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ICT investment-specific technological change and productivity growth in Korea: Comparison of 1996–2005 and 2006–2015☆

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ABSTRACT

This paper analyses the impact of information and communications technology (ICT) on the productivity growth in Korea with the dynamic general equilibrium (DGE) model including investment-specific technological change. According to the balanced growth path analysis, ICT investment-specific technological change accounts for 18.8% to labor productivity growth in 1995–2005, then 14.3% in 2006–2015, and the decline in the rate of ICT investment-specific technological change has contributed to the slow productivity growth since the mid-2000s. In cyclical fluctuations, ICT investment-specific technological shocks were significant in output variance in 1996–2005, but neutral technological shocks and non-ICT investment specific shocks became dominant in 2006–2015. In sum, it can be concluded that the impacts of ICT investment-specific technology have diminished in the growth path and cyclical fluctuations. The result that increased (decreased) ICT investment intensity with faster (slower) ICT investment-specific technological change lead to higher (lower) productivity growth indicates that Korea has been a case against the productivity paradox, and sustained technological progress in ICT and expansion of ICT usage could have boosted the productivity growth. Therefore, this study implies that facilitating ICT progress and ICT usage outside of the already well-performing ICT manufacturing can help Korean economy raise the productivity growth rate.

1. Introduction

The information and communications technology (ICT hereafter) has been considered as a source of sustained productivity growth. And Korea is an interesting case to study the relationship between ICT and economic growth. ICT industry holds a significant position in Korean economy, as ICT industry produced 10.1 percent of GDP and exported 32.6 percent of Korean aggregate exports in 2015, as reported by the Bank of Korea. Compared to other countries, Korean economy is certainly ICT industry-heavy (Fig. 1(a)). However, Fig. 1(b) presents another aspect of Korean economy. Unlike the large share of ICT output in total value added, the share of ICT investment in total investment is rather modest, and it has declined drastically.[1] In other words, Korean economy is a type of economy that heavily relies on output and exports of ICT industry, but not much on ICT investment. This appears to have implications in the productivity growth of Korean economy.

As shown in Fig. 2, the ratio of ICT investment to non-ICT investment, or ICT investment intensity, rapidly rose during the ICT industry boom from late 1990s to early 2000s, and this trend implies an increasing usage of ICT in Korean economy during the period.

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[1] For convenience, the figure contains limited countries that have data for all years from 2000 to 2010.

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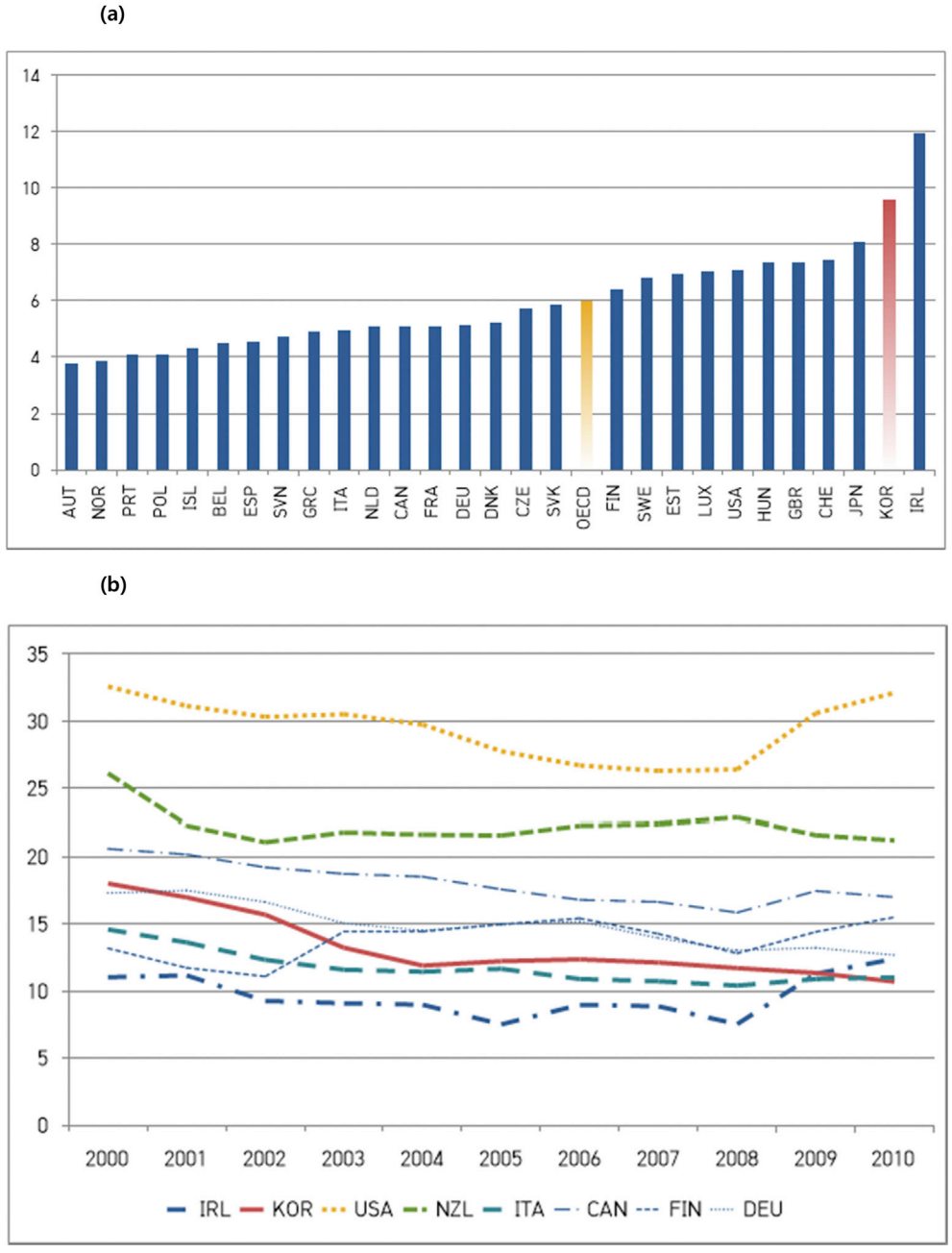

Fig. 1. (a) Share of ICT value added of total value added (2011, %). (b) Share of ICT investment in total investment (2000–2010, %).
Source: OECD Innovation and Technology data (https://data oecd.org/innovation-and-technology.htm#profile-Information%20and%20communication%20technology%20 (ICT), downloaded: June 14, 2017).

Afterwards the ICT investment to non-ICT investment ratio stopped increasing and has been stagnant. This change coincides with the transition from high productivity growth to low productivity growth at the mid-2000s (Fig. 3).[2] Considering the potential economic impacts of ICT to productivity, the co-movement of ICT investment intensity and productivity growth suggests that Korean economy might be a case against the productivity paradox. This paper attempts to quantify such transition with investment-specific technological change, and assesses the role of ICT investment in the productivity growth.

This analysis is based on the dynamic general equilibrium model with investment-specific technological change developed by

[2] The average growth rate of the GDP per hour worked (constant prices) is 5.2 percent for 1996–2005, and 3.3 percent for 2006–2015 respectively.