

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Telecommunications Policy

URL: www.elsevier.com/locate/telpol

Why was Japan left behind in the ICT revolution?

Kyoji Fukao^{a,*}, Kenta Ikeuchi^b, YoungGak Kim^c, Hyeog Ug Kwon^d^a Hitotsubashi University, Japan^b National Institute of Science and Technology Policy, Japan^c Senshu University, Japan^d Nihon University, Japan

ARTICLE INFO

Available online 14 March 2016

Keywords:

Information and communication technology

ICT revolution

Japan

Total factor productivity

ABSTRACT

In this paper, we investigate why information and communication technology (ICT) investment in Japan has stagnated since the 1990s. Given that a notable characteristic of Japan's economy is that small as well as older firms play a much greater role than in other economies, particularly the United States, our analysis mainly focuses on firms' size and age. As a first step of our investigation, using firm-level data, we examine whether larger and/or younger firms tend to have a higher ICT intensity. We find that larger firms indeed have a higher ICT intensity. In the case of firm age, there was no simple linear relationship between firm age and ICT intensity. As a next step, we estimate a Cobb–Douglas type production function and test whether the ICT input coefficient differs across different firm-size groups and firm-age groups. We find that larger firms and younger firms tend to have a higher ICT input coefficient. Another factor that may be responsible for differences in ICT intensity by firm size and firm age is constraints on ICT input. To check whether this is the case, we calculate the marginal product of ICT input by firm-size group and firm-age group using the production function estimates. We find that smaller firms and younger firms tend to have a higher marginal product of ICT input. These findings suggest that smaller firms and younger firms face constraints that prevent them from increasing ICT input.

We also examine impediments to the full use of ICT by Japanese firms, based on our analysis as well as preceding studies. We find that to enhance ICT input, the government should develop the market for business process outsourcing, which includes outsourcing of ICT processes, and resolve the scarcity of ICT experts, by supporting the training of ICT experts at universities and making it easier for foreign ICT experts to work in Japan.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Using firm-level data for Japan, this paper investigates why Japan was left behind in the information and communication technology (ICT) revolution.¹ Whereas the US economy experienced a dramatic increase in total factor productivity (TFP) growth from the mid-1990s to the early 2000s, Japan suffered a significant slowdown in TFP growth after 1991. One of the main causes of this difference is that Japan could not achieve an ICT revolution like that in the United States.²

* Corresponding author.

E-mail address: k.fukao@r.hit-u.ac.jp (K. Fukao).¹ This study was conducted as part of the project "East Asian Industrial Productivity" at the Research Institute of Economy, Trade and Industry. We would like to thank anonymous referees and the editors of this journal for their helpful comments.² On the ICT revolution in the United States, see [Jorgenson and Stiroh \(2000\)](#) and [Jorgenson \(2001\)](#).

