

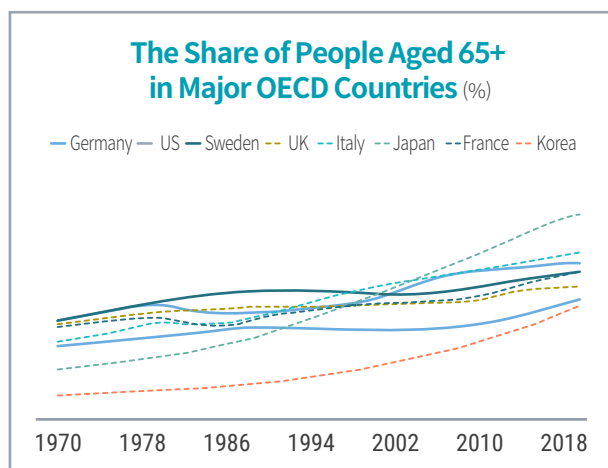
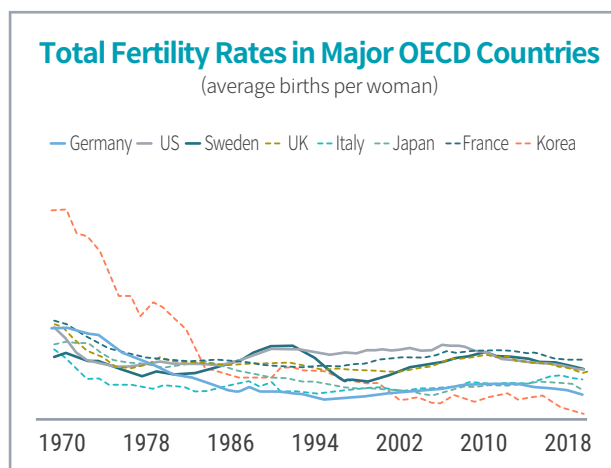


# The Effects of Demographic Changes on Economic Growth: The Case of OECD Countries

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- OECD countries are undergoing a demographic change as the working-age population decreases while the elderly population increases. In countries with a rapid aging population, such as South Korea and Japan, economic growth and the share of working-age population are positively correlated. In contrast, in countries such as the UK and US, this correlation has weakened since the 2010s. This indicates that the negative effects of population aging have been offset by increased labor force participation rates and automation-driven productivity improvements.
- A panel regression analysis of OECD countries shows that the share of people in the core working-age group (aged 30-64) have the greatest impact on economic growth. If the share of people aged 65 and over grows by 1 percentage point and those aged 30-64 falls by 1 %p, the annual economic growth rate will decrease by 0.38 %p. Since 2000, the negative impact of aging on economic growth has decreased. This is because the labor productivity gap between the core working-age and the elderly has narrowed due to automation and policies to increase labor participation.
- As a response to demographic changes, OECD countries have 1) promoted the inflow of immigrants to expand the working-age population, 2) continuously fostered automation of production and services to enhance labor productivity, and 3) implemented policies for family care, labor market flexibility, and retirement age extension to boost labor participation rate. However, an influx of immigrants entails social conflicts and integration costs and automation may create sectoral and regional inequalities.

## I. Demographic Trends of OECD Countries



## II. Analysis of the Effects of Demographic Changes on Economic Growth of OECD Countries

### 1. The Effects of Demographic Changes on Economic Growth

#### Analysis Model

##### • Production Function Approach Model\*

$$\Delta \ln y_{s,t} = \phi_t + \beta \Delta \ln \left( \frac{A_{s,t}}{N_{s,t}} \right) + X'_{st} \delta_t + u_{s,t}$$

$y_{s,t}$  is GDP or GDP per capita,  $\phi_t$  is the time-fixed effect,  $\frac{A_{s,t}}{N_{s,t}}$  is the proportion of a specific age group,  $X'_{st}$  is a characteristics variable of the existing economy,  $u_{st}$  is the stochastic error term.

\* Maestas et al.' (2016) method of analysis was partially modified and extended to OECD countries.

#### Analysis Period and Data



Analysis period and method





Regression analysis based on data of a balanced panel of 23 OECD countries from 1960 to 2020



Data

Population (UN population data), economic growth rate (World Bank), labor force participation rate (ILO), etc.

#### Estimates of the Effects of Demographic Changes on Economic Growth

		GDP growth rate	GDP per capita growth rate
	$\Delta\%$ aged 15 - 29	-0.132* (0.0723)	-0.143* (0.0733)
	$\Delta\%$ aged 30 - 64	0.289*** (0.0637)	0.297*** (0.0637)
	$\Delta\%$ aged 65+	-0.0095 (0.0893)	-0.0792 (0.0897)
	$\Delta$ Total population (log)	0.181*** (0.0279)	

Note: 1. Standard errors are in parentheses.

2. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

3. The coefficient estimates indicate effects when each age group's population decreases by 0.25 %p and their share increase by 1 %p.

4. This analysis includes the time-fixing effect and GDPs of former periods.

- The share of core working-age people (aged 30-64) has the most significant impact on the economy.
- If the total population increases by 1%, the average annual GDP growth increases by 0.18 %p.

#### Economic Growth Rate Changes Due to the Aging Population

	GDP growth rate	GDP per capita growth rate
 Population aging effects	-0.384*** (0.137)	-0.376*** (0.137)

Note: 1. Standard errors are in parentheses.

2. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

3. The estimates are derived through a linear combination of the regression coefficient estimates.

4. Population aging happens when the number of people aged 65+ increases by 1 %p and that of people aged 30-64 decreases by 1 %p.

