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Mobile Internet Inclusion Policy For Brazil

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MOBILE INTERNET INCLUSION POLICY FOR BRAZIL

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Abstract

This article investigates the pattern of internet access of Brazilian households by type of services, according to location and type of connection (home dial-up or broadband and outside home), to determine whether it is suitable to adopt a mobile broadband access policy in Latin America and Caribbean countries, as a gateway to mass access in these countries. The study was carried out by using microdata from National Household Survey (PNAD) from 2005 and 2008, produced by IBGE, which contains supplementary information about the technological utilization of information goods and services. We estimate probit models and also probit-Heckman models to control for selection bias. Our findings show that broadband access at home is the type of connection and the location of access that most increases the probability of access for all types of Internet services. This result suggests the policy adopted in Asia may be suitable for Latin countries.

Keywords: Internet, broadband, mobile, access.

1 Introduction

The population of Latin America and the Caribbean still has low access to the Internet, (lower than 12%), compared with OECD countries. The population of the last group has the following percentage of computers, Internet subscribers and broadband subscribers, 62, 24 e 19% respectively (Balboni et. al., 2011).

As a result of technological convergence and the high penetration of prepaid cell phones, Internet access by mobile, in poor and socially unequal countries, is a very important access route, particularly in Asia (Khalil and Kenny, 2008). When this fact is taken into account, a question naturally arises: is Internet access by mobile a suitable digital inclusion policy for Latin America and Caribbean countries as well?

According to Lutz-Baliamoune (2003) these countries are characterized by information and communication technology (ICT) markets that are uncompetitive. However, authors such as Spence and Smith (2010), stress that mobile telephony and Internet access by cell phone are important ways to provide the public with broadband access. Meinrath et al. (2011) point out that, in the U.S., the low-income section of the population is more likely to depend on mobile connections.

In Brazil, the expansion of mobile telephony is very expressive; 61.8% of the population between 10 and 60 years old, owned a mobile in 2009, according to IBGE data. Moreover, in 2010 the Internet service was available from telephone companies in every city that had a population of over 500,000 inhabitants. However, the high cost of mobile phones with Internet applications (mobile 3G) is still prohibitive and restricts the expansion of the Internet in the prepaid segment of the mobile broadband market.

According to Meddour *et al*. (2011) despite the rapid advances of ICT, involving economies of scale in production, providing mobile services and broadband Internet access in rural areas in developing countries, remains a challenge. The mobile operators have to face high infrastructure investments (sunk costs), higher regulatory constraints and the rapid technological change, which implies that in areas where the business return tends to be lower, such as in rural or less populated areas, the challenge is to promote at the same time a more competitive and still innovative mobile market. In these locations, infrastructure sharing can meet both needs; especially if one takes into account the importance of mobile Internet access as a route to promote mass access to broadband services, as Meddour et al. (2011) and Spence and Smith (2010) point out. In addition, it should be stressed that mobile Internet access can reduce transaction costs and provide access to financial and banking services – 90% of the world´s population does not have access to these services and an increasing percentage of then are mobile users (Spence and Smith, 2010).

Balboni *et. al*. (2011) noted that there has been a closing of the gap between OECD countries and Latin America with regard to mobile technologies. However, this gap has widened with regard to access to broadband, the Internet and computers.

Despite the arguments in favor of Internet access via cell phones, as an alternative to allowing mass access to the Internet, still little is known yet about the usage patterns of the Internet. The knowledge of on-line activities from computers could provide some guidelines for this policy proposal. Although there are limitations to Internet access by mobile telephony for certain types of use, its internet access is exclusively for broadband. The hope, however, is that mobile technology will rapidly change and some of its limitations may disappear.

