki et al. (2019), while we modify the macroeconomic assumptions in our alternative scenarios.

Note 9. Tikanmäki et al. (2019) distinguish between short-term projections (which cover period up to 2028), which could be influenced by short-term economic developments and policies, and longer-term projections (which cover period 2029–2085). In our sensitivity analysis we focus exclusively on longer-term developments (period 2029–2085).

Note 10. Tikanmäki et al. (2019) discuss alternatives that would have implications for longer-term projections, such as changes in longevity, birth rate, employment, and the terms of disability pensions (Section 5 of Tikanmäki et al., 2019).

Note 11. To adjust for lower earnings/productivity growth in the alternative scenarios, we maintain the average share of pensions fixed at the 2028 level as percentage of the average inflation-adjusted earnings from 2029 onwards. This implies that the average pension grows at the same rate as average earnings (which is consistent with the approach adopted in Tikanmäki et al., 2019). The overall share of pension outlays relative to the wage bill would still rise due to already-mentioned unfavorable population dynamics (increasing number of pensioners and shrinking employment). This is not necessarily most sophisticated, but acceptable for our purposes and in the absence of information about the distributions of pension outlays and pensioners.

Note 12. This is not necessarily something new. The Finnish government has at times postponed adjustments of some pensions to changes in the pension index while protecting pensions at the lower income levels.

References

- André C., & Chalaux, T. (2016, July). *Boosting Productivity in Finland*. OECD, Economics Department, Working Papers, 1319, OECD, Paris, France.
- Barr, N. (2013). *The Pension System in Finland: Adequacy, Sustainability and System Design*. Finnish Centre for Pensions, Helsinki, Finland.
- European Commission. (2014). The 2015 Ageing Report: Underlying Assumptions and Projection Methodologies. *European Economy*, 8, 2014. European Commission, Brussels, Belgium.
- Finnish Centre for Pensions. (2021). *Statistical Yearbook of Pensioners in Finland 2020*. Finnish Centre for Pensions, Helsinki, Finland.
- Finnish Centre for Pensions. Retrieved from <https://www.etk.fi/>. Finnish Centre for Pensions, Helsinki, Finland.
- Fornaro, P., Kuosmanen, N., Kuosmanen, T., & Maczulskij, T. (2021). *Labor Productivity and Reallocation in Finland 2000–2018*. Publications of the Government Analysis, Assessment and Research Activities, 73, Prime Minister's Office, Helsinki, Finland. Retrieved from <https://urn.fi/URN:ISBN:978-952-383-401-9/>
- Hägele, M., & Kesä M. (2021, December). Työeläkkeiden rahoitus vuonna 2020. *Eläketurvakeskuksen raportteja*, 9. Eläketurvakeskus, Helsinki, Finland.
- Lassila, J., & Valkonen, T. (2018). Longevity, Working Lives and Public Finances. *Contemporary Economic Policy*, 36(3), 467-482. <https://doi.org/10.1111/coep.12262>
- Mielonen, A., Risku, I., Vidlund, M., & Väänänen, N. (2020). Eläkkeiden rahoituksen automaattisista vakautusmekanismeista Alankomaissa, Japanissa, Kanadassa, Ruotsissa ja Saksassa. *Eläketurvakeskuksen raportteja*, 10. Eläketurvakeskus, Helsinki, Finland.
- Nivalainen, S., Tenhunen, S., & Järnefelt, N. (2020, February). Carrots, Sticks and Old-Age Retirement. A Review of

the Literature on the Effects of the 2005 and 2017 Pension Reforms in Finland. *Nordic Welfare Research*, 5(2), 83-94. <https://doi.org/10.18261/issn.2464-4161-2020-02-02>

OECD (2020, December). *Finland: Productivity, OECD Insights on Productivity and Business Dynamics in Finland*. OECD, Paris, France.

OECD. (2019). *Pensions at a Glance 2019: OECD and G20 Indicators*. OECD, Paris, France. <https://doi.org/10.1787/b6d3dcfc-en>

OECD. (2021, June). *Pension Funds in Figures*. OECD, Paris, France.

OECD. Data. Retrieved from <https://data.oecd.org/>. OECD, Paris, France.

Social Insurance Institution of Finland, Pension Data. Retrieved from <https://www.kela.fi/web/en/statistics-by-topic-total-expenditure-on-pensions-in-finland/>. Social Insurance Institution of Finland, Helsinki, Finland.

