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Determinants of Mobile Broadband Use in Developing Economies: Evidence from Nigeria

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Preliminary version, incomplete.

Abstract

Using micro-level data coming from household surveys over 5 years, from 2013 to 2017, we analyse what are the determinants of mobile broadband adoption in developing economies. We provide empirical evidence on the presence of a learning effect stemming from mobile money use, which by providing a higher experience in using mobile phone increases mobile broadband use. The ownership of a mobile phone is also positively correlated with mobile broadband use. However, for those not owning a mobile phone the ownership of an active SIM card is a prerequisite for using mobile broadband. We highlight that the population left behind is mainly composed of poor households living in rural areas.

Key Words: *Mobile Broadband Use; Developing Economy; Inequality; Economic Growth.*

JEL Classification: I30, O12, L50, L96, O55.

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1 Introduction

Telecommunication operators have found a new El Dorado to target their investments in Information and Communications Technologies (ICTs). While in more advanced economies operators are rolling out next generation access networks, the mobile telecommunication market is booming in developing economies. With their flourishing and dynamic markets, emerging economies located in Africa and in South East Asia show promising prospects in terms of return of investment. They attract national and especially international investments.

Operators are massively investing in mobile networks and more recently in mobile broadband to gain new customers and increase their market shares. In Western Europe and in the US, the penetration rate of mobile phone is over 100%, and the one of mobile broadband (MB) is above 85%.¹ Revenues are even declining in Western Europe.² However, beyond the promises of increasing revenues, the telecommunication markets have been deeply marked by their countries colonial past. The fixed telephone network is marginally deployed throughout the countries. The telecommunication market is mostly driven by mobile technologies.

Worldwide, broadband plans have been adopted with ambitious targets in terms of deployment and coverage. In a more interconnected world, the use of the Internet to communicate or make business has become a must-have and developing economies are no exceptions.³ They have also defined their own broadband plans to ensure that the economic and social benefits stemming from broadband technologies would also spread out over their territories. However, for a public authority to ensure that the benefits of these new technologies spread out to the national economy, a first step is to make sure that they are adopted or used by the population.

The contribution of this paper is to highlight what are the determinants of mobile broadband adoption in emerging economies. These economies bear their own specificities and cannot be compared to western economies. An understanding of these mechanisms would greatly help policy makers to ensure not only the complete coverage of their territories but also the uptake

¹Mobile broadband Internet subscription rate in 2017, by region.

²For a comprehensive description, see for example: Schoentgen and Gille (2017).

³National broadband plans:

For Kenya: The national broadband strategy: Kenya vision 2030, 2013.

For Nigeria: The national broadband plan 2013, now version 2018.

For Tanzania: National Information Communication and Technology Broadband Backbone (NICTBB), 2014.

For Uganda: Draft National Broadband Strategy 2016-2020, date of the version unknown.

by the population. The analysis is performed using micro-level data coming from household surveys in Nigeria over 5 years, from 2013 to 2017. Nigeria is a perfect candidate for this analysis as it is representative of post-colonial and developing countries which attract foreign direct investment, especially in the telecommunication sector. Nigeria is a lower middle income country dominated by the service sector, which employ more than half of the working force. The agriculture sector is another key sector of the economy employing more than one third of the population.

The remainder of the paper is organized as follows. Section 2 discusses the relevant literature on the mobile technology on economic growth and deployment. Section 3 provides an overview of the Sub-Saharan telecommunication sector. Section 4 presents the data and introduces the econometric framework. Section 5 presents the estimation results. Finally, Section 6 concludes.

2 Literature Review

So far the literature has mostly focused on the drivers of mobile phone adoption and mobile phone use in developing economies and especially in Africa (see for instance Van Biljon and Kotzé (2007), Kalba (2008), Aker and Mbiti (2010), Blumenstock and Eagle (2010)).

However, considering the novelty of mobile broadband deployment in emerging economies, there are only few papers dealing with issues related to mobile broadband adoption. Most of the studies have been realised for western economies and their results are hardly transposable to the case of developing economies.