Dimaggio et al. (2004) suggest that the location of access and the speed of the connection are associated with different patterns of Internet use and different purposes. More specifically, the current discussion within the digital divide, revolves around the question of digital literacy and producer versus consumer content (Selwyn, 2010). Authors such as DiMaggio et al. (2004) have been raising important questions about Digital Inequalities, which represent a more comprehensive understanding of Digital Inclusion, through an analysis of the impact and the outcomes that are associated with

differences in access, such as location of access (public or home access) and the speed of the Internet connection (dial up connection or broadband).

In other words, there has been a shift in the analytical interpretation of Internet access towards a more nuanced understanding of the access itself, moving away from the pattern of analysis inherited from the telephony paradigm, that was established in the mid-nineties, which based its analytical framework in a binary fashion between the ´haves and have-nots ´ in terms of Internet access (Digital Divide), toward what has been called the Digital Inequality paradigm.

According to DiMaggio et. al. (2004), this task involves identifying the fundamental dimensions of inequality in access, documenting intergroup differences, and measuring differences in outcomes that are associated with differences of access. In their opinion, the five dimensions of Digital Inequality can be found in: 1) Technical means (software, hardware, types of Internet connection); 2) Autonomy in the use of the Internet; 3) Skills; 4) Social support; 5) the purposes of using the Internet. This paper covers three of these five dimensions (technical means, autonomy of use and purpose of use).

Also, according to DiMaggio (2004), broadband users tend to search for information more widely, engage in a broader range of activities, and produce their own Web content more often than users of dial-up connections. In addition, broadband users spend more time on-line and are more likely to use on-line business and consumer services and recreational sites. Differences in the purpose of use of the Internet are often due to the speed of the connection, particularly because the purposes of use of the Internet that require faster connections, either for download or for upload, are clearly restricted to dial-up users.

The European Commission[1] employs models of binary choice to estimate frequency of Internet use on the basis of microdata[2] from the Europe Union, Norway and Iceland. As explained earlier, the variables that were used were age, gender, education, and occupation, number of people in the household, location, income, connection type and location of Internet Access. They found a more frequent use of the Internet in the following categories: i) younger people; ii) males; iii) urban regions; iv) those with a larger income; v) those employed and those who form a part of a workforce; vi) non-shared internet access (residential) and vii) broadband.

Demoussiss and Giannakopoulos (2006) used a probit model to estimate the determinants of access to the Internet and of the extend of use in European countries. They also found a greater probability of Internet use among more educated people, the wealthier, the young, males, and smaller families. The use of the Internet is less probable for dial- up users; however, it is not affected by the costs of the dial-up connection. Individuals who were more likely to use the Internet were also more likely to use it more extensively, in terms of the time spent online.

Cerno and Amaral (2005) used the probit model in two stages to correct for selection bias, and estimate the determinants of Internet demand in Spain. They found a positive effect arising from income and a negative effect from age. The income elasticity of residential Internet demand is elastic even though the demand for Internet use is income inelastic.

Dudek (2007) used a qualitative response model (probit) for Polish microdata and the usual explicative variables of studies involving determinants of residential Internet access (income, gender, ethnic group, educational level, age, location of residence, and presence of children in the residence). He found that the latter had a positive effect on residential access, as well as income and the educational level. Rural dwellers and female-headed households had smaller probabilities of residential access.

[1] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Determinants_of_Internet_use_frequency (2012)
[2] Set of information from individuals or households.

By analyzing the determinants of Internet use in Canadian microdata, and using a logit model, Singh (2004) found the following to be positive determinants: age of the household (15-34 and 35-54); family income; educational level; and unfamiliar houses with children.

Macedo (2010) cites as positive determinants of broadband access to Brazilian municipalities, social wellbeing indicators such as health, education and per capita income. This study seeks to fill the gap by drawing on a study by Balboni et al. (2011) who stress the need for empirical studies and make use of microdata to evaluate the extent and characteristics of the digital divide in Latin American countries and Caribbean.

