Finding out Factors Affecting Tele-density Growth in Pakistan (1997-2011)

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ABSTRACT

The main objective of this study is to find impact of Telecom foreign direct investment (FDI), Gross Domestic Product (GDP) Per capita and cellular subscriber on Tele-density growth in Pakistan. It is well known fact that Tele-density growth has been observed in Pakistan during last few years. It happened due to privatization, market independence, increase in real GDP per capita income, increase in subscribers and flexible government policies. This is an exploratory research based on the secondary data. The research model embedded in this study is extracted from linear regression that enables us to measure the impact of explanatory variables on Tele-density growth. These variables used in this model are Telecom FDI, real per Capita GDP and Number of Cellular subscribers of Pakistan. Time series data of last 15 years i.e. from 1997 to 2011 was analyzed. The chosen model has been verified with the results, the model is overall significant with probability (F-statistic) = 0.01. On the other hand, two explanatory variables (Telecom FDI and GDP per Capita) show insignificant impact on Tele-density growth. Only one explanatory variable (cellular subscriber) has significant impact on Tele-density growth. Results can set the stage for future research, with the exception of the privatization strategy, governmental and non-governmental stakeholders agreed on all strategies.

1. INTRODUCTION

1.1. Background

Tele-density is the indicator of the telephone growth in a country and measured as number of telephones connections per hundred populations. It reflects the ratio of number of connections to population which is usually expressed as a percentage and determines the upper limit to subscriber growth. Tele-density is a significant measure of a country's telecommunication infrastructure (Saunders et al. 1994).

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Due to better regulatory policy, new competitors were allowed to enter in the market; it caused it a highly competitive market. Adoption of lenient policy regarding this sector was taken from developed countries like UK and USA. These countries allowed their industries to operate independently, privatization was promoted, and it caused excellent performance by these industries. A study was concluded by Green and Teece (1998) in Australia and New Zealand, government policies play a vital role specially giving benefits to consumers attracts more and more people to be part of telecom sector.

1.2. Justification and Logical Reasoning

This study helps to find out the factor affecting Tele-density growth in Pakistan. As for Pakistani context, telecommunication is a highly attractive and growing sector. It is one of the few sectors in Pakistan which is providing profitable investments and growth opportunities to the businesses. Tele-density is an important indicator of telecom improvement of the country. The Tele-density of Pakistan which was just 2.06% in 1997 has increased to 70.1% in 2011, PTA (2011).

However as per the latest statistics of Pakistan Telecommunication Authority, Pakistan's Tele-density crossed 70.6% by end of 2012. This continuous and remarkable growth in Tele-density must have been resulted by some factors which positively influence this phenomenal increase. In this study, we will be interested in finding out the role of factors affecting the Tele-density growth in Pakistan.

1.3. Research Question

Are Telecom FDI, real Per Capita GDP and Cellular Subscribers perceived major factors to Tele-density growth?

1.4. Statement of Problem

Tele-density growth is significantly influenced by FDI, real Per Capita GDP Income and Number of Cellular Subscribers.

1.5. Objectives of the Study

- To find out factors which are affecting Tele-density growth in Pakistan.
- To find impact of FDI through the best level of privatization for the telecommunications industry on Tele-density.
- To find impact of Per capita GDP income on Tele-density
- To find the impact of number of cellular subscriber on Tele-density growth

1.6. Hypothesis

H_1: There is a positive impact of Foreign Direct Investment in Telecom Sector on Tele-density growth in Pakistan.

H_2: There is a positive impact of Per Capita GDP on Tele-density growth in Pakistan.

H_3: There is a positive impact on increased numbers of Cellular Subscribers on Tele-density growth in Pakistan.

1.7. Scope of the Study

This study will be helpful for the telecommunication industry. They will be able to know factors influencing this sector. Government of Pakistan will also get certain direction, what areas should be promoted and develop policies to further enhancing this growth.

1.8. The Delimitation

The major limitation faced on the empirical analysis was less availability of the data. Although institutions like the World Bank, the ITU, and the IMF and PTA collect statistics which were useful in collecting time series data for all the variables used in the research.

1.9. Organization of Paper

Section 1 introduction Section 2 literature review about the Tele-density growth, Section 3 methodology Section 4 results and findings, Section 5 Discussion and Section 6 conclusion of this paper.

