

Chapter 5

Exploring the ICT Diffusion and Economic Growth Nexus: Evidence From BRICS Nations

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ABSTRACT

In the last few decades, there has been a surge of interest in the effects of information and communication technologies (ICTs) on economic growth. Although ICT diffusion affects economic growth in many ways, the magnitude of ICT penetration is not time-invariant and depends on many factors. Using pooled mean group (PMG) panel ARDL model, this study aims to explore the nexus between ICT penetration and economic growth for BRICS nations over 2003-2020. The findings show that, in the short run, fixed broadband and mobile cellular subscriptions have a positive effect on economic growth, while both R&D expenditure and ICT goods import have a negative insignificant effect. In the long run, however, the effect of both R&D expenditure and ICT goods import turns out to be significantly positive, whereas fixed broadband and mobile cellular subscriptions have a negative effect on economic growth. The results have significant implications for policymakers and practitioners who are willing to harness ICTs to improve the economic and social conditions that would lead to higher economic growth.

INTRODUCTION

Economic growth is a fundamental determinant of a country's welfare and a significant indicator for social and institutional development. Conceptually, economic growth stands for higher value for goods and services produced in a country during a specific period and is generally proxied by Gross Domestic Product (GDP). From a broader perspective, however, the concept of economic growth can be extended as it is one of the most important components of economic development, which is a much more complex issue for economists and policy makers. With a greater ratio of economic growth, it is not only expected to obtain higher level of growth rate but also is expected to channel more resources to the areas that

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would yield more benefit to future economic activities through encouraging innovation, providing a more effective health care system, and lowering transaction costs, which are highly crucial for economic activities. In this sense, this creates a virtuous cycle and paves the way for further economic development more generally.

Over the past century, however, there has been a dramatic increase in the use of Information and Communication Technologies (hereafter, ICT). In this vein, the impact of ICT on economic growth has been an object of research since the early years of ICT use in the 1990s. The use of ICTs well contributed to the process of establishing an institutional structure through lowering costs in communication and documentation as well as expanding storage capacity of countries and helping countries provide better public services (Ndung'u, 2019; Mano, 2021). Besides its contribution to institutional structure, ICT has been an important concept in the study of economic growth and development. Some scholars have included the technology as a significant explanatory factor in their growth models (see, for example, Solow, 1965; Romer, 1986, 1990; Lucas, 1988). Although academics treat technology differently in their models, their common ground was in part the same: investigating the role of technology in explaining economic growth.

In the aid literature, ICT diffusion appears to be positively related to economic growth (for example, see, Jin & Cho, 2015; Cheng & Chien, 2021). Existing studies are largely empirical in nature, mostly relying on econometric methods that analyze both the linear and nonlinear association between the variables. For instance, Vu (2011) clearly defines the channels through which ICT diffusion positively affects economic growth: firstly, it encourages innovation. Secondly, it enables firms and individuals to make better decisions, which is quite similar to the previous theoretical assumptions as it lowers transaction costs. Lastly, in addition to lowering transaction costs, production costs would decrease, and demand would increase, which in turn would increase the output level. In parallel to this, for instance, using a Generalized Method of Moments (GMM) over the period 1990-2007, Nasab and Aghaei (2009) investigated the impact of ICT on economic growth for OPEC member countries. The authors find positive and statistically significant results, indicating that a 10 percent increase in ICT investment leads to a 0.2 percent increase in the average rate of GDP per capita.

On the other side, even though there is no doubt that ICT diffusion helps countries reach higher economic growth and standard of living, the magnitude of the sprawling technology does not seem to be similar across countries due to the differences in the level of economic development (Porter et al., 2001; Mayer et al., 2020). In a study which set out to discuss ICT and economic growth nexus, Niebel (2018) well explained comparatively how ICTs play a key role to increase productivity growth in developing, emerging and developed countries. The author highlights the fact that the linkage between ICT investments and economic growth is rather weak due to the lack of both micro- and macro-level data. In addition, some others point out the paradox of productivity where an increase in ICT investment does not result in higher productivity and capacity (Solow, 1987; Carr, 2003). According to Haller and Lyons (2015), however, the key point in achieving higher productivity through ICT diffusion lies not in the adoption of technology but in the use of it.

At first blush, contrasting views across the literature might seem to be confusing. This is, however, a natural reflection of the dynamic interaction happening between the dynamic phenomena. That is to say, the extent to which ICT diffusion affects economic growth may change across countries due to cultural, social, and institutional factors. Referencing to the first channel affecting economic growth through ICT by Vu (2011) above, for ICT investment to create innovation, it requires a process that would take idiosyncratic factors into consideration (Suchman, 1987). In this sense, therefore, we aim at exploring

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