In carrying this out, we investigate the pattern of Internet use of Brazilian households on the basis of their on-line activities, location of access and form of access. More specifically, this study investigates empirically which variables determine the pattern of Internet use of activities such as e-banking, information, e-shopping and so on. We include as the main determinants the location of access (home, workplace, community centers, and public paid Internet access centers) and the type of access (dial-up or broadband). We also include socio-economic and demographic variables.

The information from Brazil is representative of Latin American countries since there are common economic policies and a similar culture between them (Balboni et al. (2011). However, according to Dasgupta et al. (2011), mobile telephones is a promising new platform for Internet access and most of the Internet access in poor and developing countries is related to active public policies.

Following this Introduction, the article includes 3 additional sections. The second section outlines the data and discusses the methodological strategy adopted. The third section shows and discusses the results. Finally, the fourth section summarizes the main conclusions.

2 Methodological Strategy and data

We utilized microdata from PNAD (Pesquisa Nacional de Amostra por Domicílios – National Household Sample Survey) for 2005 and 2008 to estimate the determinants of the types of Internet services. The survey data is produced by the Brazilian National Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística, IBGE) and for these years, there is a special edition about technological utilization of information goods. The sample was restricted to include only people older than 10 and younger than 60 that had accessed internet at the time of the interview.

As dependent variables for each model, we set out the following list of Internet usage purposes: i) communication; ii) e-commerce, which represents shopping by Internet; iii) e-government, which describes services from any level of government; iv) e-learning; v) reading magazines and newspapers; vi) leisure; vii) and searching for information. These variables are available in the PNAD report and presumed to provide a good description of the types of service used in Internet.

The independent variables of interest are those related to the characteristics of access:

1) location of access, which could be: i) home access ii) access at work iii) at school or at any educational institution iv) at public access centers, such as community centers v) at public paid access centers, such as cyber cafés vi) other places, which in Brazil refers to access at a relative´s or a friend´s house)

2) type of connection (dial- up or broadband).

The estimates of the pattern of internet usage were conditioned by the fact that access had occurred. The other independent variables and control variables were adopted in accordance with the literature: i) income *per capita* ii) gender iii) situation of occupation iv) ethnic group v) presence of children at home vi) age group vii) residential location in a rural or urban region viii) schooling.

3) Dummy variables of State and year.

We used Stata software to estimate the coefficients of the non-linear probability regression.

It should be noted that variables of access location, as well variables of purpose of access are available at PNAD through individual issues and are not mutually exclusive, which means that the same individual may have made the Internet access from his or her home (dial- up or broadband) and elsewhere, so he or she could tick more than one option in PNAD regarding location and purpose of access.

We assess the Brazilian pattern of the Internet by using estimated probit models, which are based in probabilities of the inverse cumulative distribution function (CDF) of a standard normal distribution. In this case, it is a dependent variable assumed value 1 or 0, depending on whether the type of service is accessed or not (Amemiya, 1981) – see Table 2.
These binary models are able to determine the probability of occurrence of the event, (*Yi*) according to specific determinants (variables), (*Xi*).

$$y_i^* = \beta_0 + \sum_{j=1}^{k} \beta_j X_{ij} + u_i \quad (1)$$

Being y^*_i a latent non- observed variable describing the probability of a type of Internet service to be accessed by individual *I*, see Table 1. Then we utilize the observed information of *yi,* it is defined by:

$$y_i = 1 \text{ if } y^*>0 ; \quad y_i = 0 \text{ if } y^* \leq 0 \quad (2)$$

For this study, the target of applications is to explain the effects of X_{ij} variables on the probability of success, $P(y_i=1|\boldsymbol{x})=P(y^*>0|\boldsymbol{x})=P[e>-(\beta_0+\boldsymbol{x\beta})|\boldsymbol{x}]=1-G[-(\beta_0+\boldsymbol{x\beta})]=G(\beta_0+\boldsymbol{x\beta})$. To this end, Wooldridge (2002) suggests calculating $\frac{\partial p(\mathbf{x})}{\partial x_i} = g(\beta_0 + \mathbf{x\beta})\beta_j$, being $g(z) \equiv \frac{dG}{dz}(z)$ for x_i continuous. For binary variables x_i, to calculate its effect on y_i , it is necessary to calculate $G(\beta_0+\boldsymbol{x\beta}) - G(\beta_0+\boldsymbol{x\beta}-\beta_i.x_i)$.