Adoption

Overall, authors find that factors of ICT adoption in Africa are GDP, income, low inequality, availability of infrastructure and education (Bagchi & Udo, 2007). Exposure to international funding (in terms of foreign direct investments, FDI) are also positively correlated to ICT adoption (Kyobe, 2011). Brown and Licker (2003) show that social factors influence the decision to adopt the technology. Higher social groups would be more sensitive to factors such as perceived usefulness, enjoyment, and long term profitability, while perceived usefulness and ease of use will be positively correlated with ICT adoption for the most vulnerable households.

As regards fixed Internet, Oyelaran-Oyeyinka and Adeya (2004) highlight the importance of the computer cost in the decision to adopt the technology. They also show that to avoid a costly computer ownership, users turn to Internet cafe or use computers at friends or colleagues' places, which is in line with Rangaswamy and Cutrell (2012).

Besides, Birba and Diagne (2012) and Touray, Salminen, and Mursu (2015) show that other factors such as education, gender, and social network membership play a roll. Overall, Internet is adopted mostly by young educated people familiar with the uses of technology (Pénard, Poussing, Zomo Yebe, & Ella, 2012).

The use of mobile Internet, however, requires fewer skills and less financial resources than fixed Internet, and is not conditioned to home electricity (Donner, Gitau, & Marsden, 2011; Stork, Calandro, & Gillwald, 2013). Yet, exploiting interviews of socially excluded households in South-Africa, Chigona, Beukes, Vally, and Tanner (2009) highlight that respondents have limited awareness of the existence and potential uses of mobile Internet. On top of this informational issue, cell phone cost has a strong negative influence on respondents decision to use mobile Internet.

Focusing on smartphone owners, Mathur, Schlotfeldt, and Chetty (2015) emphasize how the cost of data hinders mobile Internet use. They show that regulating the easiness of smartphone acquisition, the cost of data as well as educating the population to use mobile internet could remove the barriers remaining for mobile Internet adoption. They recommend notably to educate the population to use mobile Internet as a practical tool for networking on social media, information gathering and job seeking.

2.1 Uses

We now turn to ICT uses by the population, in order to better understand how they influence both the adoption of these services and the impacts they have on the economy. Authors find that overall ICTs enhance communication practices such as financial support between family members, and everyday coordination activity (Oduor et al., 2014).

Focusing on mobile phones, authors find that they are major actors of emancipations of

the most vulnerable (Murphy & Priebe, 2011).⁴ Phones can be easily shared (Burrell, 2010; S. Wyche & Olson, 2018), enabling the poorest to contact friends and family, and even to require remittances. In particular, the effects of mobile phones are increasingly driven by mobile-based services for money transfers such as M-PESA, well developed in Sub-Saharan Africa.⁵ Such services allow for immediate money transfers in case of shock, and thus allow family members to support each other (Morawczynski, 2009).

Researchers find various uses of Internet depending on the age or activities of users. The youngest tend to use Internet for leisure, while college educated use it for information gathering (Penard, Poussing, Mukoko, & Piaptie, 2015). With the emergence of mobile Internet a lot of activities are taken out of Internet cafe to be used on mobile phones (Rangaswamy & Cutrell, 2012). Women use mobile Internet for entertainment and connection (Donner et al., 2011). Focusing specifically on Facebook, users can use it to look for formal and informal jobs, to market themselves or to seek efficiently remittances from friends and family abroad (S. P. Wyche, Forte, & Yardi Schoenebeck, 2013).

However, these effects are to be nuanced as vulnerable parts of the population, such as rural women, are still excluded from mobile Internet use. For instance they often use old mobile phone with low battery capacity, and thus can not use mobile Internet even though their device has the functionality (S. Wyche & Olson, 2018).

Our contribution is to provide empirical evidence on what are the factors driving mobile broadband adoption in emerging countries. We use microlevel data on Nigeria over 5 years, from 2013 to 2017. Nigeria is a lower middle income country located in Sub-Saharan Africa. It is one of the leading economy in Africa, after South Africa. But it still shares the characteristics of developing countries with (low-scale) agriculture being a key sector of the economy, a dependency on export of primary commodities, especially petrol and a lack of basic infrastructures. The income per capita is fairly low and there are large pockets of the Nigerian population still living under the poverty level. The population growth rate and the infantile mortality rate are high.⁶ We provide policy makers with tools to ensure that the coverage of their territory with

⁴In 2007 for the most vulnerable women in rural Kenya.

