Telecommunication Infrastructure and Foreign Direct Investment in Pakistan: An Empirical Study

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Abstract- This paper explores the role of infrastructure availability, particularly with respect to telecommunication in stimulating Foreign Direct Investment (FDI) in Pakistan. Mobile cellular subscription is taken as a proxy variable for infrastructure along with market size, labor force and trade openness as explanatory variables. The study covers the time period from 1990 to 2012 based on the fact that mobile cellular service introduced in 1990s in Pakistan for the first time. Johansen test of Co-integration has been used to check the long run relationship between the variables and then ordinary least square technique has been applied to estimate the coefficients of all the variables. The results of empirical analysis indicate the positive significant effect of infrastructure in attracting FDI to Pakistan.

Keywords: FDI, telecommunication infrastructure, market size, Pakistan.

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TELECOMMUNICATIONINFRASTRUCTUREANDFOREIGNDIRECTINVESTMENTINPAKISTANANEMPIRICALSTUDY

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Abstract- This paper explores the role of infrastructure availability, particularly with respect to telecommunication in stimulating Foreign Direct Investment (FDI) in Pakistan. Mobile cellular subscription is taken as a proxy variable for infrastructure along with market size, labor force and trade openness as explanatory variables. The study covers the time period from 1990 to 2012 based on the fact that mobile cellular service introduced in 1990s in Pakistan for the first time. Johansen test of Co-integration has been used to check the long run relationship between the variables and then ordinary least square technique has been applied to estimate the coefficients of all the variables. The results of empirical analysis indicate the positive significant effect of infrastructure in attracting FDI to Pakistan.

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I. Introduction

The growth of world Foreign Direct Investment in recent years has created opportunities and challenges for economic development and growth, especially for developing nations like Pakistan. Employment creation, capital formation, managerial skills and technology, export promotion and market access are among the main benefits of FDI to the receiving host countries. The inflow of world Foreign Direct Investment increased from US $200 billion in 1993 to US $1.3 trillion in 2000. The share of developing countries as recipients of FDI flows increased considerably, reaching from 17.1% in 1988-1990 to 21.4% in 1998-2000 (UNCTAD, 2000). Over the last decade, FDI has witnessed a dramatic increase, grew at least twice as fast as trade (Gorg and Greenaway, 2004; Meyer, 2003).

In the mid-1980s, attraction of FDI has been one of the most important goals of many countries in the world. These economies not only liberalized trade policies and investment regime but also provided fiscal incentives to foreign investors through number of tax concessions and tariff reduction. During 1993-2003, 94% of 1718 regulatory changes made by countries all over the world that were favorable to Foreign Direct Investment (UNCTAD, 2006). Government policy changes made it easier for foreign investors to invest into more economic sectors.

In 1990s, Government of Pakistan liberalized its trade policy and opened the sectors of energy, telecommunication, agriculture, banking and insurance to FDI which were not allowed before. Despite this, the level of FDI in Pakistan remained meager as compared to other developing countries due to rapid changes in political environment and inconsistent investment policies. However, FDI steadily increased in the post liberalization era. The FDI inflows to Pakistan increased from US $119.6 million in 1975-1979 to US $3299.8 million in 1995-1999. The amount of FDI increased from US $485 million in 2001-2002 to US $5409 million in 2007-2008 (BOI, Pakistan).

One factor that has drawn attention lately is infrastructure availability in the host countries. Analysts agree that telecommunication has become an enabling industry for business and commerce in today's world. Maintenance of a stable telecom sector results in increased businesses and trade and thus increasing economic performance of the country. In the mid-1980s, utility of telecommunication sector were recognized in the world and it was considered as prerequisite for economic development.

Telecom sector of Pakistan has attracted sizable investments after deregulation. Telecom infrastructure received more than US $12 billion during the last seven years. During last few years, Telecommunication sector has emerged as major recipient of Foreign Direct Investment in Pakistan. FDI in telecom sector increased from US $6.1 million in 2001-2002 to US $1.8 billion in 2005-2006. During 2006-2010, FDI in telecommunication sector exceeded 35% of total FDI in the country. Table 1 depicts inflows of Foreign Direct Investment in different sectors of Pakistan.