However, in these models there are selection bias problems because they only consider people who have accessed the Internet. Indeed, the decision of consuming one type of internet services is not independent of the decision to consume/access the Internet. To control for selection, we also estimated Heckman's sample selection models in two stages of probit models (Heckman, 1979). In the first stage, the probability was calculated of one individual being able to access the Internet, given the need for social-economic characteristics to obtain an inverse Mills ratio. In the second stage, model (1) was replicated including the last ratio and its square as a selection of controlled variables - see Table 3.

Variables	Name	Obs	Mean	Std. Dev.	Min	Max	Description
dependent variables	i_comuni	182312	0.78	0.42	0	1	Communication
	i_compra	182315	0.14	0.35	0	1	e-commerce
	i_banco	182314	0.15	0.35	0	1	e-banking
	i_governo	182316	0.2	0.4	0	1	e-gov
	i_educa	182316	0.7	0.46	0	1	e-learning
	i_noticia	182314	0.48	0.5	0	1	magazines newspapers
	i_lazer	182316	0.64	0.48	0	1	Leisure
	i_informa	182315	0.25	0.44	0	1	Information
independent variables	intdomdis	146334	0.21	0.4	0	1	Internet access from residential dial-up
	intdomlarga	146336	0.46	0.5	0	1	Internet access from residential broadband
	Intservi	182313	0.34	0.47	0	1	Internet access in the workplace
	intcurso	182314	0.21	0.41	0	1	Internet access from school, courses
	intpubfree	182309	0.07	0.26	0	1	shared access free public center
	intpubpag	182315	0.32	0.47	0	1	shared access paid public center
	intoutro	182313	0.24	0.43	0	1	Shared access with relatives and friends at home
	Age	592547	31.29	13.92	10	60	Age
	man	592547	0.49	0.5	0	1	Male
	rendapc	578721	515.53	845.5	0	32500	Income per capita
	escolari	589442	7.24	4.17	0	15	Year of school
	urbana	592547	0.85	0.36	0	1	Urban region
	ocupa	393709	0.91	0.29	0	1	Occupation
	crianca	592547	0.2	0.4	0	1	child at home
	racd#	592547	0	0.05	0	1	race dummies
	yd#	592547	0.51	0.5	0	1	year dummies
	ufd#	592547	0.02	0.13	0	1	State dummies

Table 1. Variables included in estimates

According to PNAD, the Internet access of Brazilians increased from 20.67% to 35.11% between 2005 and 2008. In the same period, the broadband access increased from 5.5% to 16% among users. The evolution of access by location of access is shown in Figure 1. These distributions do not add up to 1 because one person may use more than one source of Internet access during the time covered by PNAD. It is notable that broadband connections at home increased sharply as a form of access, from 24% in 2005 to 46% in 2008.

