

Global Demographic Structure and Korea's Productivity: Challenges and Opportunities

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I. Introduction

The Demographic Shock and the Productivity Imperative

The global economy is undergoing a profound transformation driven by low birth rates and aging populations. While this demographic shift is a global phenomenon, South Korea is experiencing it at an unprecedented speed. This change is not merely a social issue but a fundamental economic shock that alters the core engines of growth: labor and capital.

As the working-age population shrinks, the contribution of labor to economic growth inevitably turns negative. Consequently, sustaining economic growth depends entirely on productivity. The central challenge for policy-makers is no longer just how to expand the

workforce, but how to reconfigure the economy to produce more with fewer people through innovation and efficiency.

This report analyzes the impact of demographic changes on Korea's productivity, drawing lessons from Japan's experience and utilizing economic simulations. It explores how aging affects investment incentives and why "intangible assets"—such as technology, software, and organizational know-how—are critical for Korea's economic survival. Furthermore, it highlights how global financial conditions can act as a buffer for Korea's open economy.

II. Lessons from Japan: A Precursor in Aging

To understand Korea's future, it is instructive

to look at Japan, which has been grappling with “super-aging” for decades. Japan's experience offers valuable empirical lessons on the relationship between population decline, investment, and productivity.

1. Declining Investment in an Aging Society

Japan's population peaked in 2008 and has since been in decline. A critical observation from the Japanese economy is the trend in investment. During its high-growth era in the 1970s, Japan's investment rate (gross fixed capital formation as a percentage of GDP) was nearly 40%. However, as the population aged and the economy matured, this rate steadily declined to approximately 26% by 2024.

This suggests a structural trend: as the population shrinks, the demand for physical expansion (buildings, factories) diminishes. For Korea, where the investment rate is currently around 31.5%, we must anticipate a similar downward pressure on physical investment. This means growth must increasingly come from the quality of investment rather than just the quantity.

2. The Struggle for Productivity

Japan's productivity growth (Total Factor Productivity, TFP) has hovered around a low level of 0.4% annually since 2012. This low productivity growth, combined with a shrinking workforce, has kept Japan's overall economic growth rate low (around 0.6% post-COVID). This serves as a warning for Korea:

without a significant leap in productivity, an aging workforce can lead to long-term economic stagnation.

However, Japan also offers a glimmer of hope. Despite a shrinking population, Japan successfully increased its labor force participation rate from 71% in 1990 to 82% in 2024 by engaging more women and elderly workers. This indicates that policy interventions can help mitigate the labor shortage to some extent.

III. The Productivity Challenge: What is Required?

How much does Korea's productivity need to improve to offset the shrinking workforce? We conducted a growth accounting analysis to quantify this “productivity gap.”

1. The Target: Sustaining 2% Growth

To maintain a moderate real GDP growth rate of 2.0% per year over the next 30 years, Korea faces a steep challenge.

- Scenario A (Optimistic Investment): Even if Korea maintains its current high investment levels, productivity (TFP) must grow by 2.0% to 2.5% annually.
- Scenario B (Declining Investment): If Korea follows Japan's path and investment rates decline (stabilizing at 10% by 2072), the burden on innovation becomes immense. Productivity would need to

grow by more than 3.0% annually to sustain 2% GDP growth.

2. The Reality Check

Currently, Korea's trend productivity growth is estimated at approximately 0.7%. To achieve the targets above, Korea needs to triple or quadruple its current pace of innovation. If productivity growth remains at current levels while investment slows, Korea's potential growth rate is projected to fall to 0% in the near future and could turn negative by the mid-2030s. This underscores that “business as usual” is not an option.

IV. Mechanisms of Impact: Innovation and Global Factors

Beyond simple accounting, we analyzed how aging affects the economy using a structural economic model. This analysis reveals both risks and unexpected buffers.

1. The “Capital Deepening” Mechanism

As the workforce shrinks, labor becomes scarce and expensive (higher wages). In response, firms naturally try to substitute labor with capital—machines, automation, and AI. This process, known as capital deepening, increases the amount of capital per worker, which boosts labor productivity.

Our simulation shows that if firms respond to labor shortages by aggressively investing in

intangible assets (skills, software, R&D), the economy can continue to grow. In a theoretical scenario where investment remains efficient, productivity could actually rise despite aging because companies are forced to innovate to survive.

2. The Risk: Declining Investment Efficiency

The danger, however, is that aging societies often become less adaptable. If the efficiency of investing in new technologies drops—due to rigid regulations, lack of skilled workers, or slow adoption of new ideas—the positive effect of capital deepening vanishes.

- **Impact:** Our analysis shows that if the efficiency of intangible investment drops by 30%, the economic gains from capital deepening are erased, leading to a 13% collapse in productivity and a severe economic contraction. Maintaining the efficiency of investment is therefore the single most critical variable.

3. The Buffer: Open Economy and Global Rates

Crucially, Korea is an open economy. The global demographic transition is pushing down interest rates worldwide (a lower “Global Neutral Rate”).

- **Imported Resilience:** Low global interest rates allow Korean firms to borrow capital cheaply from abroad. This facilitates capital deepening even when domestic

savings might be insufficient.

- **Result:** When we account for low global interest rates, the negative impact of aging is significantly buffered. Even in a worst-case scenario where investment efficiency drops, the decline in productivity is limited to 4% (compared to 13% in a closed economy). This highlights the importance of maintaining access to global financial markets.

V. Policy Implications

The analysis leads to a clear conclusion: to survive the demographic cliff, Korea must transition from an economy driven by “input quantity” to one driven by “investment efficiency.”

1. Incentivize Intangible Assets

The tax and accounting systems, traditionally designed for physical assets like factories, must be overhauled to favor intangible assets. Investments in software, R&D, and organizational innovation should receive equal or superior incentives to physical investments. This is essential to prevent the “efficiency drop” scenario.

2. Strengthen Risk-Sharing Mechanisms

Investing in new technology is riskier than building a factory. The government should expand financial mechanisms that share this risk with the private sector, such as public-private

matching funds for R&D and guarantees for IP-based financing.

3. Build Infrastructure for Technology Diffusion

To keep investment efficient, the cost of adopting new technologies must be low. This requires robust digital infrastructure (data standards, AI platforms) that helps new ideas spread quickly across the economy, narrowing the gap between leading firms and SMEs.

4. Leverage Global Openness

Global aging provides a financial safety valve: low interest rates. Korea must maintain high financial openness to allow capital to flow in, supporting the “capital deepening” needed to offset labor shortages. Simultaneously, Korea should utilize its accumulated savings (e.g., National Pension) to invest in high-yield global assets, protecting national income.

5. Support Lifelong Learning

An aging workforce must remain productive. A comprehensive system for lifelong learning and job transition is not just a welfare policy but a growth strategy. It ensures that older workers can complement new technologies rather than being displaced by them. **KIEP**