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Table 1 : FDI share by major sectors (%)

Years	Telecom	Textiles	Oil & Gas	Power	IT	Financial Business
2001-2002	1.2	3.8	55.3	7.5	0.5	0.7
2002-2003	1.7	3.3	23.4	4.1	0.5	26.0
2003-2004	21.8	3.7	21.3	1.5	0.6	25.5
2004-2005	32.4	2.6	12.7	4.8	0.6	17.7
2005-2006	54.1	1.3	8.9	9.1	0.7	9.3
2006-2007	35.6	1.2	10.6	3.8	1.2	18.2

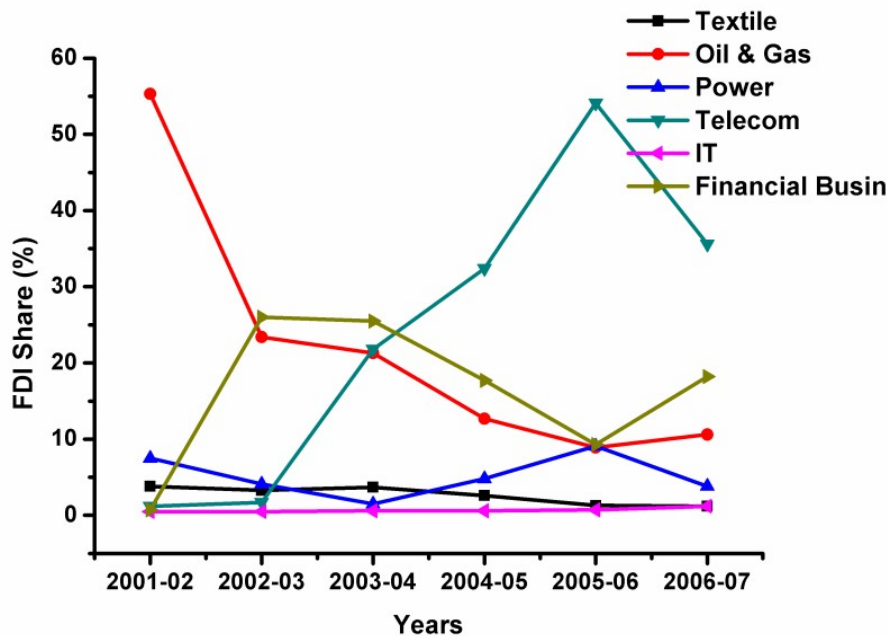*Source: State bank of Pakistan*

Figure 1 : FDI share by major sectors (%), Pakistan

As depicted from table1, telecom sector received 17% more FDI than Financial sector and almost 25% points more than Oil and Gas explorations in 2006-2007. Both of these sectors received greater amount of FDI a few years back. Similarly Textile, Power and IT received 1.2%, 3.8% and 1.2% FDI share during 2006-2007.

Major Foreign Direct Investment in telecom sector of Pakistan has come from cellular mobile companies. In Pakistan, five cellular mobile operators i.e., Telenor, Pakistan mobile communication limited (PMCL/ Mobilink), PTML (Ufone), Warid and China Mobile are providing services. At the end of March 2013, there were 121.13 million mobile subscribers compared to 118.32 million subscribers last year.

This study is mainly conducted to investigate the impact of telecommunication infrastructure on Foreign Direct Investment in Pakistan. The study is structured as follows: Section 2 provides the review of literature while analytical model is described in section 3. Section 4 discusses the analytical model's results followed by the concluding remarks in section 5.

II. Review of Literature

Vast empirical literature exists on the relationship between Foreign Direct Investment and quality of Infrastructure in developing countries. Most empirical studies in FDI literature have found infrastructure to be a robust and significant determinant of FDI. Several studies have used large sample of countries and have used different proxy variables for infrastructure quality e.g. telephone mainlines, total length of roads, electricity generation etc. to be significant determinant of FDI. For instance Asiedu (2002) used a sample of 71 SSA and non SSA countries, Root and Ahmad (1979) used a sample of 58 economies, Wheeler and Mody (1992) for 42 countries over the period 1982-1988, Kumar (1994) and Loree and Guisinger (1995) described positive role of infrastructure in attracting Foreign Direct Investment.

Many studies show that infrastructure has different impact on developed and developing economies. For example Sekkat and Varoudakis (2007), Asiedu (2006), Iwanow and Kirkpatrick (2006), kok and

Erosoy (2009) investigated that Infrastructure has a significant effect on FDI in developing economies. Some other similar studies also observed the positive role of Infrastructure in attracting Foreign Direct Investment (Rehman et al., (2011) for Pakistan, Li and Park (2006) for China).

Most of the studies investigated positive and significant impact of Infrastructure on productivity and economic performance. Such as Aschauer (1989), Escribano and Guasch (2005), Straub (2011), Calderon and Serven (2010), Canning and Pedroni (2004), Easterly and Rebelo (1993), Jan et al. (2012) have checked impact of different dimensions of infrastructure on development of different countries and found positive effect of infrastructure on productivity and economic performance during different time periods.