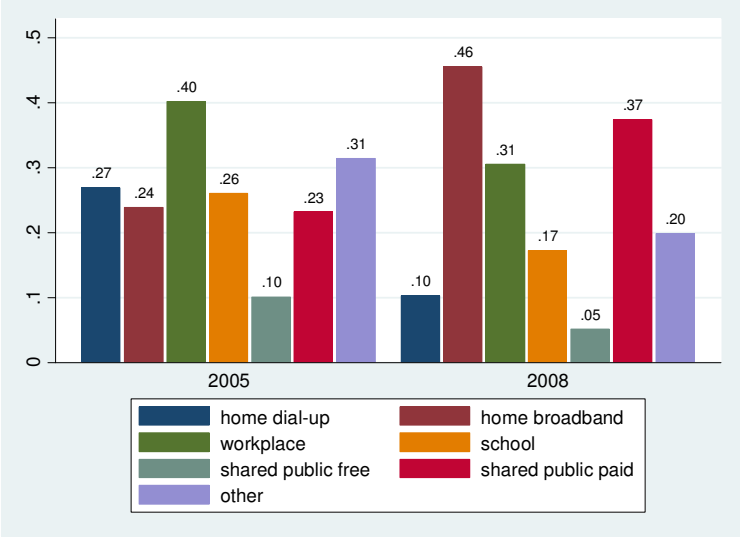

Figure 2. Percentage of Internet access according to location and form of access by population which was accessed in 2005 and 2008

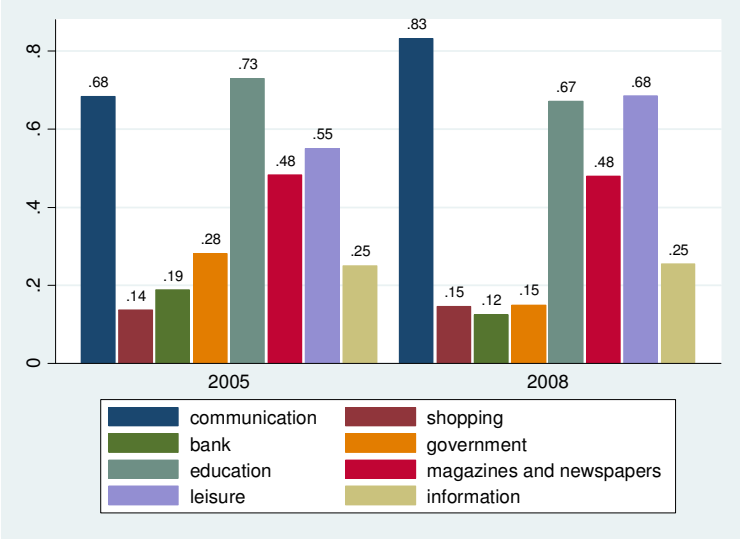

Figure 2. Percentage of Internet access according to activities on line by population which was accessed in 2005 and 2008

The evolution of access by activity on-line from 2005 to 2008 is shown in Figure 2. Likewise, these distributions do not add up to 1 because people can use many different activities on line even in a single access. It can be seen that communications and leisure services increased their relative participation from 2005 to 2008, whereas shopping, banking, education and government had a lower participation in 2008. The main uses of the Internet were in communication, education and leisure in both years.

3 Results

The results of the probit models are shown in Table 2. It can be noted that broadband home access, *intdomlarga*, enhances the probability of access to all the services; no other independent variable has a larger positive effect on the set of dependent variables than broadband home access. This finding

illustrates the significance of home access and stresses the importance of mobile broadband access as an instrument to promote mass access, especially because the latter is the form of access that is most similar to broadband home access.

Moreover, it is worth noting that the greatest effect observed is on e-commerce, (53,6%), which proves to be an important channel to boost e-business in the country as a direct result of mass access, even though the broadband subscribers still represent a small percentage of the Brazilian population.

