

### **(Box 2) Developments in Japan's TFP in Recent Years**

In this Outlook Report, Japan's TFP growth rate by industry was measured using GDP statistics based on the new base year, the capital stock series data, and the labor input data. Then, with reference to the previous studies in the United States, the TFP growth rate by industry was categorized into four groups: (1) the information technology (IT)-producing sector, (2) the IT-using sector, where IT usage is relatively high, (3) the sector where value-added is difficult to measure ("difficult-to-measure sector"), and (4) other (Box Chart 6 [1]).

The results of measurement suggest that the TFP growth rates in the IT-producing sector and IT-using sector have been decelerating since the middle of 2000s, as was stressed by Gordon (2016) and Fernald (2015) using the U.S. data. This implies that the effects of pushing up productivity by IT as "general purpose technology" appear to have been waning in recent years (Box Chart 6 [2] and [3]).<sup>37</sup> Currently, the industry that pushes up Japan's TFP, instead of IT-related industries, is construction, which enjoys favorable business conditions driven by such factors as Olympic Games-related investment and urban renewal-related investment. It should be noted, however, that the TFP growth rate of the construction industry is particularly difficult to measure accurately.

Specifically, it is pointed out that construction investment data in the GDP statistics have the following problems: (1) the data are basically estimated from the construction completed, mechanically assuming that progress has been made on schedule after orders and construction starts, but the construction completed may have been somewhat overestimated in recent years due to the delay in construction resulting from labor shortage; (2) the construction cost deflator used for deflating the nominal amount in real terms is calculated on a basis of input-cost, which mainly consists of labor costs and construction material costs, but may not fully reflect the rise in real estate and housing prices in recent years, and thus may be biased downward; and (3) investment for renovation and renewal,

<sup>37</sup> Robert J. Gordon, *The Rise and Fall of American Growth: The U.S. Standard of Living since the Civil War*, Princeton University Press, 2016.

John G. Fernald, "Productivity and Potential Output before, during, and after the Great Recession," *NBER Macroeconomics Annual 2014*, Vol. 29, 2015, pp. 1-51.

which has been on the rise in recent years, is not fully reflected in the data. These problems are highlighted as one focus for statistics reform initiative recently, and are being debated to improve the accuracy of the data.<sup>38</sup>

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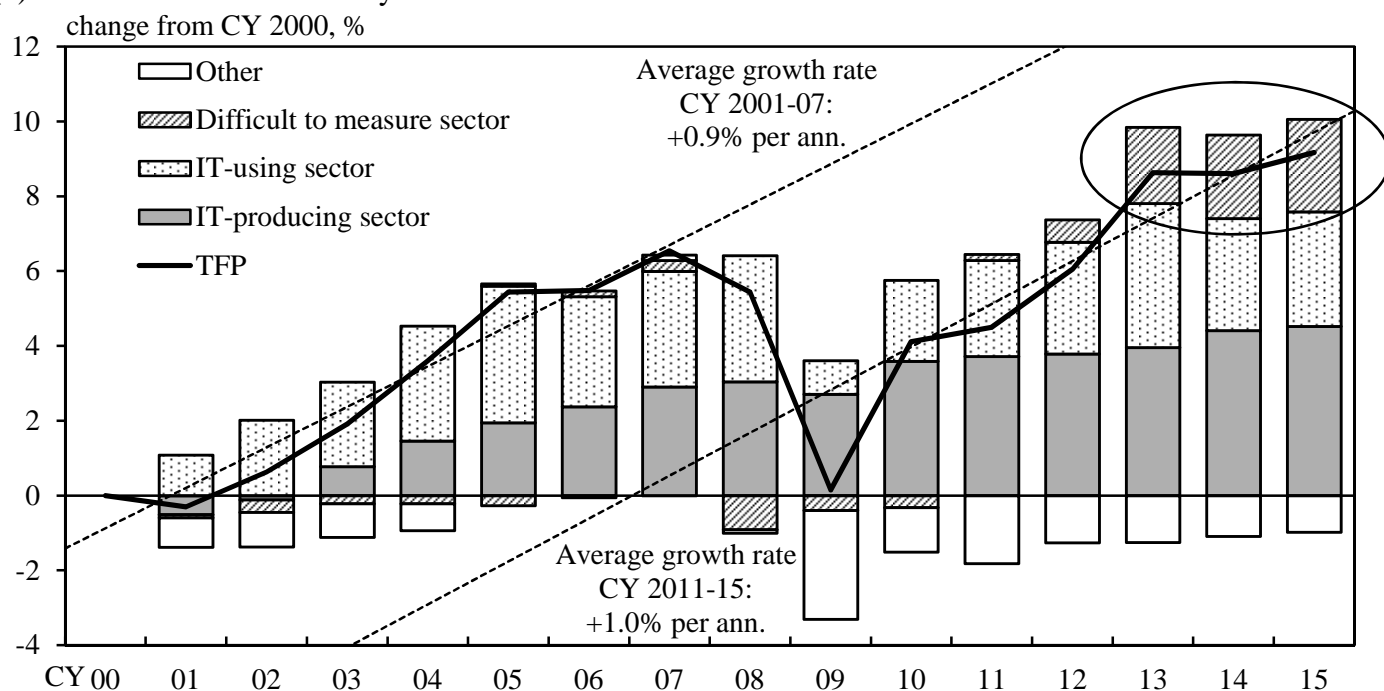
<sup>38</sup> For initiatives to improve the accuracy of the data for GDP statistics, see the Basic Policy for the Fundamental Reform of Economic Statistics released on December 21, 2016, by the Council on Economic and Fiscal Policy, and the interim report released on April 14, 2017, by the Council for the Promotion of Fundamental Reform of Economic Statistics.

## Total Factor Productivity (TFP)

### (1) Classification of Industries

IT-producing sector (3 industries) GDP share: 4%	Electronic components and devices; electrical machinery, equipment and supplies; information and communication electronics equipment
IT-using sector (9 industries) GDP share: 49%	9 industries in which the ratio of software investment to GDP is relatively high: Information and communications; transport and postal services; wholesale and retail trade; accommodation and food service activities; professional, scientific and technical activities; electricity, gas and water supply and waste management service; chemicals; textile products; other manufacturing
Difficult to measure sector (3 industries) GDP share: 26%	3 industries whose GDP is difficult to measure: Construction; real estate; finance and insurance
Other (9 industries) GDP share: 21%	Food products and beverages; pulp, paper and paper products; petroleum and coal products; non-metallic mineral products; basic metal; fabricated metal products; general-purpose, production and business oriented machinery; transport equipment; other service activities

### (2) Cumulative TFP Growth by Sector



### (3) Average Growth Rate of TFP

Annualized average growth rate, %	CY 1995-00	CY 2001-05	CY 2006-10	CY 2011-15
Overall	1.0	1.1	-0.2	1.0
IT-producing sector	8.4	9.0	7.7	4.9
IT-using sector	1.3	1.5	-0.6	0.4
Difficult to measure sector	-0.5	-0.2	-0.0	2.1
Other	0.6	0.1	-1.0	0.2

Notes: 1. TFP is measured as the Solow residual using SNA data classified by economic activity in the "Annual Report on National Accounts."

2. The GDP shares in the "Classification of Industries" are for 2015. The following 5 industries are excluded in the analysis above: agriculture, forestry and fishing; mining; public administration; education; and human health and social work activities.

Source: Cabinet Office.