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Investments in education offset the impact of lower fertility - even without additional funding

Fertility has declined rapidly and continues to reach new record low levels in Finland: in 2023 the total fertility rate (TFR) fell below the lowest-low fertility threshold of 1.3. This decline has caused considerable concern about the macroeconomic sustainability of the Finnish social security model. Low and declining fertility accelerates population aging and contributes to a declining ratio of working age population to non-working age population. This is a major societal challenge that requires policy action.

Public discussion, often polarized, revolves around two possible approaches to tackle the challenge: some focus on fertility, others on migration. While both are important, here we present a third approach that is focused on human capital, or education, of the population. Using realistic simulation model of the Finnish Center for Pensions, we show in our recent study that the adverse macroeconomic impact of very low fertility can be mitigated by investments in education (Myrskylä et al. 2024). Such investments increase the productivity of the workforce to compensate for its smaller size.

Education strategy needs to be among the key tools to tackle the challenge of population ageing, in addition to the efforts to attract migrants and support the realization of individuals' desired fertility.

- Adverse macroeconomic impacts of very low fertility can be mitigated by investments in education.
- A high education investment strategy can raise the productivity of the workforce to compensate for its smaller size.
- The investment can be made without additional funding: the amount of money spent on education will remain the same, while the number of children will decrease.
- Education, in addition to fertility and migration, should be considered an important focus to policies which aim at tackling the challenge of population aging.

Aim of the study

The future path of fertility is a key input when charting the sustainability of social security systems. While countries are increasingly concerned about the long-term implications of low fertility, policies aimed at raising fertility levels deliver modest results. If the reality is that low fertility is here to stay the key question is how societies should adapt to low fertility.

In low-fertility countries such as Finland, declining fertility is expected to put pressure on key indicators of economic sustainability such as old-age support ratio and various dimensions of pension burden. The mechanism in such calculations is often based on a static view of the impact of fertility on the economy, with the declining share of workers as the key force.

We explore to what extent investments in human capital, or education, could offset the adverse economic impact of low fertility in Finland. Finland is an exceptionally interesting case because it is ageing faster than most other European countries, it has reached lowest-low fertility, and it has had a stagnant or even declining trend in educational attainment from the cohorts born in the mid-1970s. This means that particularly in Finland, additional investments in education have the potential to deliver major gains.

The high education investment scenario

We analyze the long-term trajectories of economic sustainability under three scenarios: 1) baseline scenario with persistent low fertility with total fertility rate (TFR) = 1.45; 2) persistent lowest-low fertility scenario with TFR = 1.30; 3) and high education investment scenario with

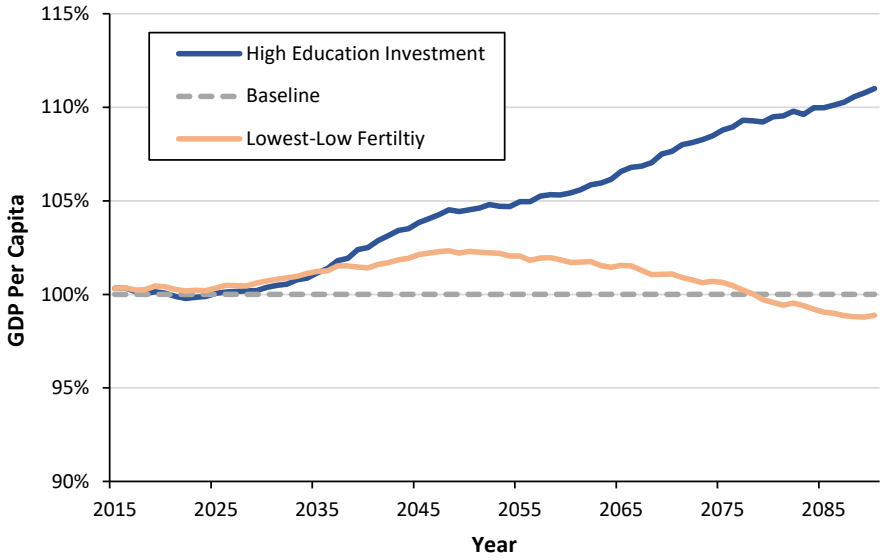

Figure 1: The trajectory of GDP per capita for the three scenarios, with baseline scenario scaled to 100.

TFR = 1.30 combined with ambitious but realistic education investment.

The high education investment scenario assumes that the total investments in education are kept constant, despite declining numbers of children. This means that each child, on average, gets more resources – with the decline of TFR from 1.45 to 1.3, the increase per child is approximately 10%, or more than a year of additional schooling. Therefore, no additional funding is required to implement the scenario.