VARIABLES	i_comuni	i_compra	i_banco	i_governo	i_educa	i_noticia	i_lazer	i_informa
intdomdis	0.108***	0.199***	0.0389***	0.0380***	0.105***	0.115***	0.184***	0.0515***
	(0.00272)	(0.0135)	(0.00338)	(0.00386)	(0.00392)	(0.00429)	(0.00397)	(0.00425)
intdomlarga	0.174***	0.536***	0.110***	0.0695***	0.133***	0.204***	0.296***	0.0699***
	(0.00280)	(0.0113)	(0.00292)	(0.00333)	(0.00356)	(0.00369)	(0.00359)	(0.00360)
intservi	0.0877***	0.490***	0.147***	0.164***	0.0416***	0.137***	0.0501***	0.0279***
	(0.00283)	(0.0107)	(0.00246)	(0.00286)	(0.00334)	(0.00343)	(0.00352)	(0.00322)
intcurso	-0.00384	0.0170	-0.00788**	0.0265***	0.289***	0.0714***	0.00695	0.0565***
	(0.00355)	(0.0136)	(0.00310)	(0.00389)	(0.00293)	(0.00437)	(0.00448)	(0.00419)
intpubfree	-0.00468	0.0426**	0.00598	0.0734***	0.108***	0.0642***	0.0224***	0.0691***
	(0.00526)	(0.0200)	(0.00478)	(0.00602)	(0.00613)	(0.00644)	(0.00653)	(0.00624)
intpubpag	0.113***	-0.0692***	-0.0244***	0.0126***	0.0232***	0.0151***	0.115***	0.0816***
	(0.00274)	(0.0128)	(0.00285)	(0.00348)	(0.00380)	(0.00393)	(0.00386)	(0.00375)
intoutro	0.0671***	0.164***	0.0252***	0.0437***	0.0688***	0.0716***	0.123***	0.0936***
	(0.00267)	(0.0116)	(0.00285)	(0.00335)	(0.00345)	(0.00369)	(0.00359)	(0.00356)
age	-0.00696***	-0.000647	0.00125***	0.00451***	-0.00403***	-1.43e-05	-0.0154***	-0.00402***
	(0.000130)	(0.000487)	(0.000110)	(0.000135)	(0.000156)	(0.000167)	(0.000174)	(0.000155)
man	-0.00382	0.300***	0.0480***	0.0273***	-0.0506***	0.0397***	0.107***	-0.00422
	(0.00242)	(0.00944)	(0.00213)	(0.00257)	(0.00290)	(0.00306)	(0.00307)	(0.00281)
rendapc	2.57e-05***	0.000109***	2.43e-05***	1.28e-05***	1.16e-05***	7.03e-06***	7.09e-06***	-8.97e-06***
	(1.59e-06)	(4.45e-06)	(1.03e-06)	(1.05e-06)	(1.34e-06)	(1.35e-06)	(1.30e-06)	(1.22e-06)
escolari	0.0102***	0.0555***	0.0136***	0.0206***	0.0357***	0.0208***	0.000513	0.0177***
	(0.000522)	(0.00229)	(0.000518)	(0.000611)	(0.000662)	(0.000676)	(0.000675)	(0.000653)
urbana	0.0973***	0.0347	0.0190***	0.0244***	-0.0122	0.0305***	0.100***	0.0683***
	(0.00763)	(0.0303)	(0.00670)	(0.00776)	(0.00807)	(0.00860)	(0.00890)	(0.00763)
ocupa	-0.0259***	0.0781***	0.0307***	-0.00473	-0.0291***	-0.0474***	-0.0350***	-0.311***
	(0.00386)	(0.0192)	(0.00423)	(0.00504)	(0.00497)	(0.00514)	(0.00521)	(0.00514)
crianca	0.00698	-0.437***	-0.102***	-0.0948***	0.193***	-0.0932***	0.0141**	-0.182***
	(0.00509)	(0.0305)	(0.00441)	(0.00606)	(0.00460)	(0.00683)	(0.00693)	(0.00447)
yd1	-0.121***	-0.0781***	0.0719***	0.143***	0.0298***	-0.0281***	-0.128***	-0.0351***
	(0.00278)	(0.0104)	(0.00251)	(0.00295)	(0.00319)	(0.00337)	(0.00338)	(0.00307)
Constant		-2.184***						
		(0.0769)						
Observations	117,466	117,466	117,466	117,466	117,466	117,466	117,466	117,466

*Table 2. Probabilities of probit models - Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; dummies of States included; dummies of race included.*

