

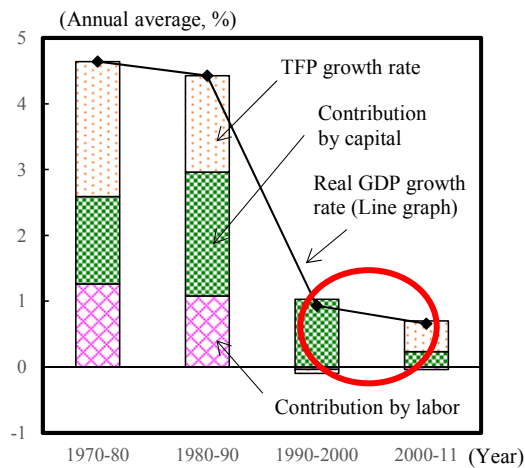
# Chapter 3 Innovation System and Productivity Growth

## Section 1 Innovation Activities During the Past Two Decades

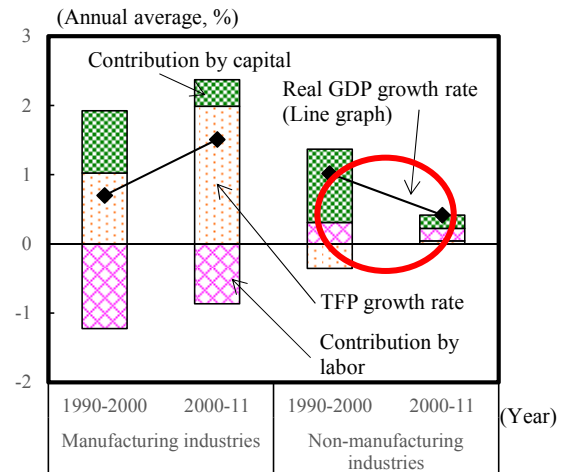
- Behind the long-lasting economic stagnation that started in the early 1990s was a lack of productivity growth, mainly in non-manufacturing industries and among SMEs.
- In non-manufacturing industries, slow progress in the usage of ICT capital has resulted in the lagging improvement in business operation efficiency, a situation which may be causing the weakness of the TFP growth rate.

Figure 3-1-2 Productivity trend as seen through growth accounting analysis

(1) Weakness of the real GDP growth rate since the 1990s and the background



(2) Breakdown of factors of growth rates of manufacturing and non-manufacturing industries

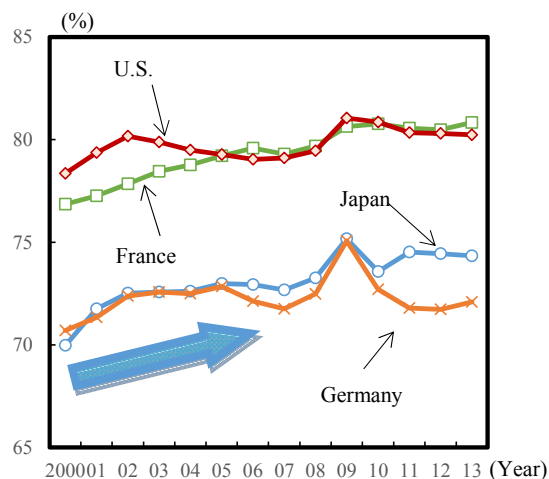


(Note) Compiled based on the JIP Database 2014, the Research Institute of Economy, Trade and Industry; the Financial Statements Statistics of Corporations by Industry, the Ministry of Finance; the System of National Accounts, and the Gross Capital Stock of Private Enterprises, the Cabinet Office.

- The shift to services industries (in which productivity growth is relatively low) in the economic structure, which is common to developed countries, has had only a limited impact on the productivity of the whole economy in the past 20 years.
- To raise the productivity of the whole economy, it is important to further raise the productivity of individual industries. It is also important to promote the allocation of resources to industries where productivity growth is high.