⁵An extensive literature focuses on the factors of adoption of different mobile financial services (MFS) (Demombynes & Thegeya, 2012; Donner & Tellez, 2008; Dubus & Van Hove, 2017; ?).

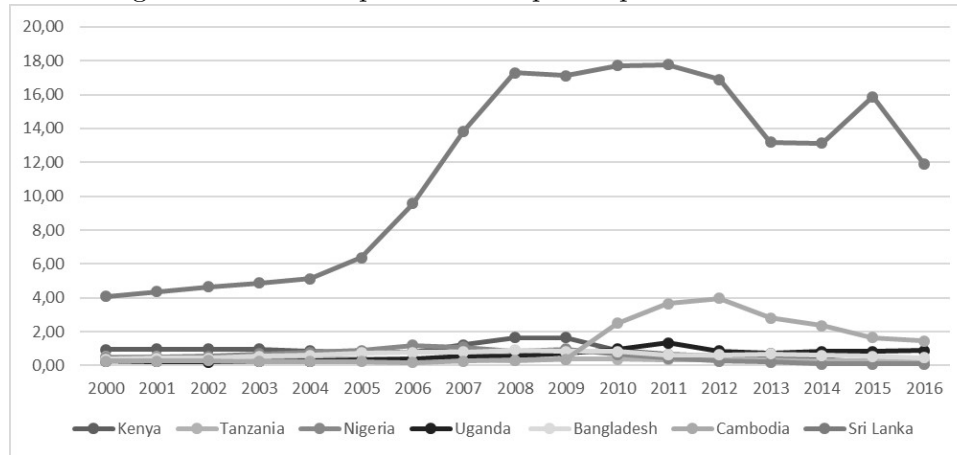
⁶See the World Bank in Nigeria Report, last available for 2018.

next generation mobile technologies is followed by the use and adoption of these technologies households.

3 Telecommunications Market in Sub-Saharan Africa

In developing countries, the fixed telephone network is mostly inherited from the past colonial time. The network was priorly rolled out to enable communications between the colonial cities and the old continent. It was not meant to connect cities within a country or within Africa or Asia. As a vestige of the colonization, the fixed telephone network coverage is limited and covers mostly urban areas. As a result, the penetration rate of fixed telephony is rather low, if not non-existent. As shown in Figure 1 the subscription rate to the fixed telephony has remained very low since 2000 and hardly reached 2% in Kenya, Tanzania, Nigeria, Uganda and Cambodia. A slight increase in the subscription rate occurred in around 2010 in Bangladesh, but it never went over 4% and declined immediately 2 years later. The only exception here is Sri Lanka which has experienced an increase in the fixed telephone subscriptions from the mid 2000's to reach 18% of the population in the end of the 2000's.

Figure 1: Fixed-telephone subscriptions per 100 inhabitants.

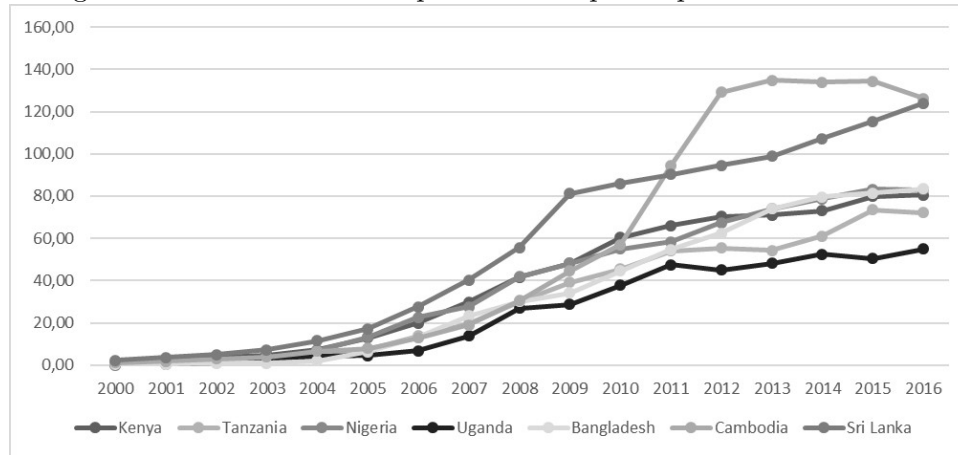


Source International Telecommunication Union databases.