VARIABLES	i_comuni	i_compra	i_banco	i_governo	i_educa	i_noticia	i_lazer	i_informa
intdomdis	0.0932***	0.158***	0.0284***	0.0341***	0.100***	0.108***	0.173***	0.0469***
	(0.00293)	(0.0138)	(0.00335)	(0.00394)	(0.00404)	(0.00442)	(0.00413)	(0.00435)
intdomlarga	0.159***	0.486***	0.0974***	0.0634***	0.126***	0.197***	0.286***	0.0641***
	(0.00290)	(0.0116)	(0.00296)	(0.00343)	(0.00369)	(0.00383)	(0.00374)	(0.00372)
intservi	0.0831***	0.479***	0.144***	0.162***	0.0387***	0.135***	0.0471***	0.0261***
	(0.00284)	(0.0107)	(0.00246)	(0.00287)	(0.00335)	(0.00345)	(0.00355)	(0.00323)
intcurso	-0.00511	0.00672	-0.0101***	0.0250***	0.287***	0.0703***	0.00606	0.0553***
	(0.00358)	(0.0136)	(0.00307)	(0.00389)	(0.00294)	(0.00438)	(0.00449)	(0.00419)
intpubfree	-0.00239	0.0472**	0.00726	0.0732***	0.107***	0.0648***	0.0239***	0.0686***
	(0.00527)	(0.0201)	(0.00480)	(0.00603)	(0.00615)	(0.00645)	(0.00654)	(0.00625)
intpubpag	0.113***	-0.0612***	-0.0229***	0.0135***	0.0247***	0.0159***	0.115***	0.0827***
	(0.00274)	(0.0128)	(0.00286)	(0.00349)	(0.00380)	(0.00394)	(0.00386)	(0.00376)
intoutro	0.0646***	0.159***	0.0237***	0.0428***	0.0680***	0.0706***	0.122***	0.0929***
	(0.00269)	(0.0116)	(0.00284)	(0.00335)	(0.00346)	(0.00370)	(0.00360)	(0.00357)
age	-0.00462***	0.00476***	0.00251***	0.00491***	-0.00357***	0.000814***	-0.0139***	-0.00352***
	(0.000163)	(0.000622)	(0.000141)	(0.000169)	(0.000195)	(0.000207)	(0.000213)	(0.000193)
man	-0.0135***	0.278***	0.0426***	0.0255***	-0.0524***	0.0365***	0.101***	-0.00618**
	(0.00246)	(0.00959)	(0.00216)	(0.00261)	(0.00294)	(0.00310)	(0.00312)	(0.00286)
rendapc	8.11e-06***	7.06e-05***	1.56e-05***	8.15e-06***	4.35e-06***	1.15e-06	-8.34e-07	-1.35e-05***
	(1.47e-06)	(4.73e-06)	(1.09e-06)	(1.19e-06)	(1.47e-06)	(1.51e-06)	(1.47e-06)	(1.45e-06)
escolari	-0.00834***	0.0133***	0.00356***	0.0182***	0.0335***	0.0146***	-0.0114***	0.0144***
	(0.000973)	(0.00387)	(0.000883)	(0.00104)	(0.00116)	(0.00122)	(0.00124)	(0.00115)
urbana	0.0277***	-0.0866***	-0.00961	0.0204**	-0.0151*	0.00958	0.0595***	0.0597***
	(0.00725)	(0.0323)	(0.00806)	(0.00833)	(0.00855)	(0.00922)	(0.00951)	(0.00826)
ocupa	-0.0200***	0.0963***	0.0337***	-0.00353	-0.0274***	-0.0448***	-0.0315***	-0.310***
	(0.00395)	(0.0193)	(0.00418)	(0.00504)	(0.00500)	(0.00516)	(0.00524)	(0.00515)
crianca	-0.0368***	-0.545***	-0.114***	-0.0988***	0.190***	-0.108***	-0.0135*	-0.187***
	(0.00609)	(0.0317)	(0.00384)	(0.00615)	(0.00488)	(0.00722)	(0.00748)	(0.00461)
yd1	-0.0817***	0.00750	0.0937***	0.150***	0.0379***	-0.0149***	-0.105***	-0.0272***
	(0.00318)	(0.0120)	(0.00295)	(0.00341)	(0.00367)	(0.00388)	(0.00390)	(0.00355)
invmills1	-0.218***	-0.720***	-0.157***	-0.0926***	-0.132***	-0.0971***	-0.129***	-0.0831***
	(0.00980)	(0.0409)	(0.00928)	(0.0108)	(0.0120)	(0.0126)	(0.0129)	(0.0120)
invmills1sq	0.0402***	0.207***	0.0417***	0.0375***	0.0551***	0.0250***	0.0212***	0.0293***
	(0.00307)	(0.0126)	(0.00288)	(0.00349)	(0.00394)	(0.00412)	(0.00430)	(0.00400)
Constant		-1.085***						
		(0.0957)						
Observations	117,254	117,254	117,254	117,254	117,254	117,254	117,254	117,254