It is estimated that population aging lowered the average annual GDP growth rate by 0.38 %p.

#### Estimates by Period

	GDP growth rate	GDP per capita growth rate
Population aging effects before 2000	-0.472** (0.221)	-0.536*** (0.226)
Population aging effects since 2000	-0.197 (0.160)	-0.253* (0.148)

- The negative effect of population aging on economic growth has decreased since 2000.
- Before 2000: Annual economic growth rate declined by 0.47-0.54 %p.
- Since 2000: Annual economic growth rate declined by 0.19-0.25 %p.

## 2. Decomposing the Effects of Demographic Changes

### Analysis Model

- Decomposing GDP per capita into labor productivity and labor participation rate

$$\ln\left(\frac{Y}{N}\right) = \ln\left(\frac{Y}{L}\right) + \ln\left(\frac{L}{N}\right)$$

Y is GDP, L is labor market participants, and N is the total population.

- Decomposition analysis results show that closing the labor productivity gap between the core working-age group and the elderly reduces the negative impact of population aging (-0.36 %p before 2000 → -0.14 %p since 2000).
- During the same period, the labor participation rate gap between the two groups narrowed slightly (-0.16 %p before 2000 → -0.12 %p since 2000).

### Decomposing the Economic Growth Rate Changes due to Population Aging

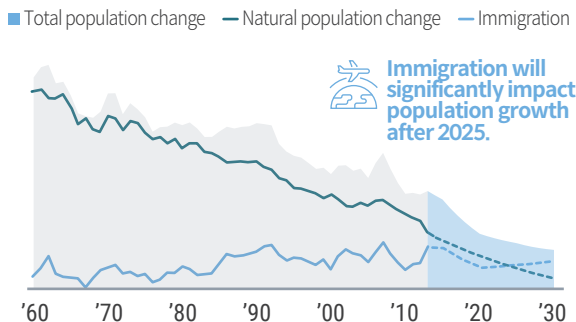
	GDP per capita growth rate	Labor productivity	Labor participation rate
Population aging effects before 2000	-0.523** (0.227) [100%]	-0.360 (0.253) [68.8%]	-0.163 (0.135) [31.2%]
Population aging effects since 2000	-0.253* (0.148) [100%]	-0.138 (0.157) [54.5%]	-0.115 (0.091) [45.5%]

## III. OECD Countries' Responses

To alleviate the negative impact of demographic changes, OECD countries have expanded the working-age population, enhanced productivity, and raised the labor participation rate.

### 1. Expanding the Working-Age Population: Overseas Migrants

#### Components of Population Growth in OECD Countries



#### Immigration to Secure Labor Forces and Social Integration Costs



- OECD countries actively implement policies to stimulate immigration, targeting skilled workers to secure labor force.



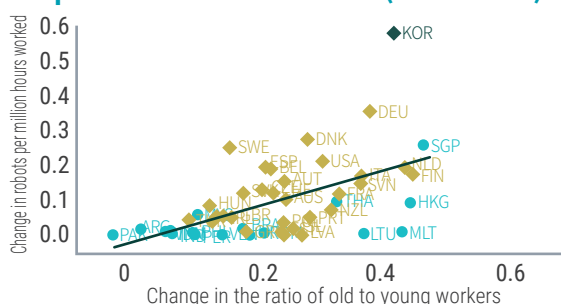
- An increase in the immigration labor force grows the economy and increases GDP, but the effect on per capita GDP growth is unclear.



- Social integration costs may incur due to immigration-based conflicts.

### 2. Increasing Productivity: Offsetting the Effect of Aging on the Productivity Decline Through Automation

#### Correlation Between Change in the Ratio of Old to Young Workers and Change in Robots per Million Hours Worked (1990–2015)



#### Automation to Enhance Productivity and Balanced Growth



- Since the 2000s, OECD countries have promoted automation to counter labor productivity declines.



- They have implemented countermeasures to address sectoral and regional inequalities in the automation process.
  - A balanced growth plan is necessary to deal with automation-induced job loss, especially among unskilled and nonprofessional workers.

### 3. Improving Labor Participation Rate: Policies That Increase Labor Participation of Aging Population

#### Default Retirement Age and Extension Plans in Major OECD Countries



Korea

- The default retirement age of 60 was implemented in 2017.



Japan

- The default retirement age is 65, but employers should retain workers age 70.



Germany

- The default retirement age will be extended from 65 to 67 by 2029.



Spain

- The default retirement age will be extended from 65 to 67 by 2027.



US

- No default retirement age



UK

- No default retirement age

OECD countries have implemented policies, such as extending the default retirement age, to increase the labor participation rate of older people.

#### Policies to Enhance Labor Participation of Older People



- US and UK have abolished their default retirement age.



- Germany and Spain are gradually extending the default retirement age to 67.



- Japan has amended legislation to encourage people to work up to 70.

- In 2020, the labor force participation rate of people aged 65 and over only averaged 15.3%, but many countries are extending the default retirement age.

## IV. Conclusion



- The analysis of OECD countries suggests that the negative impact of demographic changes on economic growth can be mitigated through appropriate responses.



- By examining the policies of major OECD countries that have experienced demographic changes, the Korean government can find strategies that minimize negative impacts.



- The government should also consider OECD policy implementation processes and issues encountered through the expansion of the working-age population, improvement of labor productivity, and an increase in the labor participation rate.



- A balance of economic effects and social costs is necessary when establishing and implementing a response strategy on demographic change.