In emerging economies, the telecommunications market is mostly driven by the use of mobile phones. Considering the high cost of fixed network deployment, which is mostly sunk, mobile infrastructures have been rolled out throughout the countries to bring telecommunications services to households and companies. Civil engineering represents 80% of the costs of deployment. The penetration rate of mobile phone is massively increasing. The boom in mobile phone subscriptions has surprised the telecommunication operators themselves. As a well cited example, Safaricom, a national operator in Kenya, projected to reach 3 millions subscribers in 2020, but reached 14 millions customers in 2010.

The spectacular growth of the mobile market has also been primarily driven by the liberalisation of the markets, which have been progressively opened-up to competition. Another important factor has been the introduction of mobile-money services, which enables everyone using a mobile phone to make financial transactions, to store money and even to start or expand their own business. This service has been exceptionally well received because a large proportion of households, notably in Sub-Saharan Africa and Asia, is excluded from the banking system or do not wish to be part of it. Besides, the use of mobile-money services doesn't require broadband, which makes the service even more attractive boosting mobile phone adoption.

Figure 2: Mobile-cellular telephone subscriptions per 100 inhabitants.



Source International Telecommunication Union databases.

In Kenya, Nigeria, Cambodia and Sri Lanka, the mobile subscription growth rate has been surprisingly high. In 2005, around 10% of the population had a mobile phone subscription, in 2016, more than 80% have one and for Cambodia and Sri Lanka this figure reaches more than 120%. In Uganda, the rise of mobile phone subscriptions has been of a lower amplitude. In 2005, less than 5% of the population had a mobile phone subscription, in 2016 it is a bit more than half of the population which has a subscription.

The figures here are not representative of mobile phone use by the population. In developing economies, mobile phone use is not exclusive as it is in Europe or in the US. The mobile phone is not considered as an individual device, but could be shared among several people, either within a household or a community. It is not rare to have individuals owning a SIM card, but no telephone. They would make use of someone's else mobile phone. Others may not have a SIM card but use the one of someone's else. In developing economies and specifically in Sub-Saharan Africa, where the poverty level remains high, there are still households, which cannot afford to purchase a mobile device.⁷

⁷"Poverty in a Rising Africa", Africa Poverty 2016 Report, World Bank.

While all countries benefits from a fairly good GSM (2G) coverage, the UMTS (3G) coverage is more limited and the LTE (4G) technology is shyly introduced onto the markets. Table 1 shows the percentage of the population covered by a 2G, 3G and 4G mobile network respectively. Based on the Inclusive Internet Index: Measuring Success 2018, "the mobile network coverage refers to the percentage of inhabitants within range of a mobile-cellular signal; irrespective of whether or not they are subscribers or users".

Table 1: Mobile network coverage in 2018, in percentage of the population

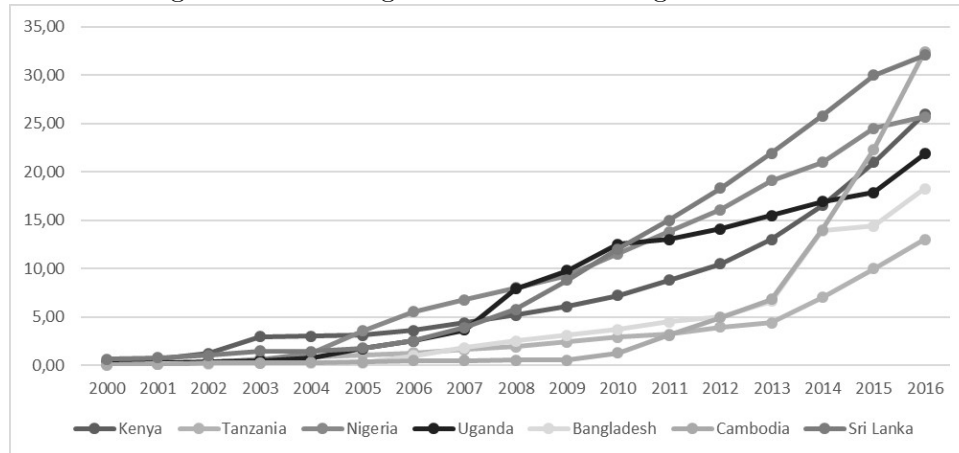
	Bangladesh	Cambodia	Sri Lanka	Kenya	Nigeria	Tanzania	Uganda
2G	99%	99%	99%	99%	93%	95%	93%
3G	90%	80%	85%	78%	54%	85%	64%
4G	65%	50%	36%	22%	51%	13%	15%