2. LITERATURE REVIEW

2.1. Tele-Density growth

Tele-density is the indicator of the telephone growth in a country and measured as number of telephones per hundred populations. Tele-density also refers to the level of a country's telecommunications infrastructure. It reflects the ratio of number of connections to population which is usually expressed as a percentage and determines the upper limit to subscriber growth.

About French and Spanish economies, Bendapudi and Berry (1997) concluded that the growth of Tele-density of any country precedes economic development. They also argued that if a country underestimates the significance of tele-density, they will have to face a huge cost of it. Jussawalla and Ogden (1999) also supported Bendapudi's claim. She worked on the same horizon and concluded that resource mobilization of a country is highly promoted by the growth of a country's tele-density.

Due to the explosive growth of telephone networks worldwide in the last ten years, there is an enormous increase in the Tele-density of many developing countries, especially Asian countries. Tele-density in Pakistan crossed 70 marks by end of December 2011. According to many authors and experts of the field, better economy, improved infrastructure due to foreign investment, per capita income, increased number of subscriber and literacy rates are among factors that significantly affect tele-density growth.

2.2. Foreign Direct Investment in Telecom

Importance of FDI cannot be denied. In Pakistan foreign investors have been allowed to own 100% share in telecommunication sector. Most of these practices were launched in 2006 when PTCL was privatized. Allowing FDI is mandatory for those countries which are lacking in technology as well as facing financial constraints (Gasmi et al. 2008).

Foreign direct investment has important part in increasing tele-density growth. It is analyzed by Guasch and Hahn (1999) costs are important, on the other hand Wallsten (2001) investigated FDI and competition have significant effect, and Fink et al. (2002) found competition among fixed line network during 1985 to 1999 in American and Caribbean countries. Their analysis was agreed about what give statement by Gutierrez (2003) and Li et al. (2004). Costs of telecom industry are getting declined due to

technological advancement. Apart from that skilled human resource, FDI and improved infrastructure can further improve Tele-density growth.

2.3. Real per Capita GDP

Though per capital is not solid measure because it is an average. There is no normal distribution in income, how one can be able to rely on results. But it can be used to know about the prosperity of a country. Despite it is used for analysis it gives certain direction. Tele-density growth and real per capita GDP have two way relationships. One can understand, increase in per capita GDP can also affect spending on phone calls. Calvin and Keck (2009) found telecommunication ameliorates real GDP per capital income because of increased social interaction. The research study conducted by Fink et al. (2002) and Calvin and Keck (2009) elaborate that the real per capita gross domestic product was used as an exogenous to check allocates efficiency of telecommunication sector in Pakistan.

2.4. Number of Cellular Subscribers

Due to increase in cell phone subscriber, a rapid growth in Tele-density has been observed. Approximately 70% of Pakistani belongs to rural areas and it was difficult to avail land line facility. With the emergence of cellular networks, they started availing this facility. In the study conducted by Fink et al. (2002) mobile subscriber was set as an explanatory variable.

3. RESEARCH METHODOLOGY

This is an exploratory research based on the secondary data. The Methodology used in this paper is Linear Regression which will enable us to understand the impact of various Independent variables on Tele-density growth. The Independent variables used in this model are Telecom FDI, real per Capita GDP and Number of Cellular subscribers of Pakistan. For this we will be using time series data of last 15 years i.e. from 1997 to 2011. The data is collected from the sources of Economic Survey of Pakistan and Pakistan Telecommunication Authority.

The Tele-density Model for this study is given below:

$$\ln TD = f (\ln \text{Telecom FDI}, \ln \text{GDP per capita}, \ln \text{Number of Cellular Subscribers})$$
$$\text{Or}$$
$$\ln TD = \beta_0 + \beta_1 (\ln \text{TFDI}) + \beta_2 (\ln \text{GDPC}) + \beta_3 (\ln \text{CS}) + E$$

Considering:

$$\beta_1 > 0, \quad\quad \beta_2 > 0, \quad\quad \beta_3 > 0$$

Where,

TD	=	Tele-Density Growth
TFDI	=	Telecom Foreign Direct Investment
GDPC	=	Gross Domestic Product Per Capita
CS	=	Number of cellular subscribers
E	=	Error Term

All data sets were run separately on time scale, it was noticed that non-linearity existed among the variable. In order to convert all variables near to linearly, natural logarithm have been used. The model indicates natural logarithm. The error term represents the random inheritance in the model. This random part is here because the model might contains the errors in observations, errors in assigning values and errors of measurement. These errors are often included in the model because of our human limitations in

observations and external random events. This error term is also adjusted here because our data captures only the subset of the population of interest.

