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The economic impact of the Internet penetration rate and telecom investments in Arab and Middle Eastern countries

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ABSTRACT

By using a sample of 93 countries and panel data econometrics, we evaluated the impact of the Internet penetration rate and investment in the telecom sector on economic growth in the Arab and Middle East (AME) region over the 1995–2014 period.[1] The results show that the Internet has been a significant growth determinant in the AME region, particularly in high-income AME countries; Internet penetration in middle-income AME countries seems to be hovering below the growth impact rate. Telecom investments did not affect growth in the AME region, thus highlighting the general-purpose technology nature of such investments and the adjustment period needed before the latter bear fruits.

1. Introduction

With the rise of the "digital economy", the information and communication technologies (ICT) have become the major source of innovation worldwide (Quiggin, 2014).[2] Parallel to the rest of the world, the 2000s marked a significant rise in ICT in the AME region. Investment in the telecommunication sector in the region soared from $3.4 billion in 2000 to $23.5 billion in 2011. The share of the telecom investment in the gross domestic product (GDP) of the countries of the region also increased, rising from an average of 0.47% in 1995 to 0.93% in 2010. This trend was common to the region's two subgroups: high-income and middle-income AME countries, although it was more pronounced in the latter (Appendix, Fig. 2). A milestone of the same decade was the rapid diffusion of Internet use across the AME countries (Appendix, Fig. 1): the average Internet penetration rate in the region was 0.22% in 1996, rising to 6.2% in 2011.

Most of the AME countries have recently adopted national ICT strategies articulated around a number of common pillars: increasing the competency of ICT manpower, developing and upgrading the ICT infrastructure, providing electronic delivery of the government's services, and streamlining the telecom regulatory framework (ESCWA, 2013). In many cases, these strategies have been accompanied by steady steps toward a more competitive telecom market structure. In various AME countries, Internet infrastructure has lately undergone several upgrades with the establishment of new core networks, submarine cables, fiber optic networks, and new Internet hosts (ESCWA, 2013).

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1 Arab and Middle East (AME) region.

2 The structural economic changes brought about by ICT have outlined the need of a new agenda for national accounts, notably in terms of valuing the stocks and flows of information, for details see Quiggin (2014).

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Against the backdrop of rolling out ICT strategies in the AME countries and the expected positive impact of the adoption of the latest technologies on the competitiveness of their economies, it is timely to investigate the extent to which ICT have impacted their economic performance throughout the last two decades and highlight the possible lessons that can be learned. In essence, this paper answers three questions: (i) Has the widespread use of the Internet been greasing the wheel of economic growth in the AME countries? (ii) Did investment in telecommunication services pay off in terms of higher standards of living in those countries? (iii) Given the disparities in terms of the ICT infrastructure/use between the two AME sub-regions, was the impact of ICT uniform across the region?

Those questions are motivated by the well-documented overall economic impact of ICT: these technologies bestow positive externalities on several sectors in the economy, leading to widespread productivity gains (Qiang, 2009). Public spending on ICT is thus expected to have spillover effects and to increase the payoffs of investments in other sectors.

To answer these questions, we employed recent data encompassing 93 countries from different regions of the world, of which 15 are from the AME region, over the period 1995–2014 and estimated a growth model with standard determinants of growth and ICT measures as the main independent variables. To identify the economic impact of ICT on the AME region as a whole as well as in each of the AME sub-regions, we allowed for a differentiated impact of ICT on growth across the regions. This also enabled us to facilitate regional comparisons in terms of the growth impact of ICT.

Our analysis shows that the Internet penetration rate has positively and significantly contributed to growth in the AME region. There is some evidence indicating that this mainly reflects the impact of the Internet on high-income AME countries. Finally, our results point to an insignificant effect of investments in the telecommunication sector on economic performance in the AME countries across the two sub-regions.

In view of previous studies on the impact of ICT on the AME economies, our approach is characterized by three main additions. The estimation procedure enables us to consider the endogeneity of the independent variables, in particular the ICT measurements. Furthermore, the empirical strategy allows a systematic differentiation of the ICT impact across the two AME sub-regions. Finally, owing to the non-composite ICT indicators used, we could provide a number of plausible factors that could underlie our key findings as well as some policy recommendations.

2. Literature review

In this section we succinctly review a selected number of recent papers that examined the economic effects of ICT before focusing on studies specifically tackling the impact of ICT in the AME region. The purpose is twofold: (i) pinpointing the key findings of the literature and (ii) highlighting the main limitations of previous work done in the context of the AME countries.

2.1. Main findings of literature examining ICT's impact on output

The channels through which ICT can affect economic activity are numerous as revealed by many studies. A first, "direct" macroeconomic impact of ICT is engendered by investments in/expansions of the ICT infrastructure (Tsang et al., 2011). On the supply side, the use of ICT is likely to raise labor productivity and foster innovation (Tsang et al., 2011; Brynjolfsson and Hitt, 2000). It can also lead to efficiency gains induced by the appearance of new business models, redesign of supply chain management, and greater access to input and output markets available to firms (Tsang et al., 2011; Brynjolfsson and Hitt, 2000). ICT-induced changes in management models can be emulated across several sectors, leading to positive spillovers (Basu et al., 2003; Basu and Fernaldm, 2007). On the demand side, the diffusion of ICT should induce a reduction in transactional costs incurred by consumers (Lee et al., 2012).

The anticipated positive economic impact of ICT was largely confirmed by empirical investigation (Giesecke, 2006; Koutroumpis, 2009; Czernich et al., 2011; Shahiduzzaman and Alam, 2014a, b).

This "stylized fact" has been nuanced by many researchers; in particular, three findings are worth expanding upon. First, an abundance of literature has stressed and explored the nature and effects of ICT as a "general-purpose technology" (GPT), chiefly in the context of the Organization for Economic Cooperation and Development (OECD) member countries (Basu et al., 2003; Van Ark and Inklaar, 2005; Basu and Fernaldm, 2007; Ceccobelli et al., 2012; Liao et al., 2016). One key lesson from this literature is that the beneficial economic effect of ICT seems to be conditional on much-needed firm-level and industry-level "complementary investments": it is only when appropriate organizational adjustments and reallocation of resources are made and combined with the widespread use of ICT capital that the latter starts significantly impacting productivity and output. Prior to that, ICT capital can entail an adverse effect on productivity. A corollary to this finding is that a substantial time lag is needed before ICT investments translate into productivity growth.

Second, there is evidence that the economic effect of ICT is positively associated with the competitiveness of the ICT sector: a number of papers have empirically documented the adverse impact of restrictive measures on foreign direct investment (FDI) inflows in the telecom sector (OECD, 2009; Borchert et al., 2012b), and the positive effects of opening up the latter to foreign service suppliers (Rossotto et al., 2003). In particular, Borchert et al. (2012a) and Rossotto et al. (2003) demonstrated that telecommunication investments are likely to yield low returns in the absence of measures enhancing competition among service providers.

A third interesting result pinpointed by the literature is that, at the aggregate level, a certain threshold of diffusion of the latter technologies has to be reached before their reverberations fully unveil. This so-called "critical mass" level, where the diffusion of ICT becomes self-sustainable (Gajek and Kretschmer, 2012), is specifically put forward in papers examining the economic impact of Internet diffusion (Koutroumpis, 2009; Czernich et al., 2011).