Source: The Inclusive Internet Index: Measuring Success 2018.

Internet use has also become more popular in developing economies. While almost non-existent in the early 2000's, it reached roughly one third of the population in Cambodia and Sri Lanka and approximately one forth of the population in Kenya, Nigeria and Uganda. Tanzania is still lagging behind with only 13% of the population makes use of the Internet in 2016.

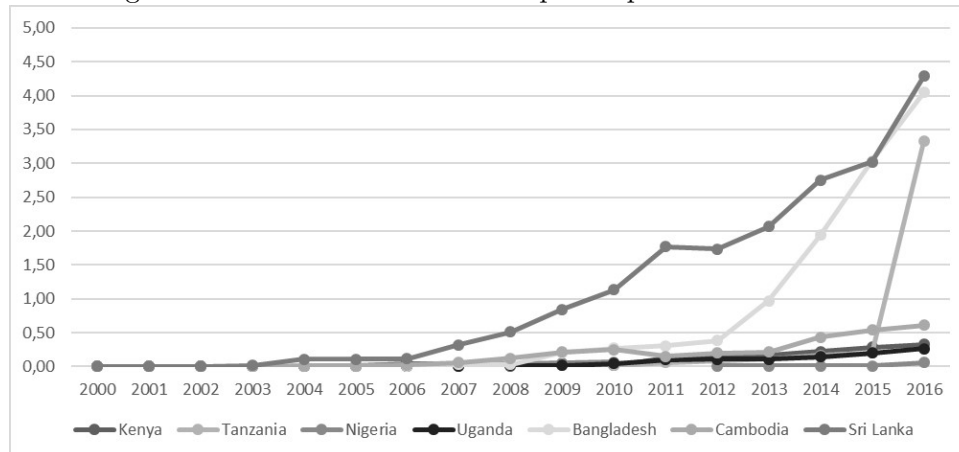
Considering the low rate of fixed-broadband subscription, individuals access the Internet using wireless technology, with mobile broadband becoming increasingly popular. Figure 3 shows the evolution of Internet use over from 2000 to 2016, while Figure 4 highlights the low level of fixed-broadband subscriptions.

Figure 3: Percentage of Individuals using the Internet.



Source International Telecommunication Union databases.

Figure 4: Fixed-broadband subscriptions per 100 inhabitants.



Source International Telecommunication Union databases.

4 Data and Econometric Model

We exploit a survey led by Intermedia's financial Inclusion Insights program, providing data for Nigeria for each year between 2013 and 2017. The choice of this country is due to the availability of the data, but also, and more importantly, to the high penetration rate of mobile phone and mobile broadband, relatively to the other African countries. Data are at the household level, and households are chosen randomly, based on the national census.

We have data on more than 24,000 individuals over five years, from 2013 to 2017. Each cross-section contains information on mobile phone use and ownership. As it is common in Africa to have a SIM card, but no mobile phone, we also have access to data on SIM card ownership and mobile phone access. Considering the fact that it is not rare to encounter people having neither a mobile phone or a SIM card, but having access to someone else SIM card, we also have data on SIM card access for those having no SIM card. The databases provide us with socio-demographical information on gender, age, socio-professional occupation, years of education and localisation.