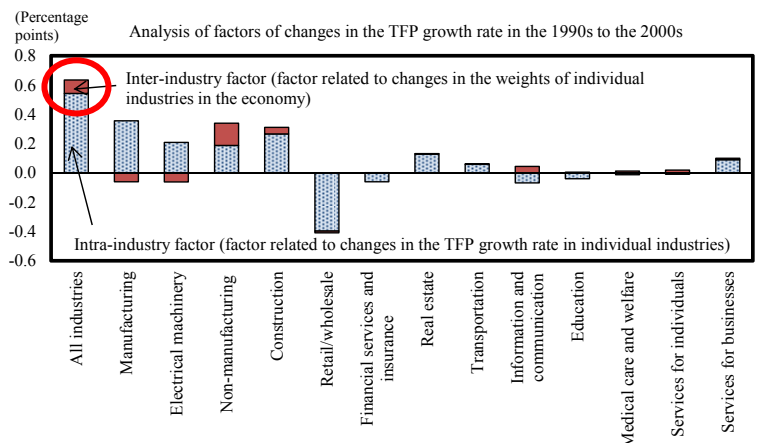
Figure 3-1-4 Share of services industries in the economy

(1) Share of services industries in nominal value-added



(Notes) 1. Compiled based on National Accounts, OECD.  
2. Share of services industries in all industries

Figure 3-1-6 Impact of changes in the economic structure on productivity



(Notes) 1. Compiled based on the JIP Database, the Research Institute of Economy, Trade and Industry.  
2. The figure for "All industries" is the macro-level figure (excluding housing and industries whose classification is unclear). The figures for industries other than "All industries" represent contributions.  
3. The TFP growth rate for "All industries" is a value obtained by totaling the TFP growth rates of individual industries with the Domar weights (the shares of the nominal output value of individual industries in the nominal value-added).

- While there is presumably extra room for productivity growth in services industries, it is also important to make better use of ICT investment, promote R&D activity, which is sluggish compared with abroad, and foster personnel with management skills.
- Japan's services industries have the reputation of outperforming their U.S. counterparts in service quality in many fields. On the other hand, Japanese supermarkets and coffee shops, for example, have the reputation of providing expensive services compared with quality.

Figure 3-1-7 R&D cost ratio in manufacturing and non-manufacturing industries in major countries

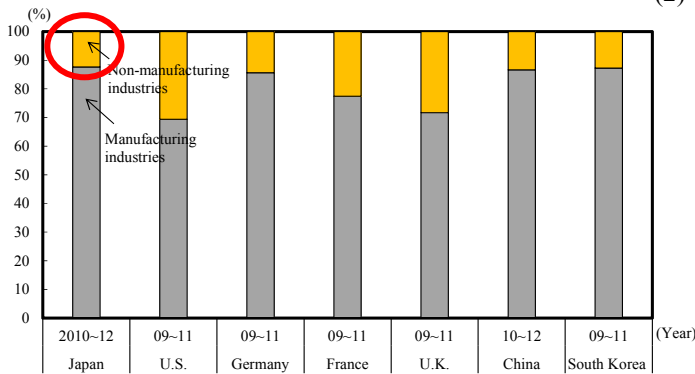
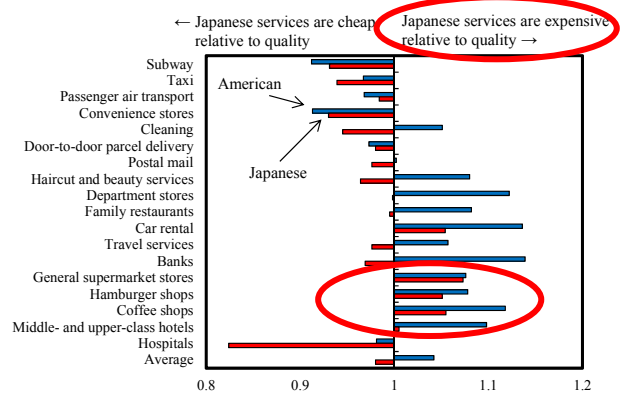


Figure 3-1-11 Comparison between Japan and U.S. in terms of quality and price in the field of services

(2) Comparison between Japan and U.S. in terms of service price



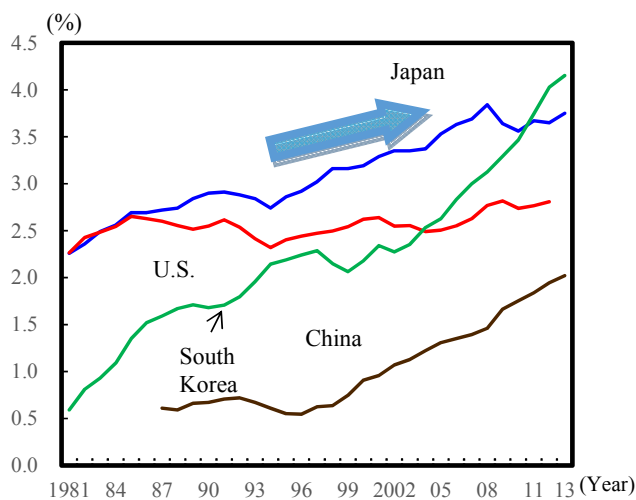
(Notes) (Left) Compiled based on the Japanese Science and Technology Indicators 2014, the Ministry of Education, Culture, Sports, Science and Technology and the National Institute of Science and Technology Policy.

