

Chapter 10

Does Information and Communication Technologies Sustain Economic Growth?

The Underdeveloped and Developing Countries Case

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ABSTRACT

This chapter tests the impact of ICT on economic growth for underdeveloped and developing countries by using a panel dataset for the period of 1995-2006. The authors first develop the theory of the relationship between ICT and economic growth. They show that ICT-capital has a positive effect both on long-run and transitional income per capita, if it is considered as a factor of production. Next, the authors estimate a panel data set with 131 underdeveloped and developing countries under the assumption that ICT is one of the determining factors of economic growth. They find that ICT has positive and significant effect on economic growth even after the use of some control variables.

INTRODUCTION

In the mid 1990s and early 2000s, a popular, but unsubstantiated belief was that information and communication technologies (ICT) would change

the world so quickly that the world would witness rapid (and perhaps sustainable) growth and productivity gains in the years to come.¹ This belief caused a big bubble in the world economy and especially in the US economy. In 2001, the bubble burst and the world has since returned to a “brick-and-mortar” economy.² It was soon realized by many that the

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ICT revolution was just a bubble from the stock market dimension. The negative experience of the stock market, however, stressed only the speculative aspects of the ICT revolution. In fact, the ICT revolution led to positive concrete changes in the real economy. In particular, it created a huge goods and services economy with strong forward and backward linkages. Given its overwhelming impact, the ICT revolution has begun to be classified by many economists as a general-purpose technology, as in the case of steam engine and electricity.³

Many economists consider ICT a general-purpose technology due to its pervasive character: it has already become an indispensable part of production of goods and services, irrespective of industry. The literature has identified two important channels by which ICT can have real effects on real economy: production of ICT and the use of ICT (by other industries). Firstly, the ICT sector itself has rapidly become an important industry at global level coinciding with the growth of the service industries. Processors, RAMs, hard disks, motherboards, desktops, notebooks, and super-computers are just few items that ICT industry produces. It is estimated that the global marketplace for ICT will exceed \$3.7 trillion in 2008 and \$4 trillion by 2011 (WITSA, 2008). In short, the ICT production sector is very important for real economy as this industry (i) nourishes GDP, (ii) increases its share in GDP due to the characteristics of this industry: rapid technological progress, strong and persistent demand, falling (relative) prices, rising quality, and increasing product variety.

Secondly, ICT revolution has contributed significantly to the whole economy by raising productivity. First, ICT increases labor productivity in ICT-using industries by simply making labor more productive (c.f., van Ark *et al.* (2003) and Matteucci (2005)). For example, a secretary can handle the same office tasks in a shorter period due to the ICT revolution. Second, ICT makes physical capital more productive (c.f., Röllner and Waverman (2001)). A good example is the com-

puter numerical control (CNC) machine, which has increased productivity of physical capital in all manufacturing industries since its use.⁴ All in all, the ICT revolution had led to significant productivity increases in the ICT-using industries.

The discussion presented above however fails to address the issue of how individual economies are affected by the 'ICT revolution'. In particular, we need to know whether developed and developing countries benefit homogeneously from the ICT revolution. The curiosity arises from the general observation that underdeveloped and developing countries do not have a sizeable ICT producing industry and may not have the capacity to absorb full benefits of using ICT. Firstly, ICT production is concentrated in few countries (e.g., U.S., Ireland, China, and Taiwan). Much of the rest of the world, including all African, Latin America and many Asian countries, have no physical capacity to produce ICT. In this respect, ICT products are nothing but imported goods for the majority of underdeveloped and developing countries. Secondly, human capital and physical capital is a scarce factor of production for a majority of underdeveloped and developing countries. In this respect, these countries may not be able to exploit the full benefits of using ICT as they lack proper and sufficient amount of human and physical capital that complements the ICT revolution. This observation raises curiosity as to the different extents to which underdeveloped and developing countries benefit from the ICT revolution.

We believe that a good macro variable that may verify whether underdeveloped and developing countries benefit from the ICT revolution is to examine the contribution of ICT to economic growth, which is the precise aim of this study. In particular, this paper aims to investigate whether the ICT stock has had any positive effect on the long-run growth rate of underdeveloped and developing countries between 1995-2006. Figure 1 below is a descriptive representation of the question: it scatter plots the relationship between average growth rate and the ICT index in our sample data.

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