We define three indicators as proxies of economic sustainability – GDP per capita, wage sum, and pension expenditure relative to wage sum. We implement our analysis using the Finnish Center for Pensions' ELSI microsimulation model.

Education investment and economic sustainability

GDP per capita

Figure 1 shows the trajectory of GDP per capita for the three scenarios, with baseline scenario scaled to 100.

In the lowest-low fertility scenario, GDP per capita initially increases relative to baseline because the proportion of working-age population is temporarily larger, but in the long term declines below the baseline level. In the high education investment scenario, the trajectory is similar or slightly below the lowest-low fertility scenario until approximately 2040. This is expected, as the population structures are the same, and the only difference is higher investment in education.

This investment starts to pay off starting from 2040, when the smaller and better educated cohorts enter the labor force. By 2090, the high investment scenario delivers more than 10 percentage points higher GDP per capita than the baseline or lowest-low fertility scenarios.

Wage sum

Figure 2 illustrates the dynamics of wage sum over the three scenarios.

These mirror the GDP per capita patterns, with the main difference that the patterns are not scaled to the population. In the lowest-low fertility scenario, wage sum keeps up with the baseline scenario until approximately the 2040s, when the smaller cohorts enter the labor force and consequently wage sum starts to decrease. In the high education scenario, higher education delivers wage sums that stay at similar levels as in the baseline scenario, or slightly higher, even though the population earning these wages is smaller.

Pension expenditure relative to wage sum

Figure 3 shows pension expenditures relative to wage sum. In all scenarios, there is first a short-term decline in the 2030s and then a long-term increase from the 2040s. In the baseline scenario, relative pension expenditure grows rapidly starting from the 2040s, and reaches 36% by the mid-2080s. Lowest-low fertility delivers even faster increases in relative pension

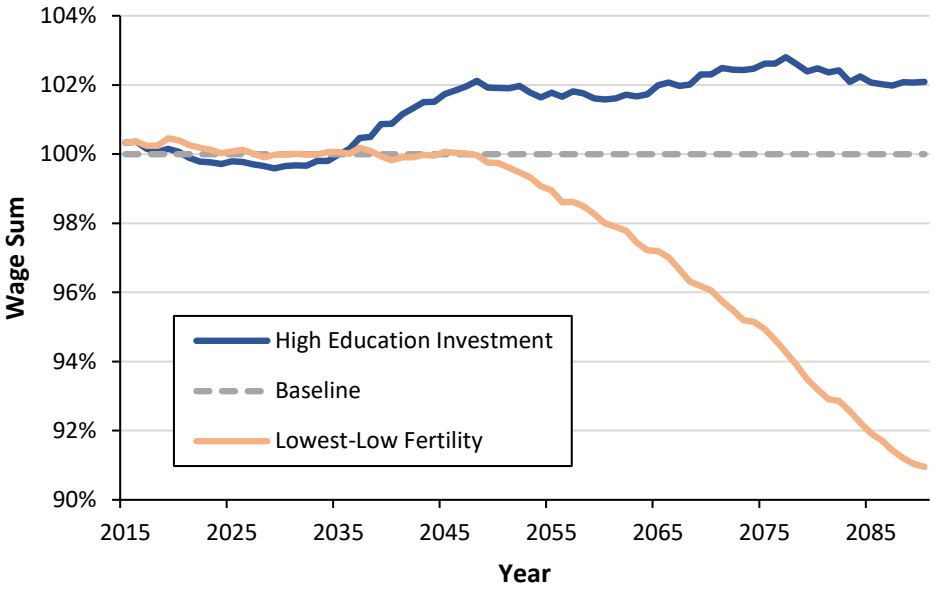

Figure 2: The trajectory of wage sum for the three scenarios, with baseline scenario scaled to 100.

expenditure, from 28% in 2045 to 39% in 2085.

In Figure 3, the high education investment scenario is split into two in the analysis of relative pension expenditure. This is because higher education increases wages, but this is also reflected in the earnings-related pension levels as pension payments in Finland are indexed 20% to changes in wages and 80% to changes in prices. For accrued pension rights, the weights are the other way around. Hence, the gain in wages may be offset by added costs in pensions, and the impact of the investment in human capital on the financing of pensions is smaller than the impact on GDP, as the growth in wages leads to higher pension levels and pension expenditure.

In the first high education investment scenario (blue solid line in Figure 3), we allow pensions to be partially indexed to wage growth. The result of this scenario is that the relative pension expenditure closely follows the baseline scenario. In other words, higher education offsets but does not overcompensate for the smaller labor force that is due to lower fertility.

In the second variant of the high education investment scenario (blue dotted line in Figure 3) we do not index the individual pensions to grow with the growing wages, but instead keep them at the level that corresponds to the lowest-low fertility scenario that does not have higher education. In such a scenario, the investments in education more than offset the impact of the lower fertility.