(Right) Compiled based on the Survey Report on Differences between Japan and U.S. in the Quality Level of the Same Services Sectors, Socio-Economic Productivity Center, council on services industry productivity. The survey period was 2008-2009.

- Japan as a whole, including the public and private sectors, are proactively conducting innovation activities, including R&D and patent applications. On the other hand, there is a concern on innovation efficiency.
- It is important to establish an innovation system which creates innovations and uses the benefits of innovations to achieve economic growth by looking at the economy and society from a broad perspective.

Figure 3-1-12 Innovation as seen through input indicators

(1) Changes in total R&D expenditures (as a proportion of GDP)

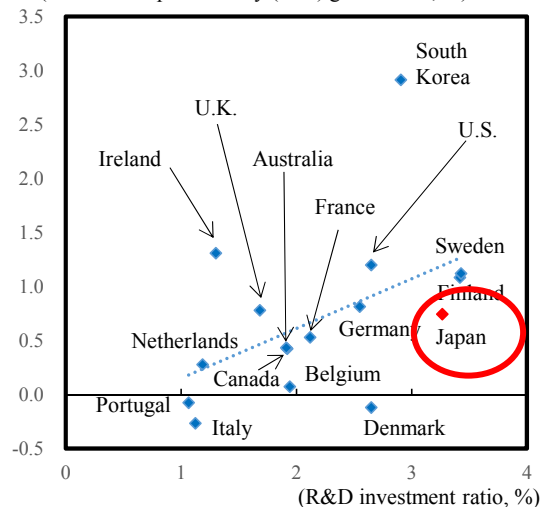


(Note) Compiled based on the Japanese Science and Technology Indicators 2014, the Ministry of Education, Culture, Sports, Science and Technology and the National Institute of Science and Technology Policy.

Figure 3-1-13 Innovation as seen through output indicators

(1) International comparison of trends in R&D activities and productivity

(Total factor productivity (TFP) growth rate, %)



(Notes) 1. Compiled based on OECD. Stat.  
2. "R&D investment ratio" is a ratio to GDP.  
3. Average for 2000 to 2012

## Section 2 Toward Promoting Innovation Activities

- The key to improving the innovation system is promoting personnel exchanges across the boundaries of companies, business types, and the industry, academia and government sectors.
- To create innovations and promote rejuvenation of industries, it is important to provide growth funds not only to major companies but also to competitive SMEs, particularly venture companies.

Figure 3-1-9 Obstructive factors for companies not conducting innovation activities  
(2) Services industries



(Notes) 1. Compiled based on the Third Report on the Japanese National Innovation Survey, the National Institute of Science and Technology Policy.  
2. The above figures represent the total of the proportions of companies which selected one of the replies “decisively obstructed,” “somewhat obstructed” or “slightly obstructed” with regard to each obstructive factor in the companies which replied that they did not conduct product or process innovation activities.

- Most R&D funds raised by the corporate sector are used by companies themselves, with only a small portion used for R&D activities at universities. It is important to promote cross-sectoral partnerships.
- Regarding international partnership, the ratio of international joint patent applications to overall international patent applications is low. It is important to conduct activities to promote open innovation.

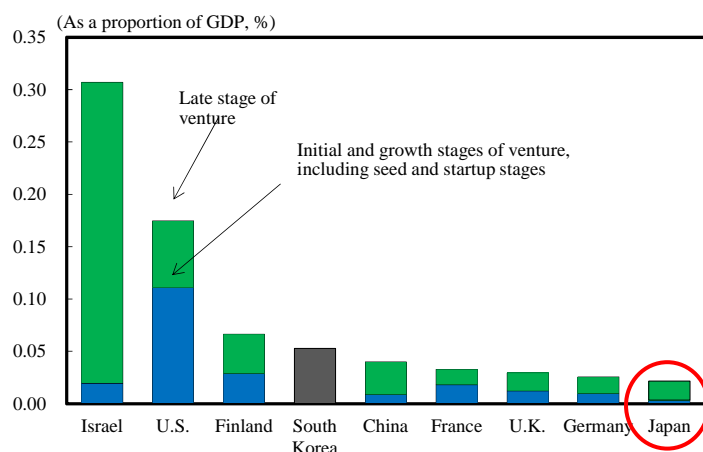
Table 3-2-4 Procurement and use of total R&D funds by institution category in Japan