We develop, in a first preliminary stage, a simple logit model to estimate what are the determinant of mobile broadband use in Nigeria.

$$\begin{aligned} mobile_bb_{it} = & \alpha + \beta_1 own_mobile_{it} + \beta_2 active_sim_{it} + \beta_3 education_{it} + \beta_4 urban_{it} \\ & + \beta_5 socio_pro_{it} + \beta_6 male_{it} + \beta_7 age_{it} + \beta_8 ppi_score_{it} + year_t + \eta_j + \epsilon_{it}, \end{aligned} \quad (1)$$

where $mobile_bb_{it}$ is a dummy variable representing mobile broadband use by respondent i , either on its own phone or on a phone he has borrowed, at time t . Mobile broadband use could be influenced by the possession of an active SIM card, denoted by $active_sim$, but also by the possession of a mobile phone, denoted by own_mobile . The level of education may affect the decision to use mobile broadband by an individual, as it requires specific digital and literacy skills. The level of education taken into account in our model and consists of four different levels, no formal education, primary education, secondary education, tertiary education and coranic education. The PPI, a measurement of the poverty level, is included to take into account the

level of poverty of the household.

Socio-demographical characteristics may also influence mobile broadband use. It may be more common to use mobile broadband in urban areas, rather than in rural areas. The gender of the respondent is also taken into account, as well as the age category. The variable *age* has five categories, 15-24 years old, 25-34 years old, 35-44 years old, 45 to 55 years old and over 55 years old. The socio-professional group, denoted by *socio_pro*_{*t*} may also have an impact on the use of mobile broadband. White collars may use mobile broadband more than retired for example.

η_i is a region dummy capturing cross-region differences. *year* is a dummy variable for each year capturing a potential time-trend. Finally, ϵ_{it} is a robust standard error, clustered at the state (or province) level.

In a second specification, we introduce instead a categorical variable to indicate whether the respondent owns an active SIM card or has access to one. It is denoted by *cat_sim*_{*it*}. The second specification is estimated on both the whole sample and on the sub-population of those having no mobile phone.

$$\begin{aligned} mobile_bb_t = & \alpha + \beta_1 own_mobile_{it} + \beta_2 cat_sim_{it} + \beta_3 education_{it} + \beta_4 socio_pro_{it} \\ & + \beta_5 urban_{it} + \beta_6 male_{it} + \beta_7 age_{it} + \beta_8 ppi_score_{it} + \beta_9 m_money_{it} \quad (2) \\ & + \beta_{10} television_{it} + \beta_{11} bank_account_{it} + year_t + \eta_j + \epsilon_{it}, \end{aligned}$$

In this second specification, we also control for the use of mobile money, which has been the service driving mobile phone adoption. We add a control for the ownership of a television, which is mostly considered as an entertainment platform and could also be a proxy for access to electricity. Finally we control for the ownership of a bank account, $\beta_{11} bank_account_{it}$, as banking is mostly common among richer households.

5 Estimation Results

The population of mobile broadband users in Nigeria appeared to be composed of young educated males, living in an urban area and being relatively wealthy.⁸ Mobile broadband use is also more common among bank account owners. Controlling for the regions, it seems that households are more likely to use mobile broadband in the southern region, located right on the ocean shore, where the network deployment started in colonisation time. The northern region, which is the least developed and has suffered terrorist attacks from the Boko Haram radical islamist groups, is the one with the lowest mobile broadband use. Naturally, the further we go back in time, the less probable it is for a respondent to use mobile broadband.

The results from specification (1) show that the ownership of a mobile phone has a positive impact on mobile broadband use. Besides, those owning a SIM card are more likely to make use of the technology. Adding a categorical variable in specification (2) to take into account that in developing countries part of the population do not own a SIM card, but have access to one, show that both the ownership and the access to a SIM card increase the probability of using mobile broadband. Interestingly, the impact is on similar amplitude.

We also highlight in specification (2) that mobile money users are more likely to use mobile broadband. This could underline the existence of a learning effect. Mobile phone adoption has been primarily boosted by the introduction of mobile money services. Those using mobile money may have been using mobile phones for a longer time and may have gained therefore more experience. In turn, more experimented users of a technology are more inclined to switch to a more advanced version.

It appears that mobile broadband is mostly used by students, which is in line with the literature. Penard et al. (2012) shows that students use the Internet for information gathering purposes. On the contrary, the unemployed and the farmers are the least likely to use mobile broadband. Besides, the ownership of a television has a negative impact on mobile broadband use. Mobile broadband could also be used for leisure activity, as underlined in the literature. It could be considered as a substitute for the entertainment programs provided by television.

