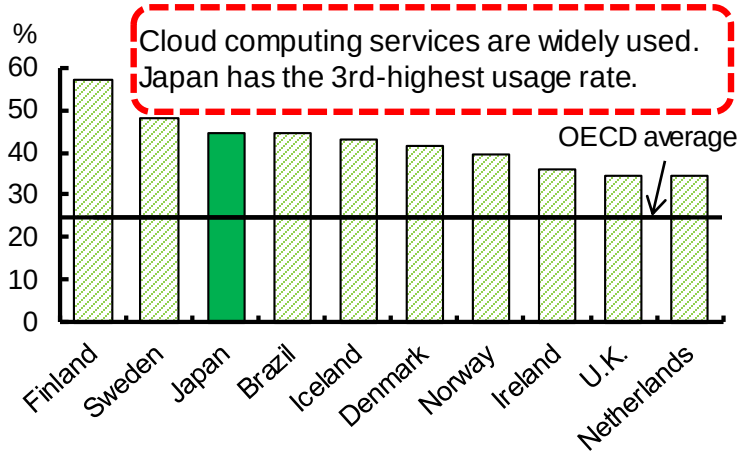
Chapter 3: Changes in Economic Activities toward "Society 5.0"

Rapid progress has been made in the Fourth Industrial Revolution, though the diffusion delays in some points.

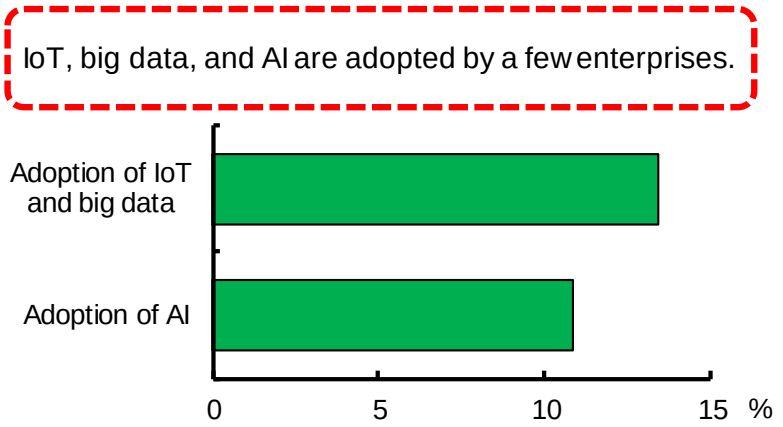
1. Progress of new technologies

Cloud computing services are widely used, but **IoT and AI are adopted by a few enterprises** in Japan.

(1) Enterprises using cloud computing services (CY 2016)



(2) Japanese enterprises adopting new technologies (Cabinet Office survey, CY 2018)

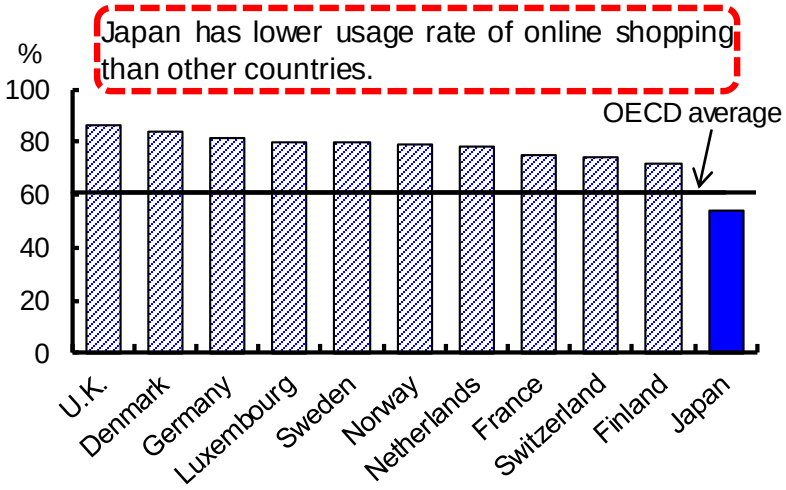


Sources: OECD, "OECD Science, Technology and Industry Scoreboard 2017"; Cabinet Office, "Survey on companies' attitude about work style, education and training".

