

Innovation, accumulation and assimilation: Three sources of productivity growth in ICT industries

Carmen López-Pueyo, María-Jesús Mancebón*

Department of Applied Economics, University of Zaragoza, Gran Vía, 2, 50005 Zaragoza, Spain

Received 1 September 2009; received in revised form 1 January 2010; accepted 1 February 2010

Available online 1 March 2010

Abstract

The purpose of this article is to explore the sources of labour-productivity growth in ICT (*Information and Communication Technologies*) sector in a set of developed countries. The appropriate technology theory extended with non-immediate spillovers is the theoretical framework used, while the decomposition analysis is carried out from a non-parametric approach. Obtained results point that high labour-productivity growth rates are mainly due to technical change and, to a lower extent, to capital intensification, while differences in speed of spillover assimilation has not been enough to shorten the existing distances to new frontiers (excluding USA). Policies that affect the incentives to invest in physical capital, as well as to create new knowledge and to favour the willingness to adapt to change are needed to foster labour-productivity growth in an industry that has a leading role for economic growth and social progress of nations in the 21st century. © 2010 Society for Policy Modeling. Published by Elsevier Inc. All rights reserved.

JEL classification: C61; D24; L63; O3; O47

Keywords: ICT; Productivity; Malmquist index; Localized innovation; Catching up; Hedonic prices

1. Introduction

Both the so-called fifth technologic wave, and the “new economy” the former has given rise to, are supported on Information and Communication Technologies (hereafter, ICT).¹ This “new economy”—which has proven its capacity to improve productivity, economic growth and peoples’ living conditions— results from structural transformations taking place in production networks and society as a consequence of the increasing, extended and intense application of new technolo-

* Corresponding author. Tel.: +34 976 761 841; fax: +34 976 761 840.

E-mail address: mjmance@unizar.es (M.-J. Mancebón).

¹ See Pérez (2002) and Freeman and Louça (2001).

gies. This technology wave has a micro-electronic basis and can be exemplified mainly through the application of ICT to economic processes and social customs.

According to the [OECD \(2003\)](#), these technologies influence growth through three main channels, namely: (1) rapid productivity growth in ICT manufacturing and the increasing size of these industries; (2) intensification of investment in equipment, incorporating information and communication technologies, and subsequent improvement in labour productivity; and (3) spillover effects on productivity generated by these technologies.

In view of the relevance of ICTs and focusing on the first channel, the aim of this paper is analysing the effects of localized technological progress, appropriate technology conditions and differences in speed of spillover assimilation on labour-productivity growth in the ICT industry during the last two decades of the 20th century in a set of developed countries. The contribution of each of these effects to convergence/divergence patterns in labour productivity are analyzed within the theoretical context of the [Basu and Weil \(1998\)](#) model, extended with non-immediate spillovers ([Los & Timmer, 2005](#)). Thus, different national development paths shall arise, clarifying the roles of alternative policies in growth.

Unlike other previous works ([Färe, Grosskopf, & Margaritis, 2006](#); [Kumar & Russell, 2002](#); [Los & Timmer, 2005](#); [Timmer & Los, 2005](#)), this paper follows a sectorial approach which allows a more accurate study of convergence/divergence patterns in OECD countries, as [Bernard and Jones \(1996\)](#) pointed out. This is due to the fact that convergence driven by technology diffusion occurs at level of industries (or products) rather than at aggregate level. For that reason, if countries experience different patterns of industrial specialization, convergence at industry level might not be reflected in aggregate studies. On the other hand, sector-specific analyses allow a better approach to the empirical approximation to of the appropriate technology concept. In this paper, the sector object of analysis is, as it has already been explained, ICT-producing manufacturing industries.

Special attention is paid to the accurate measurement of the variables used in the article, due to the nature of the industry and the difficulties of international and intertemporal productivity analysis ([OECD, 2001](#)). By one hand, [Inklaar, O'Mahony, and Timmer \(2003\)](#) expose the rapid quality change that suffers the ICT industry and so, the need to properly deflated current values by hedonic prices. On the other hand, [Inklaar and Timmer \(2007, 2009a, 2009b\)](#) offer a systematic analysis about the consequences of measurement error in productivity comparisons.

Empirical analysis shall be based on a frontier non-parametric intertemporal approach ([Tulkens & Van den Eeckaut, 1995](#)) which allows decomposing labour-productivity growth in three parts ([Kumar & Russell, 2002](#)): movement towards the frontier (gains of efficiency), movements along the frontier (capital accumulation) and movements of the frontier itself (technical change or innovation). This approach allows measuring the theoretical concepts proposed by [Basu and Weil \(1998\)](#) and [Los and Timmer \(2005\)](#).

The paper is organized as follows. Section 2 presents the theoretical framework; Section 3 sets up the database used in the research and the methodological issues; the fourth section discusses the results about global frontiers and productivity growth paths. The paper finishes with a conclusions section.

2. Theoretical framework

[Basu and Weil \(1998\)](#) introduced a new theoretical model of international growth dynamics which may explain the patterns of international convergence and divergence observed in developed economies.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات