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Impact of Developments in Telecommunications on Poverty in Nigeria

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Abstract
This study tried to ascertain the impact of developments in telecommunications on household Poverty level in Nigeria through its impact on household per capita income, small business turn over employment and health, using cross-sectional data from a nationwide survey. Two states were selected from each of the six geo-political zones in the country and in each state, a sample of 1 000 households were selected, making a total sample size of 12 000. The estimation was carried out using a probit model. The results of both the regression and marginal impact analysis generally suggest that developments in telecommunications to a very large extent have a positive impact on poverty reduction in Nigeria. This lead to the recommendation that the Nigerian Communications Commission should try and see that there is increase in development of the telecom sector through liberalization and deregulation.
Keywords: Nigeria, poverty reduction, probit model, marginal impact, liberalization.

1 Introduction

There has been some notable development in Nigeria telecommunication sector which include; liberalization of the sector in 2001, the establishment of Universal Service Provision Fund (USPF) in 2003, Deregulated Telecommunications Services, Increase in the Number of Major Players and others. These have made the sector to witness unprecedented growth since 2001. In 2004, the Nigerian telecom sector received global acclaim as one of the fastest growing mobile markets in the world and this trend continued to date. From about 0.886 million lines at the end of 2001, the number of connected telephone lines increased to about 98.67 million as at April 2010. This represents an average annual growth rate of about 115%. The number of active lines increased from 41.9 million in 2007 to 78.85 million as at April 2010. The installed capacity increased from 84.7 million in 2007 to over 146.6 million as at April 2010 (Pyramids Research Reports, 2009), (www.ncc.gov.ng/index5_e.htm). Equally, the usage and penetration of internet services witnessed commensurate growth. Internet users increased from less than half a million in 2002 to about 1.8 million in 2004, representing increase in penetration rates from 0.3 in 2002 to 1.4 in 2004. Trends in teledensity in Nigeria increased from 0.72 in 2001 to over 56 in 2010. (http://www.ncc.gov.ng/index5_e.htm).

These also came with huge investments in infrastructure by the providers. Private investment into the Nigerian telecommunications sector has grown to over US$6 billion, from US$50 million in 2001, with the sector now the largest generator of Foreign Direct Investment (FDI) after the Oil and Gas Industry (Ndukwe, 2008). NCC (2005) also reports that equity investments into the Information and Communications (ICT) sector constitute about 56% of total investments made by Nigerian banks under the Small and Medium Enterprises Investment Scheme (SMEIS). A number of international agencies and multilateral institutions have also been investing in the Nigerian telecommunications industry. These include the International Finance Corporation (IFC) - the private sector arm of the World Bank Group, which played a significant role in the US$395million syndicated loan to MTN Nigeria. IFC contributed US$100 million to the financing package, representing about a quarter of the entire deal package, and one of its largest ever investments in the telecommunications sector. IFC's contribution to the deal was also the corporation's second largest investment in Africa so far. Other international agencies investing locally include the Export-Import Bank of the US (US Exim Bank), African Export-Import Bank (AFREXIM), African Development Bank (ADB), Development Bank of South Africa (DBSA), and DMO Germany (http://www.ncc.gov.ng/index5_e.htm).

Data from CBN statistical bulletin and NCC website indicates that the sectoral growth of the telecommunications component of the GDP increased from 8% to 30% between 2000 and 2004 and that, the percentage contribution of telecommunications to GDP increased from 0.55% in 2001 to 2.75% in 2008 (CBN, Various

years and NCC, 2010). Also, the communications sector's contribution to GDP increased from 0.11% to 1.14% while total telecommunications revenue constituted 3.5% in 2004, this was a sharp increase from the 0.8% that was experienced in 2000, (CBN, Various years and NCC, 2005).

Indeed, GSM (an important part of telecommunications) has emerged as an integral and essential part of the culture and life of Nigerians. It has also created countless opportunities for small and medium businesses in franchises, dealerships, retailer-ships and value added services within the GSM market. For instance, over 10,000 people are directly employed by GSM operators alone in 2003 while an estimated 1,000,000 indirect employment opportunities are created through the operation of GSM (Recharge card hawkers, Resellers, etc, including the 'umbrella people'). Also, over 10.5 million Nigerians now have a convenient way of communication. This development has greatly affected positively business environment in the country.

To buttress the last sentence in the above paragraph, Fong (2009) assesses the impact of ICTs on Gross National Income (GNI) per capita in developing countries in 2005 and found a significant relationship between GNI per capita (in PPP international dollar) and adoption of each ICTs (mobile phone, personal computer, and telephone) but not for Internet technology adoption. Jensen, (2007), Mercer, (2001), Oberski, (2004), Reisman, Roger, and Edge, (2001), United Nations Development Programme [UNDP], (2001), World Bank, (2003) Bongo, (2005), Tella, Amaghionyeodiwe and Adesoye, (2007)and UNICT. (2003) confirmed the positive relationship between ICTs and economic growth. They suggest that ICTs have potential in alleviating poverty in poor countries. These technologies have also been viewed by governments and international aid agencies as important tools for national integration because they are capable of enabling greater access to health and education services and creating economic opportunities for underprivileged population groups. In fact, the 2006 Information and Communications for Developments report published by World Bank (2006) for example, considered ICTs to be crucial to poverty reduction.

1.1 Problem statement

Despite the above developments in telecommunication and their supposed influence on the production process and other socio-economics activities in Nigeria, poverty level is still very high and increasing. The Nigerian Human Development Report 2008/09 (HDR) published by UNDP in December 2009 reports that 54.4% of the population lives below the national poverty line (UNDP, 2009). Unemployment rate in Nigeria rose from about 12 out of 100 working age people in 1999 to 18 in 2005 with the rate of youth unemployment rising in urban area than rural area. This makes sceptics to worry that the above positive impacts of telecommunication especially on the poor may be exaggerated. This may be due to weak methodological approaches; the forced transition: as information is a luxury good whose demand requires the attainment of higher incomes; the implications for local social relations and the negative impacts of a "single" global economy; the barrier that cost of access imposes on the poor and the other trade-offs; the focus on benefits rather than a cost-benefit analysis etc. See for instance, Sardar (1996), Jayaweera (1986), and Kaye and little (2002), Kenny, C. et al (2000), Lanvin and Qiang (2003).

Furthermore, subscribers are faced with some constraints which militate against their deriving maximum returns from the use of telephones. All these could, on the long run, impact negatively on the performance of the sector and hence have negative impact on the poor. The issue is therefore broader than access.

1.3 Research Questions and Objectives

From what has been described above, there is no doubt that access to telecommunication has improved in Nigeria through all the new developments in the sector. However, the questions to be answered are: Is access enough? That is, does mere access translate to improved wellbeing: increased income? The objective of this study is therefore to examine the extent to which Nigeria's telecommunications development has influenced poverty reduction and general well being of the masses.

2 Methodological Design

This study is a microeconomic analysis which used micro econometric model with primary data collected from a cross sectional survey of 12 states in Nigeria. The States were selected based on Income level, Geographical Location, Catchments Areas, Institutional, Ethnic and behavioural diversity. The states are Benue and Nassarawa from North-Central; Bauchi and Yobe from North-East; Kaduna and Kebbi from North-West; Ogun and Ekiti from South-West; Enugu and Anambra from South-East; and Akwa-Ibom and Edo from South-South. In each of the states selected, the survey was conducted in urban and rural Local Government Areas. The sample size is 12,000 and this was uniformly distributed across the states being sampled (1000 per State).

2.1 Model Specification

The impact of ICT on poverty is approached from a multi dimensional stand point through its impact on income generation (household per capita Income) (Y_1), Business turns over (Y_2), employment creation (Y_3) and health of the households (Y_4). These can each be modelled as a function of vector of household demographic characteristics X_m^{DF}, vector of household Information and Communication Technology indicators X_m^{ICT} and vector of household socioeconomic characteristics X_m^{SE}.

$$Y_i = \alpha_i + \beta_{im}\sum X_m^{DF} + \delta_{im}\sum\left(X_m^{ICT}\right) + \lambda_{im}\sum(X_m^{SE}) + \mu_i.$$

In addition to model 1, the analysis involves the use of probit model to find out the marginal impact of each of the variables especially the ICT indicators on poverty.

3. Presentation of Research Findings

3.1 Estimation of the impact of telecommunications on Household per capita income and poverty

The estimated impact of developments in telecommunications on household per capita income and poverty are shown in table 1 appendix A. Models (1) and (2) are the Ordinary least Square (OLS) estimates and OLS with robust standard errors respectively.

The regression results as contained in table 1 indicate that access to television has a positive and significant impact on Income per capita of households. The seventh row shows that having fixed telephone has a positive but non-significant impact on per capita income of household but helps in poverty reduction. On the other hand, having mobile telephone, computer at home and access to internet as shown in the eight, ninth and tenth row respectively of same table 1 have very strong impact on increasing per capita income and reduction of poverty.

The fact that poor households have access to most of telecommunications may imply reverse causality. Having mobile phone has the largest positive impact on household income and this is followed by having internet access at home and ownership of a computer. These three devices may increase income earning capacity of households and thus reduce household poverty.

Table 2 in appendix A contains a summary of the probit estimates of the marginal impact of telecommunications on poverty. Households that have and use mobile phones have about 16.3 percent lower probability of being poor compared to households that do not. Having internet at home reduces household's chances of being poor by about 14.9 percent and having a computer at home decreases household's chances of being poor by about 15 percent. Households that have access to fixed telephone lines have 17.6 percent lower probability of being poor compared to those that do not.

3.2 Impact of developments in telecommunications on the turnover of small businesses

Table 3 in appendix A shows the estimated impact of developments in telecommunications on the turnover of small businesses. We find that internet usage has positive and significant impact on the monthly turnover of small businesses and this remained robust after controlling for other factors. The uses of mobile phone and number of years used mobile phone in business have significant positive effect on monthly turnover. Using the internet and mobile phone to interact with customers and to get information about the market has significant positive impact on business turnover. Business owners who are aware of developments in the telecommunications have significantly higher turnover than those who are not aware of such developments. This implies that awareness and use of telecommunications have become fundamental for business success in recent times.

To further show the positive impact of developments in telecom on income of especially the poor and Small scale business turnover, figure 1 in appendix A shows average annual additions to total profit of the small scale business due to developments in telecommunications. The figure indicates that the internet and mobile phone usage increase annual profits substantially. For example, small businesses that have been using the mobile phone frequently in business for the past eight years have achieved annual average increase in profits of about ₦125 000, while those business that have been using the internet in their operations have achieved annual increase in profits of about ₦75 000 on the average.

Figure 2 in appendix A shows the perception of small businesses on how developments in telecommunications have impacted on their business profitability, sustainability and security. The overall evidence indicates that developments in telecommunications in Nigeria have impacted significantly on these three indicators. For example, of the businesses surveyed, about 50 percent believed that developments in telecommunications have

increased business profit to a great extent, while about 40 percent believe it has increased business profits. Less than 10 percent of the respondents believe developments in telecommunications have no effect on business profit while less than 1 percent believes it has decreased business profits. Similar pictures are shown on the perceptions of businesses on business security and sustainability. These have important implications for realization of MDGs in Nigeria. One such implication is that growth in small businesses can be sustained by developments in telecommunications and this is likely to increase the probability of individuals undertaking self-employment activities and hence reduce the risk of persistent poverty due to unemployment.

3.3 Impact of developments in telecommunications on employment and health.
Table 4 in Appendix A contains the result of the impact of developments in telecommunications on employment and health. These results indicate that individuals that live in urban areas are more likely to find employment or more easily change their jobs compared to individuals that live in rural areas, controlling for other factors. Consistent with the above, individuals that live in urban areas have better health outcome. Availability of internet at home increases the chance of getting employment on average and decreases the probability of falling ill. This may be because the individual is likely to get better health information and how to apply them through the internet.
Although the micro analysis could not establish a significant relationship between ownership of both fixed and mobile phone and probability of having ill health, table 4 of appendix A contain the fact that access to telecom facilities makes it easier for households to contact their medical doctor(s) in times of need and this increases the speed of getting medical advices thereby, boosting the family health.