A singularity of developing economies is that mobile phones are not necessarily considered

⁸The estimations have been run without the PPI variable, the results are qualitatively similar.

as an individual device and can be shared among a community. It is common that part of the population do not own a mobile phone. They can use the one of a relative or a friend. Mobile phones can also be a common device among a community allowing each member to make use of it. It is important to take into account this specific category of mobile internet users to get an accurate picture of the reality.

In specification 3, we highlight that the ownership of a SIM card is a pre-requisite to use mobile broadband when one doesn't own its personal mobile phone. Though the access to a SIM card has a positive effect on mobile broadband use, owning an active SIM card increases the probability of using the service. This finding may reflect that SIM card owners are more likely to have a subscription to mobile broadband than those only accessing someone else SIM card. Making use of mobile broadband by accessing the SIM card (and mobile phone) of someone else would imply to either use it for free or contribute to the cost of the subscription.

In this particular category of users who do not possess a mobile phone, we don't find any significant effect from using mobile money on broadband use. This in turn strengthens the potential existence of a learning effect. As those having a mobile phone have a better access to the service and could gain more experience in using mobile phones. We do not find any significant effect either of having a television. Another interesting finding is that non-mobile owners using the internet are more likely to be unemployed. This result is also in line with the literature. Penard et al. (2012) highlight that the internet and specifically Facebook can be used as a job portal.

The same analysis has been performed for Kenya, Tanzania and Uganda, three Sub-Saharan countries displaying the same pattern in terms of telecommunications markets, similar qualitative results in terms of signs and significance have been found.⁹

6 Conclusion

Using micro-level data coming from household surveys over 5 years, from 2013 to 2017, we estimate what are the determinants of mobile broadband use in developing economies.

In developing countries, the mobile phone is not considered as an individual device, but as

⁹Results available upon request. Should be added in a more advanced version of the paper.

the fixed phone in Europe or in the Northern hemisphere, a mobile phone could be shared among several individuals. As such it is not uncommon to encounter individuals not owning their own device but accessing the one of someone else. The same is also true as regards the ownership of SIM cards. A SIM card can be owned by a group of people, relatives, friends or villagers and shared among several users. As a result, it is crucial to take into account access to the device and SIM card to analyse what are the determinants of mobile broadband use.

We show that mobile broadband is mostly used by young educated males, living in an urban area and being relatively wealthy. People owning a mobile phone are more likely to use mobile broadband. Similarly the ownership of /or access to a SIM card increases the probability of using mobile Internet. Considering the population of non-mobile owners, we show that those owning an active SIM card are the most likely to make use of mobile broadband. SIM cards owners may also be more inclined to subscribed to a mobile Internet service, which could be reflected by this positive effect.

We also highlight a positive effect of mobile money use on the probability of using mobile broadband, which could underline the presence of a learning effect. The introduction of mobile money services has boosted the mobile phone adoption. Those using the service may have an higher experience in using mobile phone and therefore may be more inclined to use a more advanced technology.

Considering the importance of mobile phone and SIM card ownership for mobile broadband use, it seems essential that policy makers defined demand stimulation policies. As suggested by Mathur et al. (2015) a regulation of the cost of data could be implemented. A decrease in the device cost, which could be achieved partly by subsidisation, could also increase the number of mobile phone owners.

The results also show a digital divide in terms of territories, social groups and gender, which could be reduced by educating people to use telecommunications technologies especially in rural areas. It seems also essential to ensure that women are not left out. It has been shown that mobile phone adoption has been a powerful tool to empower women, specifically in rural areas.