III. Analytical Model

To build an econometric model, it is necessary to explain the relevance of variables that determined FDI entrance in Pakistan. Although there are many factors that affect FDI but four variables were taken under consideration in the present study. The following model is proposed for regression analysis:

$$FDI = \beta_o + \beta_1(INF) + \beta_2(LF) + \beta_3(MS) + \beta_4(OPEN) + \varepsilon. \tag{1}$$

The data comprises the period of 1990 to 2012 for Pakistan. The linkage between Foreign Direct Investment and Infrastructure is our particular concern. All the variables are treated as natural logarithmic form (ln). The relationship between FDI and its determinants is analyzed using ordinary least square method. The variables and source of data is in the following table:

Table 2 : Determinants of Foreign Direct Investment in case of Pakistan

Source	Proxy	Variables
World Development Indicators	FDI (FDI in million US $)	Dependent Variable: Foreign Direct Investment
World Development Indicators	INF (Mobile Cellular subscriptions)	Explanatory Variables: Infrastructure
State Bank of Pakistan	LF(Employed labor force)	Labor Force
World Development Indicators	MS (GDP in million US $)	Market Size
World Development Indicators	OPEN (%age of GDP)	Trade Openness

IV. Results and Discussion

The first procedure in time series data is to verify stationary of the series. This will be done through Augmented dickey Fuller test developed by Dickey and Fuller (1979 and 1981). Results of ADF test are shown in Table 3.

Table 3 : ADF unit root test

ADF with 1st Diff.	ADF at Level	Variables
-3.23**	-1.51	FDI
-3.65**	-0.49	INF
-4.97*	1.89	LF
-3.96*	1.00	MS
-5.45*	-2.37	OPEN

*&** Reject the null hypothesis of non-stationary at 1% & 5% level of significance respectively.

The results presented in table 3 show that all the series were non stationary at level. When differentiated one, all the series became stationary with 1% and 5% level of significance. Since all the series are integrated of same order, it becomes necessary to determine the possible co- integration relationship between them. For this purpose, we use Johansen (1988) model which was further extended by Johansen and Juselius (1990) to find out the long run relationship between the variables. Initially we need to set the optimal lag length for our model. According to Enders, SC test is thriftiest among others and it has specified one lag for our model. The results are presented in table 4.

Table 4 : Lag order selection criteria

SC	AIC	HQ	Lag
26.42506	26.17636	26.23033	0
19.63311*	18.14093	18.46477	1
20.32646	17.59080*	18.18451*	2

*indicates lag order selected by the criterion

Table 5 : Johansen Co-integration test

Hypothesized no.of CE(s)	Eigenvalue	Max-Eigen statistics	0.05 Critical Value	Prob.**
None*	0.815568	35.50000	33.87687	0.0318
At most 1	0.730506	27.53537	27.58434	0.0507
At most 2	0.483891	13.89018	21.13162	0.3741
At most 3	0.408977	11.04389	14.26460	0.1520
At most 4	0.272455	6.679665	3.841466	0.0598

*denotes rejection of the hypothesis at 5% level of significance

Results of table 5 show the existence of one co-integrating vector. This confirms the existence of long run relationship between Foreign Direct Investment and Infrastructure. As the long run relationship between the variables was reached, now we can estimate the coefficients of our variables by using ordinary Least Square method. Table 6 shows the results of OLS.

Table 6 : Regression results of OLS model

Dependent variable: FDI

Variables	Coefficient	Std. Error	t-statistics	Prob.
constant	22.5550	20.0633	1.1241	0.2757
INF*	0.5759	0.0852	6.7520	0.0000
LF	-0.0001	5.3405	-2.0599	0.0542
MS	-0.4226	0.8914	-0.4741	0.6411
OPEN*	0.1468	0.0252	5.8088	0.0000

R-Squared= 0.91   *F-statistics= 46.06*

Adjusted R-Squared= 0.89   *Prob (F-stat) = 0.0000*

Durbin-Watson stat= 1.96

*indicates significance at 1%

Results of table 6 present that INF which is the pivotal variable of our study is significant at 1% significance level and carry positive sign. The coefficient of INF represents that one percent increase in infrastructure increases FDI by almost 58%. Market size and Labor force variables are having negative relationship with FDI but the results were not found significant. The coefficient of our last variable is positive and has significant impact on FDI. It is concluded that if trade openness increases by one percent then FDI will also increase by almost 15%. The value of $R^2= 0.91$ shows that 91% variations in dependent variable is explained by independent variables. Value of F-statistics is 46.06 and the probability is 0.000 which is less than one percent, this indicates the significance of our model. Moreover, DW statistic is 1.96 which shows that there is no autocorrelation exist in our model.