4 Conclusion and Policy Recommendations

4.1 Conclusion

This study tried to ascertain the impact of developments in telecommunications on Poverty at the micro (individual, household, small business) level. The work started by identifying the key developments that has taken place in the telecommunications sector in Nigeria. The objective of the study is to find out the impact of these developments indicators in telecommunication and Poverty reduction. In order to achieve this, we used cross-sectional data generated from a nationwide survey of households and individuals, small businesses and MDG institutions. Two states were selected from each geo-political zone and each state was divided into urban and rural areas where questionnaires were administered on households and individual members, small businesses and MDG-related institutions to capture as much variation in the data as possible.
The regression analysis used a probit method at the individual and household levels as well as on the small firms' levels in addition to other descriptive statistics. The estimation was conducted on the impact of developments in telecommunications on household poverty and household per capita income, while at the individual level we estimated the impact of developments in telecommunications on health and employment. For small businesses we estimated the impact on the monthly additions to business sales or turnover.
The results generally suggest that developments in telecoms to a very large extent have a positive impact on poverty reduction in Nigeria

4.2 Recommendations

Nigeria has less than four years to the target year for the attainment of the MDGs in which Poverty reduction is a major goal and there are considerable challenges still to be overcome. The poverty rate in Nigeria is still very high. This study reveals that the Nigerian Communications Commission (NCC) should be seen as an active partner in helping to see that poverty is reduced to the barest minimum in Nigeria. So far, it has been a passive partner. What this study has shown is that more telecommunications is better than less in the pursuit of poverty reduction goal. The sure way to provide more telecommunication is to ensure real competition which is within the domain of NCC.

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APPENDIX A: Detailed Regression result of the analysis

	(1) Percapita ~e	(2) Percapita ~e	(3) poor	(4) poor
location of respon~t	2589.3**	2589.3**	-0.189*	-0.189*
	(2.70)	(2.59)	(-2.51)	(-2.49)
Age of household head	-127.65*	-127.65*	0.089**	0.089**
	(-39.6)	(-39.04)	(0.13)	(0.19)
number of househol~s	-988.7***	-988.7***	0.0534***	0.0534***
	(-9.05)	(-10.44)	(5.28)	(4.72)
has electricity	-2059.9	-2059.9	-0.0181	-0.0181
	(-1.29)	(-1.02)	(-0.14)	(-0.13)
has radio	-823.2	-823.2	0.581***	0.581***
	(-0.61)	(-0.74)	(3.93)	(3.92)
has television	2851.3*	2851.3*	0.190	0.190
	(1.98)	(2.32)	(1.71)	(1.63)
has fixed telephon~e	1777.2	1777.2	-0.512***	0.512***
	(1.11)	(1.06)	(-4.96)	(-4.93)
has a mobile phone	5136.2**	5136.2***	-0.668***	0.668***
	(3.15)	(6.01)	(-4.61)	(-4.48)
has computer at home	6111.8***	6111.8***	-0.466***	0.466***
	(4.74)	(3.65)	(-5.26)	(-5.08)
has internet acces~e	7662.5***	7662.5**	-0.487***	0.487***
	(4.90)	(3.25)	(-4.86)	(-4.00)
Constant	11203.1***	11203.1***	0.602**	0.602**
	(5.33)	(7.75)	(3.11)	(3.18)
Adjusted R-squared		0.133	0.133	
Pseudo R-squared			0.123	0.123
AIC	32038.4	32038.4	1701.9	1701.9
BIC	32091.1	32091.1	1756.1	1756.1
t statistics in parentheses				
* p<0.05, ** p<0.01, *** p<0.001				

Table 1: Estimates of the Impact of Telecommunications on Household Per capita Income and Poverty

	(1) poor	(2) poorrobust
location of respon~)	-0.0579*	-0.0579*
	(-2.52)	(-2.51)
number of househol~s	0.0164***	0.0164***
	(5.33)	(4.79)
has electricity	-0.00555	-0.00555
	(-0.14)	(-0.13)
has radio	0.178***	0.178***
	(3.94)	(3.93)
has television	0.0583	0.0583
	(1.71)	(1.63)
has fixed telephon~)	-0.176***	-0.176***
	(-4.58)	(-4.53)
has a mobile phone~)	-0.163***	-0.163***
	(-6.21)	(-6.04)
has computer at ho~)	-0.154***	-0.154***
	(-4.97)	(-4.82)
has internet acces~e	-0.149***	-0.149***
	(-4.84)	(-3.98)
Pseudo R-squared	0.123	0.123
AIC	1701.9	1701.9
BIC	1756.1	1756.1