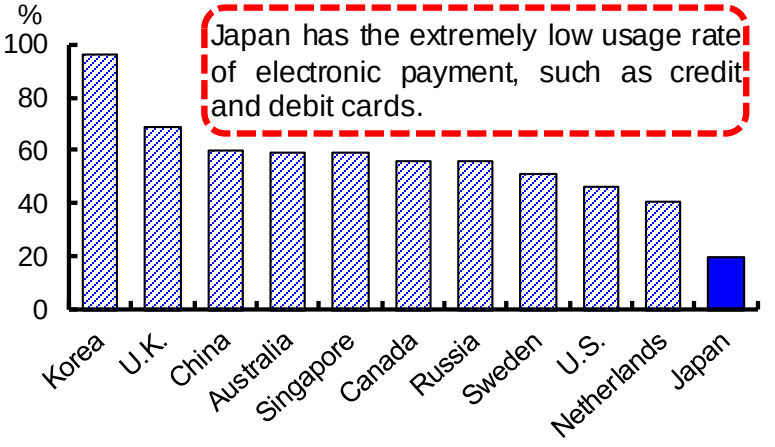
2. Utilization of online shopping and electronic payments

Utilization of online shopping and electronic payments, based on new technology, **is limited** in Japan.

(3) Individuals who purchased online (CY 2016 survey)



(4) Ratio of electronic payment to household consumption expenditure (CY 2016)



Sources: OECD, "OECD Science, Technology and Industry Scoreboard 2017"; BIS, "Statistics on payment, clearing and settlement systems in the CPMI countries"; United Nations etc.

3-2. Progress of Innovation and Japan's Competitiveness

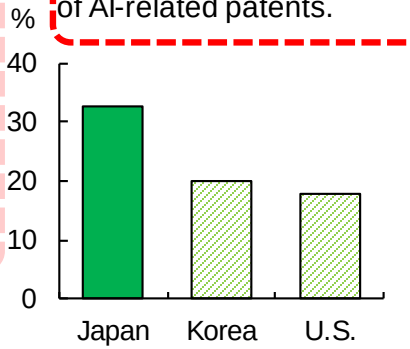
Japan has fundamental skills for innovation, but less adaptive to using them effectively.

1. Fundamental skills and capabilities for innovation

Despite **rich fundamental skills and capabilities** for innovation, Japan **prefers incremental innovation** in R&D and has **low openness to international collaboration**.

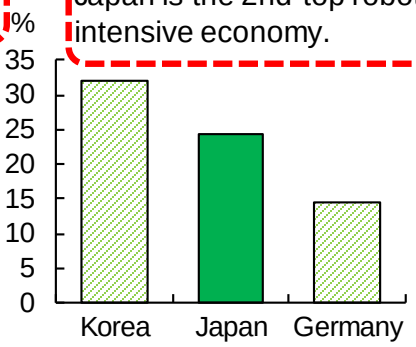
(1) AI-related patents share (CY 2012-2014)

Japan has the highest share of AI-related patents.



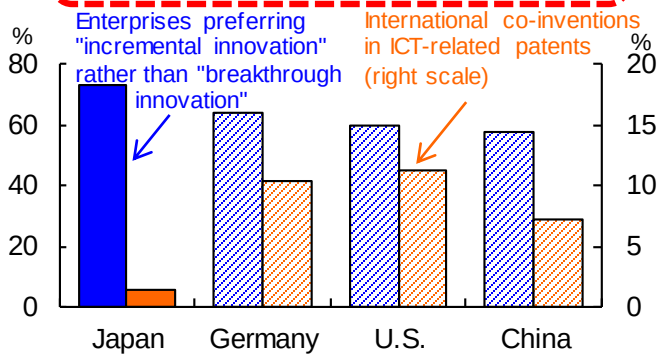
(2) Industrial robots (value of stock) over manufacturing value added (CY 2015)

Japan is the 2nd-top robot-intensive economy.



(3) Japan's characteristics in R&D

Japan prefers incremental innovation. It has been much less involved with international collaboration in R&D.



