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# Information and communication technologies and their impact in the economic growth of Latin America, 1990–2013 <sup>☆</sup>



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## ABSTRACT

This article examines the contribution of information and communications technologies (ICT) to economic growth and productivity in Latin America in the period 1990–2013. Increased ICT investment explains an important part of the acceleration of economic growth in the United States since 1995. An objective of this study is to verify if the same happened in Latin America. The analysis is presented at two levels. First, the study takes into account the aggregate level of the economy, for a set of 18 countries in the region. Second, it analyzes the relationship of ICT, economic growth and productivity by sector in five countries, Argentina, Brazil, Chile, Colombia and Mexico, which are part of a project on sectoral growth analysis using a growth accounting approach (LA-KLEMS project). The decomposition of the factors that determine the gap in GDP per capita with the US showed that improvements in the labor factor have helped to reduce the gap in GDP per capita relative to the US and conversely poor labor productivity has contributed negatively. The main cause that the labor productivity gap remains is the widening gap in ICT capital that counteracts improvements in human capital in Latin America. The role of ICT has been very low, representing less than one sixth of the total capital contribution. The analysis by economic activity, using the LA-KLEMS data base for Argentina, Brazil, Chile, Colombia and Mexico, shows that the contribution of capital is the main source of growth in the fastest growing industry, the transportation industry and communications, and went hand in hand with high investment especially in ICT.

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## 1. Introduction

This article examines the contribution of information and communications technologies (ICT) to economic growth and productivity in Latin America in the period 1990–2013. Low labor productivity in Latin America has been widely documented, as well as the divergence of GDP per capita in the region compared to the U.S.. The literature has established that the increase in ICT investment explains an important part of the acceleration of growth in the U.S. (U.S.) since 1995.

A primary objective of this study is to verify if the same happened in Latin America. It specifically aims to estimate investment in ICT in a group of countries of Latin America and explain how the low level of ICT investment is one of the

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main causes of the weak performance of labor productivity and an important source of the divergence of GDP per capita between the region and the U.S.

The analysis is presented at two levels. First, the study takes into account the aggregate level of the economy, for a set of 18 countries in the region.<sup>1</sup> Second, it analyzes the relationship of ICT, economic growth and productivity by sector in five countries, Argentina, Brazil, Chile, Colombia and Mexico, which are part of the LA-KLEMS<sup>2</sup> project.

This article is organized as follows. After the introduction, Section 2 revises the literature and describes the evolution of the level and growth rates of GDP per capita and ICT investment in Latin America. In Section 3 the methodology is presented, Section 4 presents the data sources. In Section 5 the results are analyzed and Section 6 concludes.

## 2. Evolution of per cápita GDP and ICT investment in Latin America

The use of digital technologies has increased dramatically in the World and in Latin America in the last quarter century (ITU, 2015). The impact of ICT in economic growth has been documented extensively (Inkelaar, Timmer, & van Ark, 2008; Jorgenson & Vu, 2005; van Ark, Inkelaar, & McGuckin, 2003; Vries de, Mulder, Borgo, & Hofman, 2010). Moreover, recent approaches to networking, complexity of production and diffusion of knowledge as the core of economic development underline the central role of ICT in economic growth.<sup>3</sup> At the end of the 1990s the difference in economic growth between Europe and the U.S. was a matter of great concern in the European Union. A possible explanation for the difference was the greater production and use of ICT in the U.S.. The EU-KLEMS project established the role of ICT in economic growth with analysis at the industry level of investment in ICT goods and services (Timmer, Inkelaar, O'Mahony, & van Ark, 2010).

The digital economy has three main components: Communication equipment, computers and software. ICT production contributes directly to economic growth by satisfying the increasing demands for their products and also through increased productivity and investments in ICT using industries. Greater production and use of ICT was found in the US as compared with European countries, especially in market services (van Ark, Gupta, & Erumban, 2011).

In Latin America analysis on the impact of ICT in economic growth are scarce. Capital formation in ICT was estimated in Latin America and especially Brazil had relatively high levels (Vries de et al., 2010). Balboni, Rovira, and Vergara (2011) make use of micro data to study the impact of ICT in Latin America. In Cimoli, Hofman, and Mulder (2010) the impact of ICT in Latin America was analyzed using different approaches. ECLAC'S latest publication on the digital economy stresses the use of ICT in the production process (ECLAC, 2015b) and in ECLAC (2013) ICT, structural change and equity was analyzed.

ICT analysis on the sectoral level in Latin America is even more limited. The most recent advance is in the LA-KLEMS project on where ICT and economic growth were analyzed at the industry level (Hofman, Mas, Aravena, & Fernandez de Guevara, in press). In Restuccia and Rogerson (2013) the sectoral productivity performance of Latin American countries is compared with the U.S.. Productivity growth in the agricultural, industrial, and services sectors was below that in the U.S. during 1950–2000. The exception is the agricultural sector in Chile, which has been catching up since the 1980s. The fall in relative productivity was more marked in the services sector. Restuccia and Rogerson (2013) makes use of the 10-sector database of the Groningen Growth and Development Centre (GGDC) which does not have information on capital stock by sector.

Vergara and Rivero (2006) used capital per industry data from the Banco Central de Chile to calculate industry TFP growth in Chile during the period 1986–2001. The average annual TFP growth was highest in the *Wholesale and retail sector* and lowest in the *Manufacturing* industry. This high TFP growth in the service sector could be related to the of ICT adoption, which are relatively large in this sector. Fuentes and García (2014) analyze productivity growth in nine sectors in Chile to explain recent lower TFP growth. They indicate that the increase in the minimum wage, especially for industries intensive in labor like manufacturing, construction and retail, and the increase in energy costs could explain lower TFP growth. Rodríguez et al. explore econometrically, using panel estimations, the impact of ICT in the level of innovation in Latin America and the Caribbean. Finally, Restuccia (2013) emphasizes that both low labor productivity and total factor productivity growth in Latin America explain much of the poor performance in terms of GDP growth.

Szirmai, Naudé, and Alcorta (2013) summarize the literature with respect to the manufacturing industry and its importance in the development process and emphasize its role in the 19th and 20th century. Szirmai and Verspagen (2010) stress the role of the manufacturing industry sector especially during periods of accelerated growth. Timmer and de Vries (2009) point out that the manufacturing sector has become less important in recent periods.

During the 1990s Latin America showed an economic growth of 4.2% (annual average), which represented a recovery with respect to growth experienced by the region during the 1980s, when average growth only reached 1%. Despite this, the Latin American region exhibits a slight deterioration in its per capita GDP compared with the U.S. In the 2000 decade, the region grew at an annual average rate that allowed it to reduce its per capita GDP gap with US, see Table 1.

<sup>1</sup> The 18 countries included in this part of the study are: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, Dominican Republic, Uruguay and Venezuela (the Bolivarian Republic of). In the remainder of this article the Plurinational State of Bolivia will be named Bolivia and the Bolivarian Republic of Venezuela will be named Venezuela.

<sup>2</sup> The LA-KLEMS project is coordinated by the Economic Commission for Latin America and the Caribbean, ECLAC of the United Nations. The project started with 4 countries, Argentina, Brazil, Chile, and Mexico and later on additional countries, Colombia, Costa Rica and Peru, joined the project.

<sup>3</sup> Hidalgo and Cesar (2015), and Hausmann et al. (2014) argue that ICTs lower the cost of storing and reproducing crucial codified information to develop economic complexity and – in complement with the human capital-accelerate economic growth.

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