



# Evolution and determinants of digital divide in Brazil (2005–2013)



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## ARTICLE INFO

### JEL classification:

O10  
O20  
O38

### Keywords:

Internet  
Digital divide  
Inequality  
Access  
Mobile

## ABSTRACT

During the last decades, the widespread growth of information and communication technologies (ICT) has posed incentives to broaden the participation of individuals in social, political and economic dimensions of life. However, utilization of ICT also involves access to technology and infrastructure, and acquisition of skills to deal with innovations and, thus, digital literacy is, primarily, a complementary good. The digital divide expresses inequalities in access and utilization of ICT among individuals and populations in different countries. The study adopts inequalities indexes of Internet access and mobile phone ownership to measure use of ICT goods, accounting for the digital divide in Brazil. The inequality indexes are also split according to main determinants using four nationally representative survey data from 2005 to 2013. Results indicate that the digital divide among individuals is decreasing quite fast among Brazilians over time. However, there is room for policies of mass access to ICT goods based on mobile Internet broadband access. In addition, digital illiteracy, evaluated by lack of education, is one of the main determinants of the digital divide in the country, especially among elderly individuals.

## 1. Introduction

The recent widespread growth of information and communication technologies (ICT) poses incentives to broaden the participation of individuals in social, political and economic dimensions of life; including the access to key information and the opportunities of social interaction that include education, leisure and working activities. However, the access to ICT presupposes the access to technology and infrastructure, and also acquisition of skills to deal with innovations of the digital world (Prieger, 2013; Wirthmann, 2010, 2012).

Several studies show the role of socioeconomic, cultural and geographical characteristics in determining the level of technological advances among countries worldwide. The definition of digital divide refers to “the gap between individuals, households, businesses, and geographic areas at different socioeconomic levels with regard both to their opportunities to access ICTs and to their use of the internet for a wide variety of activities” (Organisation for Economic Co-operation and Development [OECD], 2001, p. 5), and it represents the measurement of inequalities in accessing and using ICT among individuals and populations in different countries (Dasgupta, Lall, & Wheeler, 2011; Pantea & Martens, 2013; Vicente & López, 2011; Zhang, 2013).

Zhao, Collier, and Deng (2014) point out that digital divide literature usually investigates two dimensions: digital divide among countries (*international digital divide*) or among individuals/groups of individuals within a country (*domestic digital divide*). Regarding the first dimension, evidence shows that there is significant gap between developing and developed countries due to socioeconomic factors, mainly due to differences in income and educational attainment. In relation to the second dimension, studies

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tend “to focus on specific groups of people within a nation who appear especially disadvantaged by the digital divide (...) people on low incomes, people with limited education or low literacy levels, ethnic minorities, the unemployed, the elderly, people in isolated or rural areas, people with disabilities, single parents, and women and girls” (Zhao et al., 2014, p. 40).

Dewan and Riggins (2005) unfold the digital divide in other two dimensions: inequality in access to ICT and inequality in capacity of ICT utilization; that is, differences in reaching technological innovations and in ability to use technological devices. Other authors point to the utilization of the Internet on mobile phones as alternative to reduce the inequality in Internet access (DiMaggio, Hargittai, Celeste, & Shafer, 2004; Wirthmann, 2012), since differences in access to ICT have been declining faster in relation to mobile devices than other technologies (technological convergence) (UNCTAD<sup>1</sup>).

The present study follows Zhang (2013) to evaluate the Brazilian domestic digital divide, adopting the inequality index to analyze the relationship between income, Internet access and mobile phone access in the Brazilian population. The inequality of ICT access is estimated controlling for geographical, socioeconomic and demographic characteristics, using nationally representative data. The National Household Sample Survey (Pesquisa Nacional por Amostra de Domicílio, PNAD), from the Brazilian Institute for Geography and Statistics (Instituto Brasileiro de Geografia e Estatística, IBGE) in 2005, 2008, 2011 and 2013, contains information of individuals and households, including ICT goods utilization. Also, inspired by Dewan and Riggins (2005) dimension of inequalities in ICT access and capacity of usage, the study includes logistic models to evaluate the disaggregation of digital divide among individuals in Brazil.

The estimates account for weighted measure of Internet use among different individuals (see James, 2008). Differences in population size between countries and variations in income among individuals with access to Internet within countries matter for the proposed concept of digital divide. Also, the influence of digital illiteracy on ICT access is investigated in the case of elderly individuals (older than 60 years).

Although there is scarcity of information about the digital divide and its determinants in Brazil, it is known that there is a positive trend in Brazilian's access to multimedia broadband communication in recent years, as well as in its regions (Fig. 1).

The proportion of population covered by mobile 3G according to Brazilian regions from 2005 to 2015 has been increasing also (Fig. 2). It is important to highlight that, although 4G technologies have been disseminated since 2013, Brazilian regions have not still completely replaced 3G technology with full coverage. The data show evidence that more developed regions (Southeastern and Southern Brazil) has higher access to ICT goods in comparison to other regions.

In addition to the introduction, the article includes four additional sections. Section 2 presents the literature review on the determinants of the digital divide among populations and individuals worldwide. Section 3 outlines the databases and discusses the methodological strategy adopted in the study. Section 4 presents the results. Section 5 summarizes the main conclusions of the study.

## 2. Literature review

### 2.1. Digital divide in Brazil and Latin America

According to World Bank data, the Latin American and Caribbean countries' populations had increased Internet access in 2014, with 44.0% of the population having access to computers, 50.2% having Internet subscriptions, 9.8% having broadband subscriptions, and there being 115 subscribers of mobile per 100 people.

In comparison to the population of North America (82.1%, 87.3%, 31.5%, and 117, respectively), and Europe and Central Asia (74.4%, 79.2%, 23.7% and 126, respectively), the evidence suggests reduction of the technological gap between regions worldwide with regard to mobile technologies; however, there are still disparities in relation to broadband, Internet and computers access (Balboni, Rovira, & Vergara, 2011). In Brazil, 52.0% of the population has access to computers, 57.6% have Internet subscription, 11.7% have broadband subscription, and 139 are subscribers of mobile per 100 people.

According to Lutz-Baliamoune (2003), information and communication technology markets in Latin American countries are characterized by lack of competitiveness. However, the expansion of mobile telephony in Brazil is very striking: according to data from Instituto Brasileiro de Geografia e Estatística (IBGE, 2015), 72.8% of the population above 10 years old owned a mobile phone in 2013.

Furthermore, Internet service was available for at least 90% of the population living in 18 Brazilian states and Brazilian country capital in 2015, and the remaining states had Internet services coverage ranging from 71% to 88% of the population (Agência Nacional de Telecomunicações [ANATEL], 2016). Despite the optimistic scenario, high prices of mobile phones with Internet applications (smartphones and mobile 3G/4G) are still prohibitive and restrict the expansion of the Internet in prepaid sector of the mobile broadband market.

Macedo (2010) analyzes determinants of broadband access of the Brazilian municipalities and finds a positive impact of social wellbeing indicators (health, education and income per capita) on broadband access. Balboni et al. (2011) stress the need for additional empirical studies and use of individual-level data to evaluate the extent and the characteristics of the digital divide in Latin American and Caribbean countries.

<sup>1</sup> Text available at [http://unctad.org/en/PublicationsLibrary/dtlstict2013d8\\_en.pdf](http://unctad.org/en/PublicationsLibrary/dtlstict2013d8_en.pdf) [06/05/2016].

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