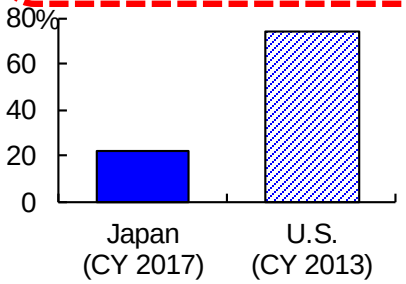
Sources: OECD, "OECD Science, Technology and Industry Scoreboard 2017"; GE, "2016 GE Global Innovation Barometer".
Note: "Incremental innovation" represents innovation improving existing products and solutions, while "breakthrough innovation" represents innovation launching products that are completely new and have the ability to disrupt their market.

2. Adaptive attitudes toward innovation

Japan is **less adaptive to innovation**: delay in **improving organizational structure** for the new digital age; **low levels of human capital investment and entrepreneurship**; **inactive entry and exit of firms**.

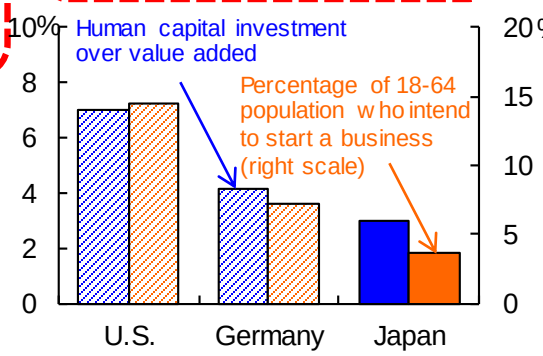
(4) Assignment of dedicated CIO (chief information officer) position

In Japan, fewer enterprises have dedicated CIO reporting directly to CEO. There is room for improving organizational structure for the new digital age.



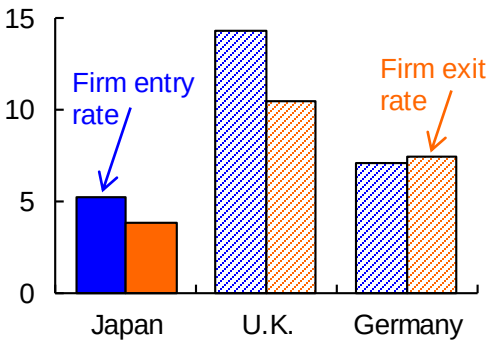
(5) Human capital investment (CY 2011-2012) and entrepreneurship (CY 2017)

Japan has weak investment in human capital and the low level of entrepreneurship.



(6) Firm entry and exit rates (2015)

Entry and exit of firms are inactive in Japan.



Sources: Japan Electronics and Information Technology Industries Association; OECD, "OECD Science, Technology and Industry Scoreboard 2015"; Global Entrepreneurship Monitor etc.

3-3. Progress of Innovation and Labor Share & Productivity

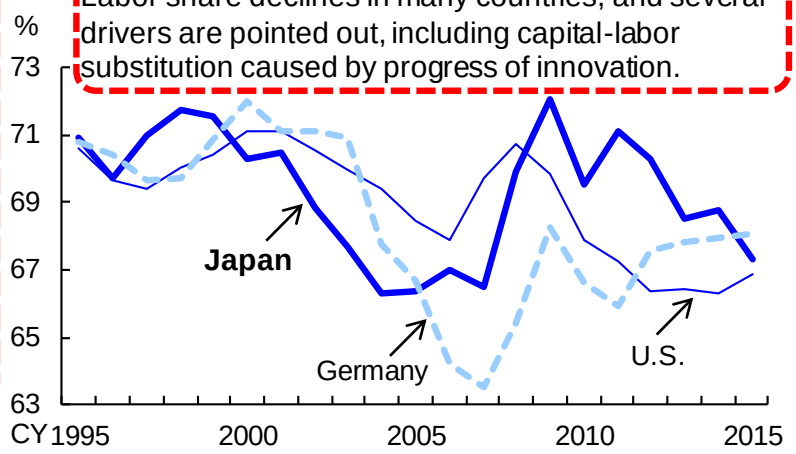
Innovation tends to lower labor share. Raising productivity by human resource development is a key.