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Appendix

Table 2: Summary statistics (years 2013-2016)

Variable	Obs.	Mean	Std. Dev.	Min	Max
Mobile broadband use	24,324	.4276024	.494741	0	1
Education	24,324	1.785192	.9578681	0	3
Urban	24,324	.3832018	.4861768	0	1
Age	24,324	32.34916	13.23898	15	102
Gender (male)	24,324	.5686976	.4952683	0	1
Number of household members	24,324	4.462259	2.133542	1	8
TV	24,324	.2718303	.444912	0	1
Mobile only	24,324	.0090035	.0944604	0	1
Active SIM card only	24,324	.0151291	.1220689	0	1
Mobile phone and SIM card	24,324	.8101464	.3921933	0	1
No mobile phone, no SIM card	24,324	.1657211	.3718377	0	1

Table 3: Summary statistics; years 2013-2016; N=24,355

Variable	Percentage
Mobile broadband use	42.7
Education	
No Education	15.4
Primary	12.9
Secondary	49.6
Tertiary	22.1
Urban	38.3
Age	
15-24	30.4
25-34	35.9
35-44	17.2
45-54	8.5
Over 55	8.0
Gender (male)	56.8
TV	72.8
Mobile only	0.9
Active SIM card only	0.9
Mobile phone and SIM card	81.0
No mobile phone, no SIM card	16.6
Number of household members (mean)	4.462259

Table 4: Evolution of Mobile Internet Use over 2013 and 2016 in urban and rural areas in our sample

Year	Urban	Rural	Overall
2013	0.403	0.233	0.304
2014	0.539	0.458	0.489
2015	0.505	0.419	0.459
2016	0.394	0.481	0.456
All year	0.465	0.404	0.427

Table 5: Determinant of mobile broadband adoption in Nigeria between 2013 and 2017

	Whole sample	Whole sample	Non mobile owners
Mobile ownership	1.014*** (0.196)	1.095*** (0.206)	
SIM card access		1.906*** (0.203)	2.628*** (0.313)
SIM card ownership	0.830*** (0.196)	1.892*** (0.333)	3.028*** (0.328)
mobile money user		1.575*** (0.173)	0.279 (0.765)
bank_account		0.818*** (0.055)	0.984*** (0.381)
15-25			
25-34	-0.386*** (0.057)	-0.388*** (0.058)	-0.587*** (0.223)
35-44	-0.850*** (0.091)	-0.851*** (0.091)	-0.572* (0.306)
45-54	-1.229*** (0.109)	-1.234*** (0.108)	-0.584 (0.365)
Over 55	-1.629*** (0.112)	-1.633*** (0.114)	-1.028** (0.443)
Gender (Male=1)	0.560*** (0.054)	0.565*** (0.054)	0.501*** (0.183)
No formal education			
Primary education	0.007 (0.158)	-0.029 (0.159)	0.593* (0.303)
Secondary education	0.989*** (0.168)	0.944*** (0.167)	1.376*** (0.331)
Higher education	2.212*** (0.164)	2.175*** (0.164)	1.968*** (0.323)
Koranic education	0.139 (0.255)	0.128 (0.253)	0.704** (0.309)
Urban	0.391*** (0.066)	0.391*** (0.066)	0.376 (0.267)
Household size	0.092*** (0.016)	0.089*** (0.017)	0.094 (0.059)
Wealth (PPI index)	0.021*** (0.002)	0.021*** (0.002)	0.013** (0.005)
tv		-0.255*** (0.059)	0.276 (0.202)
Intermediate professions			
Farmers	-0.635*** (0.108)	-0.640*** (0.108)	0.127 (0.503)
Craftmen, Self-employed	-0.080 (0.083)	-0.082 (0.084)	0.670 (0.490)
White collars	0.243** (0.108)	0.247** (0.109)	0.894 (0.780)
Manual workers	-0.013 (0.076)	-0.019 (0.076)	0.615 (0.402)
Military	0.460* (0.244)	0.488* (0.253)	
Unemployed	-0.145* (0.079)	-0.140* (0.080)	0.692* (0.376)
Student	0.407*** (0.098)	0.408*** (0.098)	0.491 (0.494)
Constant	-5.082*** (0.230)	-6.166*** (0.223)	-8.446*** (0.676)
Year fixed effects	yes	Yes	Yes
Region fixed effects	yes	Yes	Yes
Pseudo R-squared	0.27	0.27	0.29
AIC	22669	22543	1258
BIC	22920	22802	1450
Log Likelihood	-11303	-11239	-599
Observations	24,324	24,324	4,393

Standard errors in parentheses: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$