Marginal effects; t statistics in parentheses
(d) for discrete change of dummy variable from 0 to 1
* p<0.05, ** p<0.01, *** p<0.001

Table 2: Marginal Effects of Telecommunication on household Poverty

	(1) turnover	(2) turnover	(3) turnover	(4) turnover
number of years in~s	0.00122	0.00136	0.00266	0.00220
	(0.16)	(0.18)	(0.35)	(0.29)
use internet for b~s	0.988***	0.853***	0.748**	0.744**
	(3.95)	(3.43)	(2.97)	(2.95)
use television for~s	-0.0813	-0.0914	-0.0939	-0.0920
	(-0.61)	(-0.69)	(-0.71)	(-0.69)
use mobile phone f~s	3.013*	2.928	2.661	2.656
	(1.96)	(1.93)	(1.76)	(1.76)
number of years us~n	0.0652**	0.0570**	0.0534*	0.0541**
	(3.14)	(2.77)	(2.56)	(2.59)
use other telecom ~r	1.120	0.941	0.823	0.829
	(1.46)	(1.24)	(1.09)	(1.10)
use telecom facili~i	0.975***	0.833***	0.830***	0.825***
	(8.88)	(7.42)	(7.26)	(7.20)
used for interacti~m	0.640***	0.554***	0.577***	0.572***
	(4.80)	(4.17)	(4.27)	(4.21)
use for purchasing~o		0.562***	0.523***	0.521***
		(4.76)	(4.39)	(4.37)
awareness of any d~			0.433***	0.434***
			(3.62)	(3.63)
use for e-banking				0.109
				(0.47)
Constant	6.044***	6.130***	6.106***	6.112***
	(3.94)	(4.05)	(4.05)	(4.05)
R-squared	0.160	0.183	0.200	0.201
Adjusted R-squared	0.152	0.174	0.190	0.189
AIC	2998.2	2977.6	2879.7	2881.5
BIC	3040.5	3024.6	2931.1	2937.5

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 3: Impact of Developments in Telecommunications on Business Turnover

	(1) employed	(2) ill health
sex of the respond~t	-0.121	-0.0704
	(-1.50)	(-1.02)
location of respon~t	0.171*	-0.181**
	(2.09)	(-2.63)
education level of~t	0.264***	-0.135**
	(4.56)	(-3.04)
used radio	0.0937	-0.222**
	(0.99)	(-2.74)
used television	-0.351***	0.261***
	(-3.80)	(3.34)
used internet	0.425***	-0.572***
	(3.95)	(-5.59)
used fixed telephone	0.594*	0.0353
	(2.51)	(0.15)
used mobile phone	0.125	0.117
	(1.04)	(1.20)
getting job relate~n	0.282**	
	(3.16)	
used other telecom~s		-0.220
		(-0.23)
getting informatio~h		-0.0169
		(-0.19)
ever contacted a d~c		0.342***
		(5.71)
Constant	-1.713***	0.449**
	(-9.33)	(3.05)
Pseudo R-squared	0.069	0.052
AIC	1373.6	2004.0
BIC	1427.0	2068.
t statistics in parentheses		
* p<0.05, ** p<0.01, *** p<0.001		