*Table 3. Probabilities of probit models corrected by selection - Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1; dummies of States included; dummies of race included.*

The results obtained from selection tests for all the models, show the need to control selection bias[3], Table 3. Indeed, the probit models with selection bias correction show that the inverse of Mills ratio

[3] All the results can be obtained directly from the authors.

and its square are statistically relevant to all the models. The sign and the significance of all the coefficients do not change with the selection bias correction, except for a couple of controls that are not directly related to the variables of interest. The magnitude of these coefficients changed, but not expressively. All the coefficients of the socio-demographic variables are compatible to the finds documented in the international literature; this shows that, as observed in our study, age has a negative effect on the probability of access to almost all the purposes, and that schooling, income *per capita* and urban dwelling all have positive effects on all or almost all of the purposes of access. Men are more likely to access the Internet for the following purposes of access: e-commerce, e-banking, e-gov, reading newspapers and magazines and leisure.

The effect of access at work is positive for all purposes of access, although the effect of the variable occupation is negative to almost all of them. When interpreting this phenomenon, one has to keep in mind the structure of the Brazilian labor market, which is characterized by extreme informality; in 2007, 57.6% of all occupations were informal (IBGE). In our findings, it is worth noting that the individuals who had access to the internet at work are usually white-collar workers, and were in the formal labor market, but if one examines occupations as a whole, the effect is negative because a majority of the workers are in the informal labor market.

4 Concluding Remarks

The main objetive of this paper was to empirically investigate the pattern of Internet access of the Brazilian population by location and type of access, together with other determinants, to verify the suitability of adopting a mobile broadband access policy in Latin America and Caribbean countries as a gateway to mass access in these countries. This is one of the Knowledge Society promotion strategies currently in practice in Asia. Understanding the differences in purposes of access *vis-a-vis* location of access and the type of connection, is an essential task if one plans to achieve digital inclusion with digital equality. The article also seeks to narrow the gap that exists in empirical studies by using microdata about the Internet in Latin America and the Caribbean, as recommended by a research agenda launched by the United Nations recently (Balboni et al, 2011).

Our findings suggest that broadband home access enhances the probability of access of all the purposes of use of the Internet in a more satisfactory way than any other location of access and type of connection. This finding corroborates the suitability of a mobile Internet access policy to these countries as one of a set of strategies to implement a Knowledge Society in Latin America since mobile broadband is the internet access form. This is of great value, especially if one considers that the latter is the most similar access to broadband home access and that although Internet access by mobile phone has limitations for certain purposes of use, its Internet access is exclusively broadband. Yet mobile technology is rapidly changing and some of its limitations may soon disappear. It should be noted that, considering the main purpose of access (Figure 2), promoting mobile access as a public policy toward mass access may also enhance the individual´s social support network and economic opportunities, and, for the purpose of use under consideration (communication), mobile broadband access allows it anywhere, at anytime, without any significant loss in terms of quality of access.

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