Conclusion: Improvement of the human capital of the populations should be the focus of population policies

Sustained low fertility is likely to accelerate population ageing, and thereby put increasing pressure on the economic sustainability of low-fertility societies. There is limited evidence for the success of policies targeted at increasing low fertility, even in contexts where desired family size is higher than the actual realized fertility. It is possible that low fertility is here to stay, and the question of adaptation requires more attention.

We explore to what extent education could be the adaptation tool. We find that a human capital investment strategy that keeps the total costs of education constant when cohort size declines, thereby increasing per capita investment in human capital, offsets much of the negative macroeconomic impact of the smaller labor force brought about by a decline of the TFR from 1.45 to 1.3.

The gains from such human capital investment are not limited to controlling pension burden, as working years, retirement years, pension income, and longevity of the population also increase. Policies focusing on human capital investment are likely to be a feasible tool for maintaining economic sustainability amid the landscape of low fertility.

Our results rely on one key assumption: the productivity of a single highly educated person does not decline when an increasingly

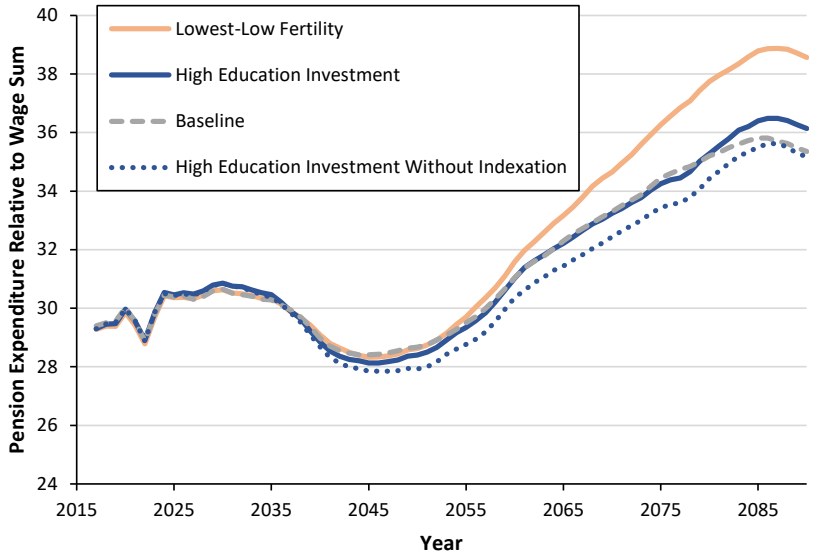

Figure 3: The trajectory of pension expenditure relative to wage sum for the three scenarios.

large share of the population receives higher education. It is possible that this assumption is wrong, and at some point the economy becomes saturated with high- or over-educated individuals. We think that this is unlikely in the near future in the Finnish context where overall the level of education has been stagnant or declining, and lagging behind peer countries. Existing research also does not find diminishing returns to high education, not even in the most highly educated countries of the world.

Our findings align with existing literature that emphasizes the key role of human capital in demographic and economic development (Lutz 2014; Lutz et al. 2019) and suggests that macro-level sustainability is possible with lower than replacement levels of fertility (Marois, Bélanger, and Lutz 2020).

Two recent studies that focused on the Finnish context also found results that highlight the importance of human capital for economic sustainability. Marois, Rotkirch, and Lutz (2022) forecast productivity weighted labor force dependency ratio under various fertility and education scenarios. They conclude that a TFR around 1.6. should not be a major economic concern if productivity increases. Mäki-Fränti et al. (2023) model economic growth in Finland under various human capital investment scenarios and also conclude that investments in human capital are key to economic growth.

To conclude, we combine realistic fertility scenarios, including stability at the current level of TFR 1.3, with an educational investment strategy that increases per-capita investments but does not require additional funding. We argue that such a strategy is politically feasible – especially in a country context like Finland, where the population is rapidly ageing, period fertility is at a lowest-low level, and educational expansion has stagnated. The Finnish government has recently set an aim to increase the share of population with tertiary education (Valtioneuvosto 2021). The results of our study provide an important additional reason to contribute to this goal.

Our results provide empirical support for the idea that the improvement of the human capital of the populations, rather than demographic targets (such as a specific level of fertility) should be the focus of population policies. One of the reasons for this is that discussion focusing on concepts such as replacement level of fertility do not account for the qualitative aspect of the population. Demographic targets of fertility may also be viewed as questionable from a human rights perspective. This does not mean that continued attention should not be paid by governments to find ways to alleviate the barriers to childbearing that contribute to the gaps between individuals' intended and realized fertility.

More information

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