1. Progress of innovation and decline in labor share

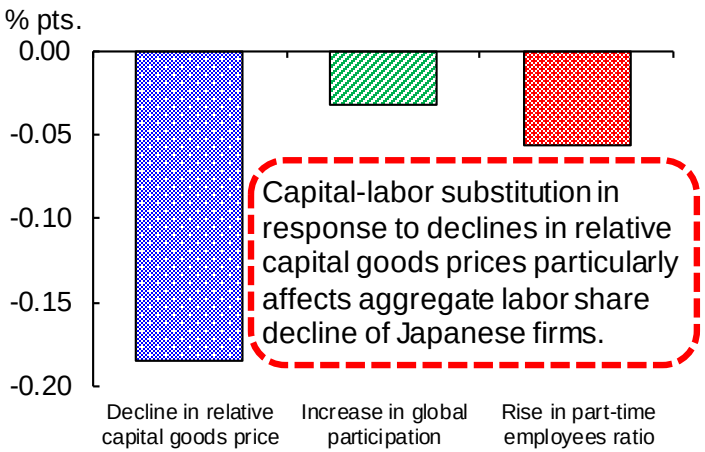
Technology-driven declines in relative capital goods prices and capital-labor substitution in response to them **account for the overwhelming part of the aggregate labor share decline** in Japan.

(1) Labor share developments (SNA base)

Labor share declines in many countries, and several drivers are pointed out, including capital-labor substitution caused by progress of innovation.



(2) Estimated contributions to Japan's labor share decline (firm-level regressions)



Capital-labor substitution in response to declines in relative capital goods prices particularly affects aggregate labor share decline of Japanese firms.

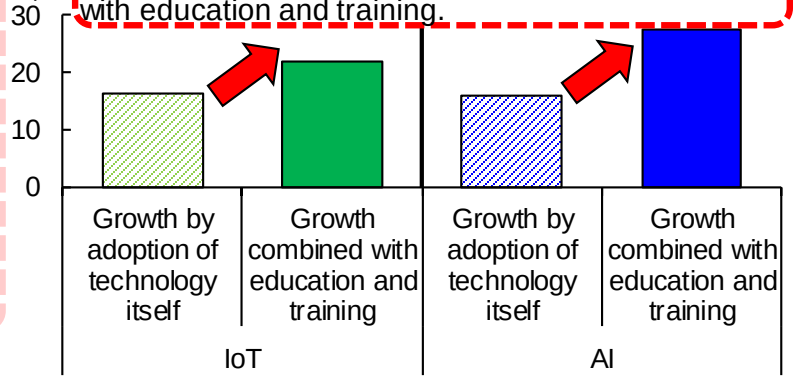
Sources: OECD.stat; Ministry of Economy, Trade and Industry, "Basic Survey of Japanese Business Structure and Activities" (firm-level panel data).
Note: Labor share in (1) is calculated as compensation of employees divided by national income (at factor cost); labor share in (2) is calculated as labor cost divided by value added.

2. Progress of innovation and productivity growth

Japan needs not only **improve productivity further** by **human resource development for innovation** and **activation of new entries of firms**; but also **take advantage of its benefits to wage increase and human capital investment**.

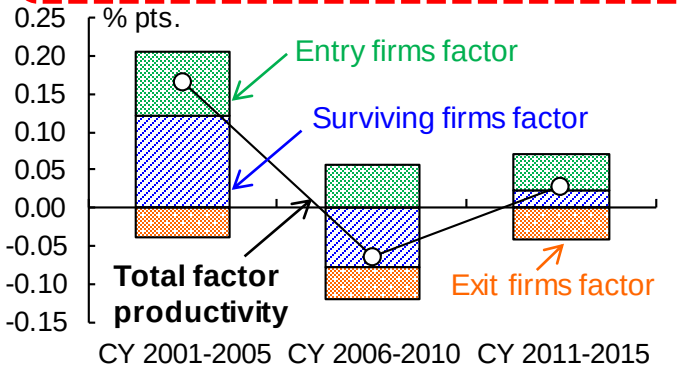
(3) Productivity growth by combination of IoT, AI and human resource development (difference in differences estimation)

Productivity is raised by adoption of new technologies. It can increase further when combined with education and training.



(4) Decomposition of Japanese firms' productivity change

Upward impact of firm entries on productivity growth is reduced. It is possible that higher productivity firms exit and lower productivity firms still survive.



Sources: Cabinet Office, "Survey on companies' attitude about workstyle, education and training", "Survey on companies' attitude toward use of new technologies and human capital to improve productivity"; Ministry of Economy, Trade and Industry, "Basic Survey of Japanese Business Structure and Activities" (firm-level panel data).