Table 4: Probit Model of Impact of Telecommunications on Employment and Health

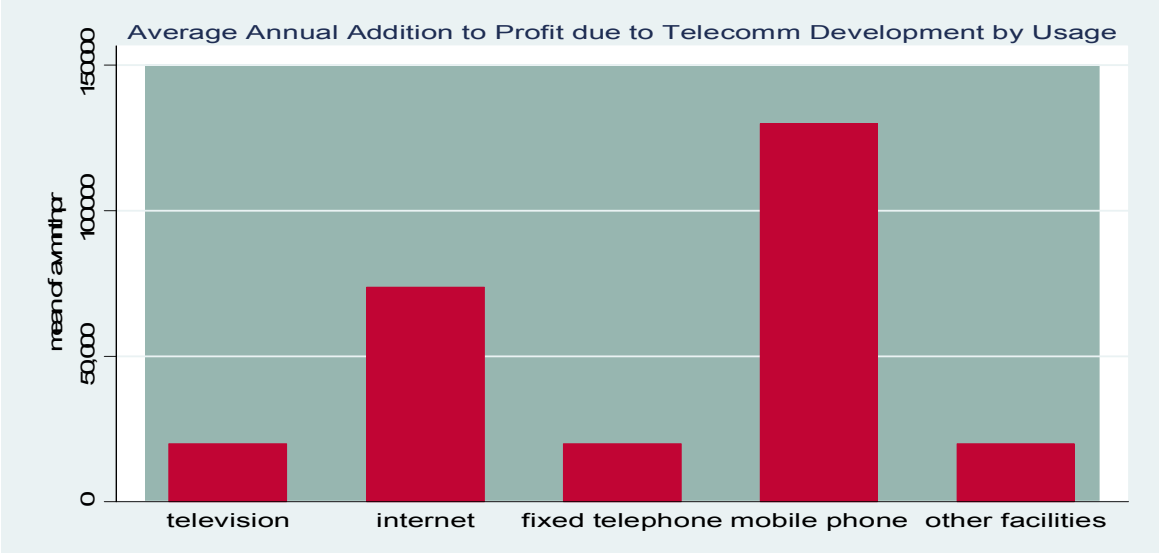

Figure 1: Average Annual Addition to Profit in small Business due to developments in telecoms.

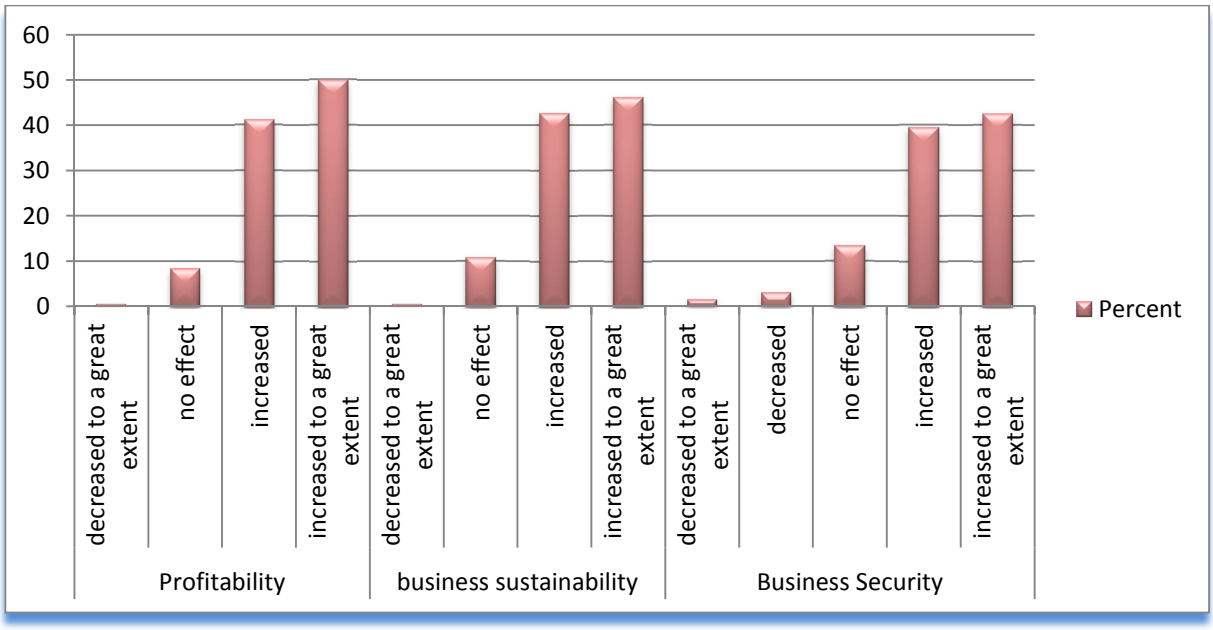

Figure 2: Self Assessment of Impact of Developments in Telecommunications by Small Businesses