V. Concluding Remarks

The main interest of the present work was to study how telecommunication infrastructure is playing a role in attracting Foreign Direct Investments in Pakistan. Other variables namely Market size, Trade openness and Labor force were also taken under consideration along with infrastructure. The results indicated that there is long run relationship exist between Foreign Direct investment and infrastructure. One percent increase in infrastructure increases the level of FDI by almost 57%. This confirms the importance of Infrastructure in attracting Foreign Direct Investment in Pakistan. The availability of infrastructure contributes to productivity and economic development and thereby attract higher amount of FDI. The Government of Pakistan should pay

key attention to a good infrastructure by maintaining policies consistent with macroeconomic growth.

References Références Referencias

1. Aschauer, D. A. (1989). Is Public Expenditure productive?, J. Monetary Economics, 23, 177-200. Asiedu, E. (2002). On the determinants of foreign direct investment to developing countries: Is Africa different? World Development, 30 (1), 107-118.

2. Asiedu, E. (2006). Foreign direct investment in Africa: The role of government policy, institutions and political instability, World Economy, 29 (1), 63-77.

3. Calderon, C., & Serven, L., (2010). Infrastructure and Economic Development in Sub-Saharan Africa, J. African Economies, 19, 13-87.

4. Canning, D., & Pedroni, P. (2004). The Effect of Infrastructure on Long Run Economic Growth, Mimeo.

5. Dickey, D. A., & Fuller, W. A., (1979). Distribution of the Estimates for Autoregressive Time Series with a Unit Root, Journal of the American Statistical Association, 74 (4), 427-31.

6. Dickey, D. A., & Fuller, W. A., (1981). Likelihood Ratio Test for Autoregressive Time Series with a Unit Root, Econometrica, 49 (4), 1057-72.

7. Easterly, W., & Rebelo, S., (1993). Fiscal Policy and Economic Growth: An Empirical Investigation, J. Monetary Economics, 32, 417-458.

8. Enders, W., (1995). Applied econometric time series, New York: John Wiley, 1995.

9. Escribano, A., & Guasch, J. L., (2005). Assessing the Impact of the Investment Climate on productivity Using Firm-Level Data: Methodology and the Cases of Guatemala, Honduras and Nicaragua, Working Paper, World Bank, Washington.

10. Gorg, H., & D. Greenaway (2004). Much Ado about Nothing? Do Domestic Firms Really Benefit from Foreign Direct Investment?, World Bank Research Observer, 19 (2), 171-97.

11. Iwanow, T., & Kirkpatrick, C., (2006). Trade facilitation, regulatory quality and export performance, Journal of International Development, 19 (6), 735-753.

12. Johansen, S., (1988). Statistical Analysis of Co-integrating Vectors, J. Economic Dynamics and Control, 12 (2-3), 231-254.

13. Johansen, S. and Juselius, K., (1990). Maximum Likelihood Estimation and Inference on Co-integration with Applications to the Demand for Money, Oxford Bulletin of Economics and Statistics, 52 (2),169-210

14. Jan. S. A., Chani, M. I., Pervaiz, Z., & Chaudhary, A. R., (2012). Physical infrastructure and economic development in Pakistan, Middle East journal of scientific research, 11(2), 216-220.

15. Kok, R., & Ersoy, A. B. (2009). Analyses of FDI determinants in developing countries, International Journal of Social Economics, 36 (1/2), 105-123.

16. Kumar, N., (1994). Determinants of export orientation of foreign production by US multinationals: An inter-country analysis, Journal of International Business, 25 (1), 141-156.

17. Li, S., & Park, S. H. (2006). Determinants of Locations of Foreign Direct Investment in China. Management and Organization Review, 2, 95-119.

18. Loree, D. W., & Guisinger, S., (1995). Policy and non-policy determinants of US equity foreign direct investment, Journal of Business Studies, 26(2), 281-299.

19. Meyer K. E. (2003), FDI spillovers in emerging markets: A literature review and new perspectives, mimeo, Copenhagen Business School.

20. Rehman, C. A., Ilyas, M., Alam, H. M., & Akram. M., (2011). The impact of Infrastructure on Foreign Direct Investment: The case of Pakistan, International Journal of Business and Management, 6 (5).

21. Root, F. R., & Ahmed, A., (1979). Empirical determinants of manufacturing direct foreign investment in developing countries. Economic Development and Cultural Change, 27, 751- 767.

22. Straub, S., (2011). Infrastructure and development: A critical Appraisal of the Macro-Level Literature. J. Development Studies, 47 (5), 683-708.

23. UNCTAD (2000), World Investment Report: Cross-border Mergers and Acquisitions and Development (Geneva: UNCTAD).

24. UNCTAD (2006). World investment report: FDI from developing and transition economies: implications for development (No.WIR06). United Nations, New York and Geneva.

25. Wheeler, D., & Mody A., (1992). International investment location decisions: The case of U.S. firms, Journal of International Economics, 33, 57-76.

26. World Bank., (2010). World development indicators. World Bank, Washington D. C.

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