3.1. Sampling Design

Data used in this research was time series and collected from the sources of Pakistan's Telecommunication Authority, Economic Survey of Pakistan, World Bank and State Bank of Pakistan. For finding out the effects of Telecom FDI, per Capita GDP and Cellular subscribers on Tele-density growth of Pakistan we utilized the data of last fifteen years starting from 1997 till 2011.

4. RESULTS AND FINDINGS

It is time series data of last fifteen years. It was tested whether data is stationary or not at level. Data has unit root at level. It was tested at first difference, it has unit root. Finally, data is tested at second difference, it has no unit root. Therefore data is stationary at second difference level and results have been generated and interpreted.

Table 01 contains the percentage of correlation between variables. From the table we can see that, Telecom FDI is weakly correlated with Tele-density, GDP per Capita is showing almost no correlation with Tele-density. Whereas Cellular subscriber is 73.8% correlated with Tele-density.

Table: 01 Correlation Matrix

	TD	TFDI	GDPC	CS
TD	1	0.144	-0.01	0.738
TFDI	0.144	1	0.503	0.017
GDPC	-0.01	0.503	1	-0.472
CS	0.738	0.017	-0.472	1

Table 02 contains regression results, from the results, we can conclude that the model is overall significant with probability (F-statistic) = 0.01. On the other hand, two explanatory variables (Telecom FDI and GDP per Capita) show insignificant impact on Tele-density growth. Only explanatory variable (cellular subscriber) has significant impact on Tele-density growth. Coefficient of determinant or R-squared shows 70%, it means Tele-density is influenced 70% by the factors discussed above. There are some other factors that need to be terraced which affect Tele-density growth by 30%. Durbin Watson is greater than 1.8; it shows that model does contain auto-correlation in the errors. Tolerance and VIF shows multicollinearity among the explanatory variables. Severity of multicollinearity has been removed through data transformation.

Table: 02 Regression Analysis

R-squared	0.703	Adjusted R-squared	0.604
S.E. of regr:	0.10972731	Durbin-Watson	1.836
F-statistic	7.108	Prob(F-statistic)	0.01

Variable	Coefficient	Std. Error	t-Statistic	Prob.	VIF	Tolerance
C	0.005	0.031	0.162	0.874		
TFDI	-0.024	0.04	-0.61	0.557	1.506	0.664
GDPC	0.934	0.45	2.073	0.068	1.936	0.516
CS	0.523	0.116	4.518	0.001	1.448	.691

5. DISCUSSION

While having the continuous growth in the telephone lines, every one hundred inhabitants (Tele-density) in Pakistan are enjoying the remarkable success in the telecommunication sector. This paper combines research from international academic literature and empirical studies to examine and synthesize the possible quantitative factors that affect the Tele-density growth of Pakistan. The independent variable used in the research is Telecom FDI, GDP Per Capita and Cellular Subscribers. The data used for the study is time series from the years 1997 till 2011. For empirical results we used Linear Regression model in order to test the significance and to see the impact of the explanatory variables on Tele-density growth of the country. The results proved that two variables (Telecom FDI and GDP per capita) have insignificant impact on Tele-density growth. Both variables have significant values are 0.557 and 0.068 and t-statistics are -0.61 and 2.073 respectively. From the numerical results, it can be concluded that Telecom FDI is highly insignificant and GDP per Capital is weakly insignificant. On the other hand, third explanatory variable (Cellular subscriber) has significant effect on Tele-density growth. From the numerical results significance value is 0.001 and test statistic value is 4.518. it shows it is highly significant.

6. CONCLUSION

The results of this study demonstrate that Pakistan's telecommunications stakeholders favor strategies that were implemented successfully in other countries to address their low Tele-density problems. It also indicates that cellular subscriber rate is very high because of less expensive. The perceptions of these stakeholders are important to Tele-density growth in the region. Agreeing on most of the strategies implies that we can expect greater cooperation between the government and the private sector in promoting telecommunications. Our results can set the stage for future research, with the exception of the privatization strategy, governmental and non-governmental stakeholders agreed on all strategies.

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