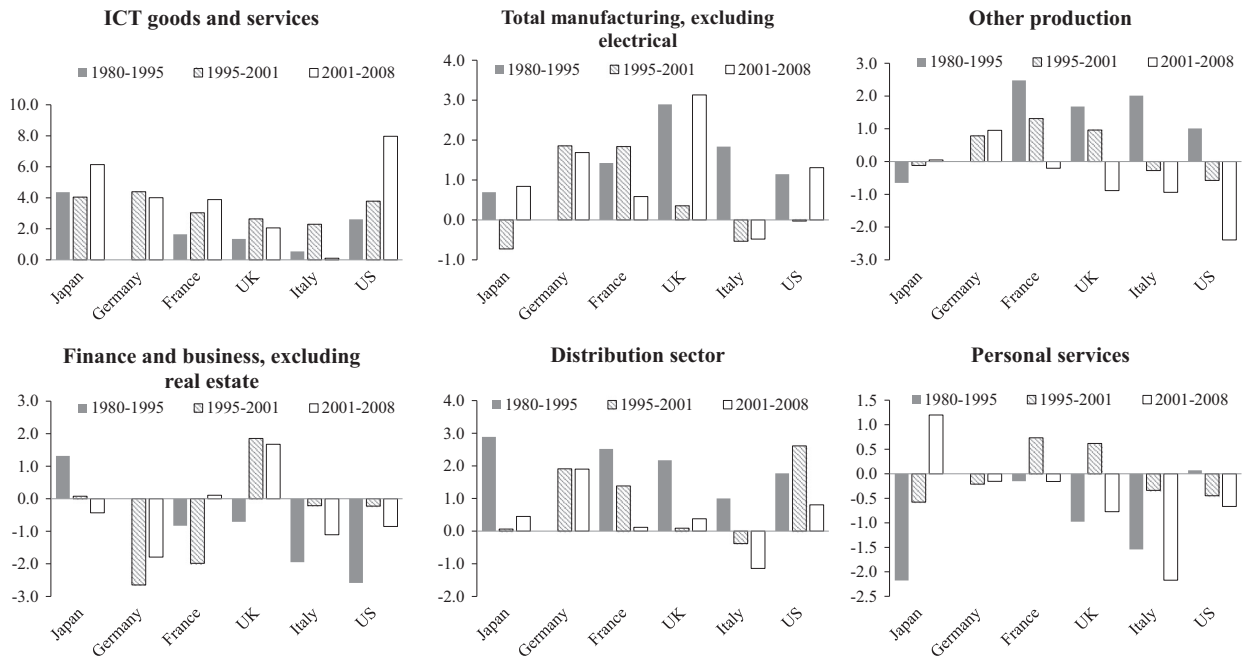


Fig. 1. TFP Growth in the market sector, by sector and country: 1980–1995, 1995–2001, and 2001–2008 (annual rate, %).
Source: EU KLEMS database, rolling updates.

In Fig. 1, the market economy is divided into six sectors and average annual TFP growth rates in each sector before and after 1995 are compared across six major developed economies. The figure shows that the United States experienced an acceleration of TFP growth not only in the ICT-producing sector (electrical machinery, post and communication), but also in ICT-using sectors, such as distribution services (retail, wholesale and transportation) and all other manufacturing (i.e., excluding electrical machinery).³ Japan also experienced relatively high TFP growth in the ICT-producing sector. The problem for Japan, however, is that TFP growth in ICT-using service sectors, such as distribution services, and manufacturing other than electrical machinery declined substantially after 1995. Moreover, these ICT-using sectors are much larger than the ICT-producing sector: the average labor input share (hours worked) of the ICT-producing sector in Japan's total labor input in 1995 was only 4.1% (similar to the corresponding share in the United States of 3.8%). On the other hand, the labor input shares of distribution services and all other manufacturing in 1995–2007 were 22.8% and 16.5%, respectively.⁴ It is also interesting to note that, like Japan, France and Italy experienced a slowdown of TFP growth in ICT-using sectors such as distribution services manufacturing other than electrical machinery in the 2000s. On the other hand, Germany experienced high TFP growth in these ICT using sectors. In the case of the United Kingdom, TFP growth accelerated in manufacturing other than electrical machinery but slowed down in distribution services in the 2000s.⁵

Why did an ICT revolution of the magnitude observed in the United States not occur in Japan, France, and Italy? One possible explanation is the small ICT investment in ICT-using sectors in these countries.⁶ Table 1 shows the contribution of increases in ICT capital service input to sectoral (and market economy total) real gross value added growth in the six major countries. The figures indicate that in the period 1995–2000 the contribution of ICT investment to economic growth (market economy) in Japan was not substantially smaller than in the United States, but then declined notably after 2000. At the sectoral level, Japan registered active ICT investment in ICT goods and services but in most of the other sectors ICT investment was much less active than in the United States in both the sub periods. France and Italy, just like Japan, also experienced a sharp decline in the growth of ICT service input in most sectors (with ICT goods and services in France being an exception). On the other hand, the United Kingdom experienced continued active ICT accumulation in the 2000s both in the economy as a whole and at the sector level in manufacturing, finance and business, and distribution services. Meanwhile, ICT accumulation in Germany also decelerated notably in the 2000s, although it remained relatively high in distribution services.

However, the relationship between ICT investment and TFP growth is not straightforward. For example, although the United Kingdom experienced high levels of ICT investment in the distribution sector, TFP, unlike in the United States, did not

³ The acceleration of TFP growth in the rest of the manufacturing sector in the United States occurred during the period 2001–2008.

⁴ Basu et al. (2003) have shown that more than 70% of TFP growth in the United States during 1995–2003 occurred in the wholesale and retail industry. Meanwhile, for Japan, Fukao and Miyagawa (2008) have shown that about 70% of TFP growth during 2000–2005 occurred in the ICT-producing sectors.

⁵ For more details on the low TFP growth in the ICT-using sectors of some European countries, see Inklaar, Timmer, and van Ark (2006).

⁶ For more details on this issue, see Fukao et al. (2012).

Download English Version:

<https://daneshyari.com/en/article/556535>

Download Persian Version:

<https://daneshyari.com/article/556535>

[Daneshyari.com](https://daneshyari.com)