Sorsa, V. P., & van der Zwan, N. (2022, February). Sustaining the Unsustainable? The Political Sustainability of Pensions in Finland and the Netherlands. *Journal of European Social Policy*, 32(1), 91-104. <https://doi.org/10.1177/09589287211035691>

Statistics Finland, Economic Data. Retrieved from <https://www.stat.fi/>. Statistics Finland, Helsinki, Finland.

Tikanmäki, H., Appelqvist, J., Reipas, K., Sankala, M., & Sihvonen, H. (2016, September). Lakisäätöiset eläkkeet: pitkän aikavälin laskelmat 2016, 8. Eläketurvakeskus, Helsinki, Finland.

Tikanmäki, H., Lappo, S., Merilä V., Nopola, T., Reipas, K. & Sankala, M. (2019, February). Lakisäätöiset eläkkeet: pitkän aikavälin laskelmat 2019, 2. Eläketurvakeskus, Helsinki, Finland.

Valkonen, T. (2020). The Finnish Pension System and Its Future Challenges. *Intereconomics*, 55(2), 92-96. <https://doi.org/10.1007/s10272-020-0877-1>

Appendix: Description of data and projections

- Data for total population, total employment, and total number of pensioners in Finland: historical data up to year 2020 from Statistics Finland; for period 2021–2085, rebased from the projections in Tikanmäki et al. (2019).
- Data for real gross domestic product (GDP): historical data up to year 2020 from Statistics Finland; for period 2021–2085 projections have been generated using macroeconomic assumptions for employment and productivity (as discussed in the main text). GDP may be defined as $GDP*(E/E) = (GDP/E)*E$, where GDP/E stands for labor productivity and E stands for total employment. Then output growth is the sum of productivity and employment growth rates.
- Data for productivity is generated as (GDP/E). Projections for productivity are calculated using historical data up to 2020 and macroeconomic assumption for productivity/earnings growth (for period 2021 – 2085), as discussed in the main text.
- Data for the consumer price index (P): historical data up to year 2020 from Statistics Finland; for period 2021–2085 projections are calculated using macroeconomic assumptions for inflation, as discussed in the main text.
- Data for nominal wage bill (W): historical data up to year 2020 from Statistics Finland, which we have divided by the consumer price index (base year 2017=100) to compute inflation-adjusted wage bill (W/P) (in 2017 prices). The average inflation-adjusted wage is calculated by dividing the wage bill with total employment (i.e., (W/P)/E). Projections for the inflation-adjusted average wage for period 2021–2085 are calculated using the assumptions for productivity and earnings growth in our macroeconomic analysis.
- Data for pension outlays: historical data up to year 2020 from Statistics Finland, Finnish Centre for Pensions, and the Social Insurance Institution of Finland, which have been rebased for period 2021–2085 using projections in Tikanmäki et al. (2019) for the average pension and earnings-related pension (both measured in inflation-adjusted terms and in the 2017 price level).
- Data for end-of period pension fund assets: historical data up to year 2020 from Statistics Finland and Finnish Centre for Pensions; projections for period 2021–2085 are calculated using rolling beginning-of-period assets and taking into account inflows into and outflows from pension funds during each year (contributions from workers and government, investment returns, payments of pensions, and net expenses) and using macroeconomic assumptions for investment returns and pension contributions. Net expenses are not a significant component (less than one-third of a percent of the beginning-of-period assets) and are kept as a constant share of beginning-of-period assets in the projections.

- Differences in the longer-term projections are primarily driven by productivity differences between scenarios, as the population trends (incl. for employment) remain unchanged across scenarios. Productivity growth determines earnings (wages) and pensions (given a fixed contribution rate), and output levels (Figure A.1).

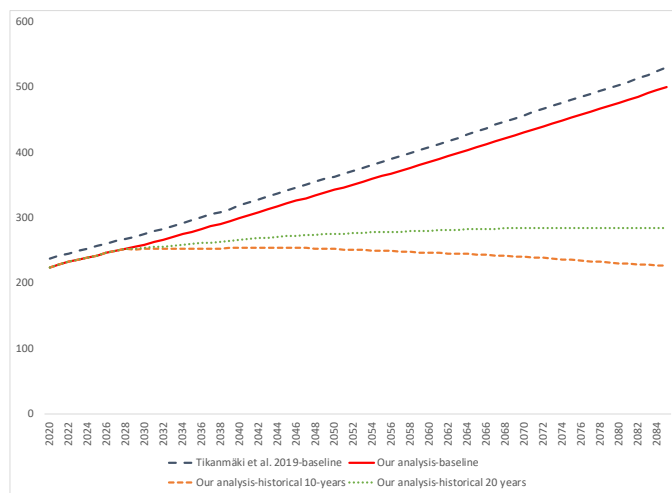


Figure A.1. Output trends (2020 – 2085)
(Billions of euros, at the 2017 price level)

Sources: Tikanmäki et al. (2019) and the author.