(1) R&D fund procurement share by institution category and recipients of the funds

	R&D fund procurement share by institution category	Recipients of the procured R&D funds			
		Government	Universities	Companies	Total
Government* 1	18.1%	54.4%	40.2%	5.4%	100.0%
Universities	5.9%	0.6%	99.3%	0.1%	100.0%
Companies	75.5%	0.6%	0.5%	98.9%	100.0%
Abroad	0.5%	9.6%	1.6%	88.8%	100.0%

(Notes) (Left) 1. Including non-profit research institutions.  
2. Compiled based on the OECD R&D Statistics Database.  
(Right) Compiled based on the Science, Technology and Industry Scoreboard 2013, OECD.

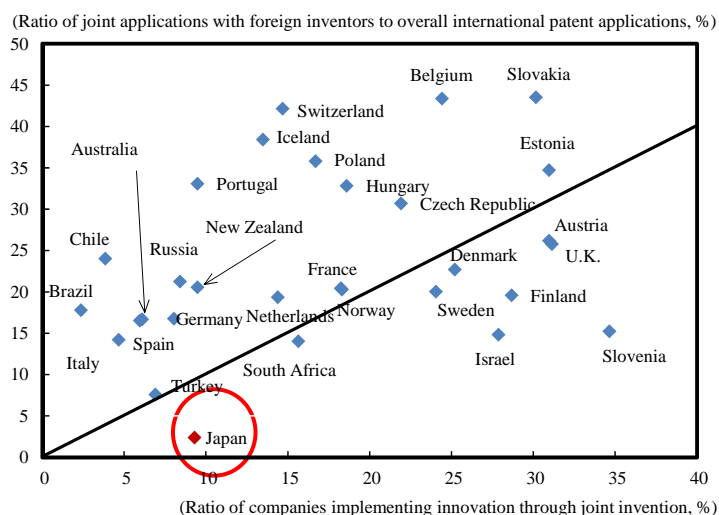
Figure 3-2-3 Trend in venture capital investment  
(1) International comparison of venture capital investment (as a proportion of GDP) (in the early 2010s)



(Notes) 1. Compiled based on the Economic Surveys: Japan 2015, OECD.  
2. The figure for South Korea is the total value.

Figure 3-2-5 Trend in open innovation

(1) Ratio of international joint applications to overall international patent applications (Trend around 2010)



- Japanese' companies ROE has stayed low by international standards. However, since 2013, there has been improvements in profitability-related indicators. On the other hand, like U.S. and European companies, Japanese companies have accumulated internal reserves and have increased cash holdings.
- It is important to enhance the mechanism that encourages proactive business decisions that take into consideration the enhancement of corporate value.

Figure 3-2-6 International comparison of corporate profitability

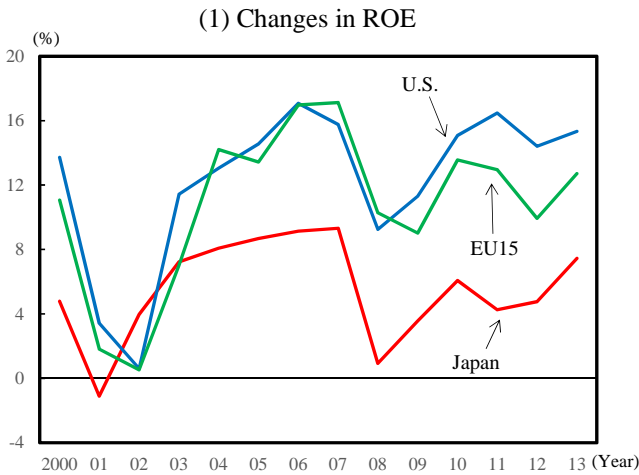
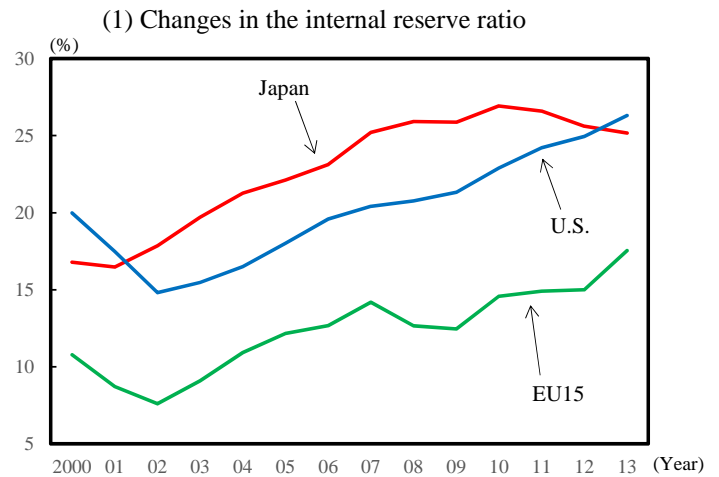


