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The telecommunications divide among Indian states

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A B S T R A C T

Using data for 16 major states in India from 2001 to 2015, this paper examines the patterns, distribution dynamics, and the drivers of telecommunications (telecom) services across different states. We apply both parametric and nonparametric econometric techniques to study the distribution dynamics of telecom services across the states. Further, we employ the generalised method of moment (GMM) to examine the determinants of telecommunications services in India. Our results indicate that the interstate gap in telecommunications services has been declining over time and there is a tendency for convergence in teledensity towards the national average. The regression analysis suggests that per capita income and network externality are significant determinants of teledensity across states in India. Furthermore, literacy rate and relative size of the service sector are independently significant predictors of teledensity. If we consider rural and urban areas separately, there are some important differences. For example, while the interstate gaps in telecom services in rural areas seem to have declined, there is little evidence of such a tendency in urban areas. However, the regression results with respect to the importance of per capita income and network externality for telecom services are robust to the rural-urban divide and to the inclusion of additional explanatory variables. The findings of this study have important policy implications.

1. Introduction

Telecommunications (or telecom) services are essential for accessing and reaping the benefits of modern information and communications technology (ICT). As technologies get integrated and a wide range of services (telephone service, messaging, the Internet, music, movie, radio) are being delivered through a single device, the demand for telecom services increases by leaps and bounds. The economic growth enhancing effect of ICT in general and telecom in particular has been documented in the economics literature. For example, according to Leff (1984), modern telecommunication facilitates faster transmission of information which eventually promotes overall economic development by reducing transaction and information cost. A well-developed telecommunication infrastructure improves efficiency in an economy by reducing information asymmetry among producers and consumers (Abraham, 2007; Eggleston, Jensen, & Zeckhauser, 2002; Sen, 1994). Studies by Lam and Shiu (2010) for European countries, Roller and Waverman (2001) and Datta and Agarwal (2004) for OECD countries, and Ghosh and Prasad (2012) and Ghosh (2016) for India present further evidence to highlight the importance of telecommunications for economic growth and development.

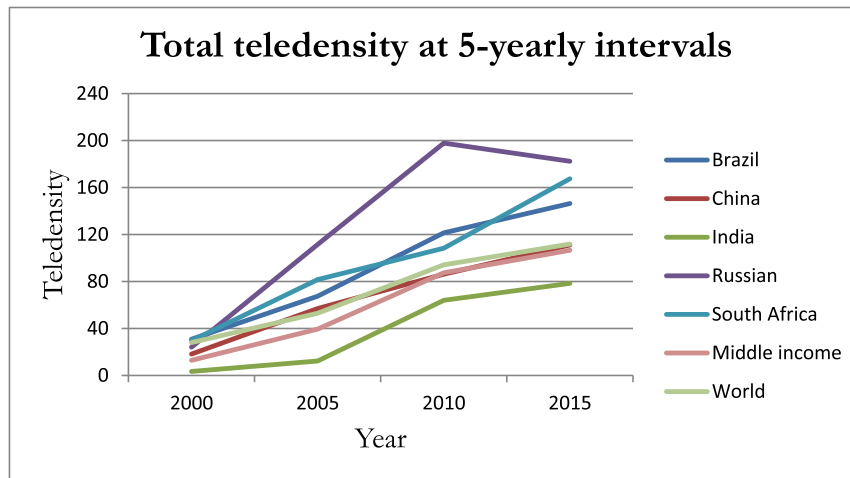
As one of the fastest growing emerging markets, India receives special attention from the researchers. Several authors have attributed the rapid growth of the Indian economy in recent years to acceleration in the service sector growth (Babu, 2005;

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Source: World Development Indicator, World Bank

Fig. 1. Teledensity in India vis-à-vis middle-income countries, BRICS, and the world.
Source: World Development Indicator, World Bank

Balakrishnan & Parameswaran, 2007). Among various service categories, ICT or ICT enabled services are the prime drivers of India's economic growth (Eichengreen & Gupta, 2011; Gordon & Gupta, 2004). However, notwithstanding this growth in these specific services, their overall growth relative to the potential is considerably low as a substantial section of India's population is still do not have access to modern telecommunication facilities such as basic telephone connections. In comparison to the world-wide average access to telecommunications, India has been lagging behind. As Fig. 1 shows, the overall teledensity (both fixed landline and mobile telephone subscriptions per 100 population) in India has been consistently lower than the average for middle income as well as other BRICS (Brazil, Russia, India, China, and South Africa) countries, the two groups to which India belongs. The figure also indicates that teledensity grew at a faster pace between 2005 and 2010 and then it slowed down.

Despite lagging behind the world average, because of its population size, India is the second largest and one of the fastest growing telecom markets in the world. Although there has been substantial increase in the number of telephone connections during the last decade or so, the digital divide (the disparity in the access to various ICTs including telecom) continues to be significant in India (Government of India, 2012).¹ Furthermore, the growth in the access to telecommunication has also not been uniform across states in India. Several studies document the uneven growth in the number of telephone subscribers and highlight the existing digital divide or digital gap across the states (Ghosh & Prasad, 2012; Sridhar, 2010). It is interesting to note that the disparity in access to telecommunication exists in spite of a uniform policy framework across the length and breadth of the country.² In this context, it is pertinent to investigate the distribution of telecom services and its dynamics over time across various states. Therefore, in this paper, our purposes are to examine the distribution pattern and dynamics of telecommunications services in India and the factors that are responsible for their uneven diffusion. Specifically, our paper attempts to address two questions: (i) what are the patterns and dynamics of diffusion of telecommunication services across states and over time in India? and (ii) what are the drivers of telecommunication diffusion across states in India?

Using data for 16 major states in India from 2001 to 2015, this paper examines the patterns, distribution, dynamics and the drivers of telecommunications services across different states.³ We apply both parametric and nonparametric econometric techniques to study the distribution dynamics of telecom services. Further, we employ the generalised method of moment (GMM) to examine the determinants of telecommunication services in India. Our results indicate that the interstate gap in telecommunication services has been declining over time and there is a tendency for convergence in teledensity towards the national average.⁴ The regression analysis suggests that per capita income and network externality are significant determinants of teledensity across states in India. Additionally, literacy rate and the relative size of the service sector in a state are independently significant predictors of teledensity. If we consider rural and urban areas separately, there are some important differences. For example, while the interstate gap in telecom services in rural areas seems to have declined, there is little evidence of such a tendency for urban areas. However, the regression results with respect to the importance of per capita income, education, and network externality for telecom services are robust to the rural-urban divide and to the inclusion of additional explanatory variables.

¹ In the ICT literature, the gap between those who have access to technology such as a telephone and those who do not is known as the digital gap or digital divide (Rao, 2005).

² The Indian Constitution assigns telecom services to the Central Government List. Accordingly, all policies for promotion, development, regulation (including licensing and pricing) of telecom services are formulated and implemented for the nation as a whole.

³ India's financial year runs from April 1 in a year to March 31 in the following year. For instance, 2000–2001 comprises data from April 1 of 2000 to March 31 of 2001. In order to keep our description simple, we write 2001 for the financial year of 2000–2001, 2002 for 2001–2002, and so on.

⁴ Teledensity is defined as the number of telephone (both fixed landlines and mobile phones) subscribers per 100 population.

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