- Figure A.1. shows differences in output levels between our baseline and alternative scenarios (based on historical trends). As explained in the main text, our baseline projections for output and other macroeconomic variables are based on the assumptions used in Tikanmäki et al. (2019). Hence our baseline (solid red line) follows the baseline of Tikanmäki et al. (2019), which is illustrated by the dotted blue line. Because of more up-to-date data and actual output in 2020 falling below Tikanmäki et al. (2019) projections, our baseline is below that of Tikanmäki et al. (2019). A similar chart could be generated for the average wage where lower productivity growth leads to weaker inflation-adjusted earnings growth.

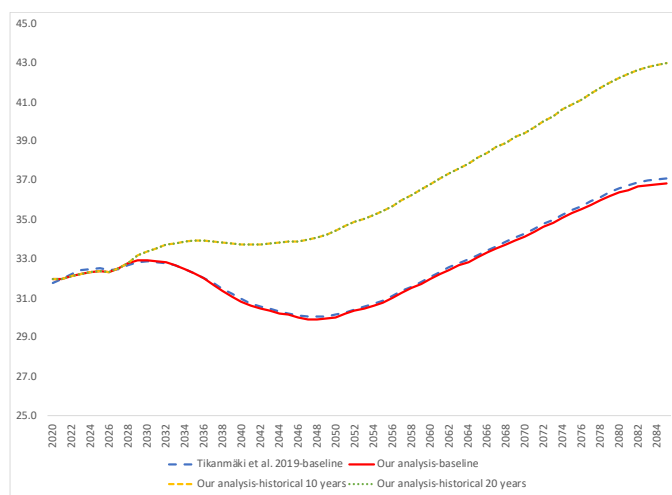


Figure A.2. Earnings-related pension outlays (2020–2085)
(In percent of the wage bill, at the 2017 price level)

Sources: Tikanmäki et al. (2019) and the author.

- Figure A.2. shows projections for earnings-related pension outlays where our baseline is not materially different from Tikanmäki et al. (2019). We have fixed the average earnings-related pension to the average wage starting 2029 in both alternative scenarios and therefore the paths of pension outlays relative to the wage bill are identical. We haven’t modified the path of employment, although a weaker output growth in the alternative scenarios could in practice result in lower employment levels compared to the baseline scenario (see the main text).

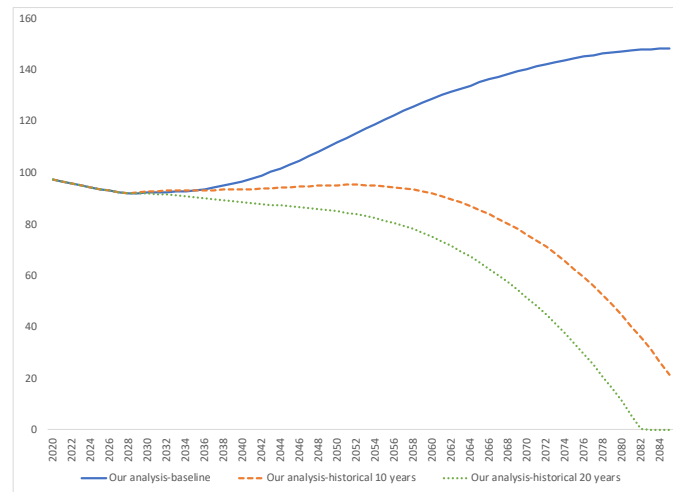


Figure A.3. Earnings-related pension system assets (2020 – 2085)
(In percent of GDP, end-of-period, at the 2017 price level)

Sources: Tikanmäki et al. (2019) and the author.

- In the absence of adjustments in the pension system (to illustrate the point, we have kept the contribution rate the same as in the baseline scenario), higher pension outlays relative to the wage bill, as illustrated in the alternative scenarios, would need to be reflected in the financing, which primarily relies on the contributions of employees and employers. Unfavorable population dynamics would work against sustainability. The gap between the inflows (contributions and returns to investment) and outflows (pension outlays) would widen, leading to the depletion of pension system’s assets, as illustrated in Figure A.3. (average pension-to-average wage ratio remains constant). Consequently, it would become impossible to cover the widening financing gap with investment returns.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the [Creative Commons Attribution license](#) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.