Figure 3-2-7 International comparison of internal reserves and cash holdings



- (Notes) 1. Compiled based on "Osiris," BvD. The internal reserve ratio = Earned surplus/gross assets.  
 2. EU15 are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and U.K..

- Regarding the relationship between the cash ratio and profits, the more active a company is in making investment, the more profitable it is. Companies achieving robust earnings are expected to improve fund efficiency and create innovation by actively using cash for new capital investment and M&As.
- Innovation creation has spillover effects on the demand aspect of the economy by unlocking potential demand.

Figure 3-2-8 Relationship between the cash ratio and ROA

- (1) Companies with many investment opportunities      (2) Companies with few investment opportunities

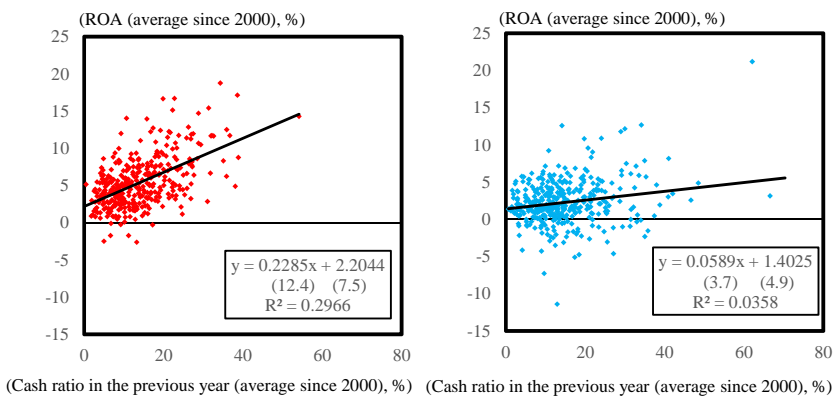
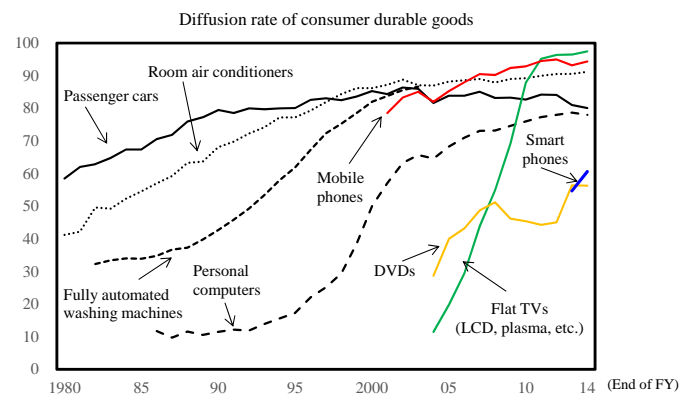


Figure 3-2-11 Arrival and diffusion of new products through innovation



- (Note) Compiled based on the Consumer Confidence Survey, the Cabinet Office.

- (Notes)  
 1. Compiled based on "Osiris," BvD. Cash ratio = Cash and cash equivalents/gross assets. ROA=Net profit/gross assets.  
 2. The figures in (1) and (2) cover 1,102 listed companies in Japan for which data on ROA, the cash ratio, tangible fixed assets and gross assets in 2000 to 2013 are available.  
 3. Regarding the classification of companies by investment opportunity, companies in the top one-third in terms of the average of the investment-to-gross asset ratio=increase in tangible fixed assets/gross assets in the previous year since 2000 (simple average) are classified as "companies with many investment opportunities" and companies in the bottom one-third are classified as "companies with few investment opportunities."