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Foreign Direct Investment in the Indian Telecommunications Sector

By Keith Green

Abstract

This paper will examine the current status of foreign direct investment (FDI) in the Indian telecommunications sector and the issues facing foreign companies seeking to invest in the Indian telecommunications sector. The paper concludes with a brief econometric examination of the factors influencing the level of FDI in the Indian telecommunications sector.

Introduction

In the early 1990s India began to open up an economy that was previously closed to foreign direct investment (FDI). The liberalization in India included the gradual granting of authority for foreign direct investment in specific sectors of the economy. India has received significant inflows of foreign direct investment after liberalizing its economy in 1991 (see Figure 1 in the appendix). FDI inflows to India have exceeded many other ASEAN countries over time. However, China, not depicted in Figure 1, continues to be the leading destination for FDI in the Asia-Pacific region.

India has achieved substantive improvements in telecommunications access since opening its telecommunications sector in the early 1990s. However, India has realized fewer benefits than were possible during the period of market reform. The slow implementation pace of liberalization, disparity between urban and rural areas and unclear regulations have impeded the flow of investment to the telecommunications sector in comparison to other emerging market economies.

History of Indian Telecommunications

Prior to 1991 India actively implemented an import substitution strategy.¹ This strategy effectively limited foreign direct investment in almost all major areas of the Indian economy. In 1991 India experienced a balance of payments crisis when foreign exchange reserves ran dangerously low. Subsequent to the crisis the Indian government implemented a structural adjustment plan to stabilize the balance of payments and sustain long-term economic growth. India sought to reduce the role of the government in the economy and create greater market efficiencies. Some of the primary impacts of the plan were to open up the economy to foreign investment and encourage privatization in some formerly state dominated industries.² In addition, licensing requirements and import tariffs were reduced.³

Telecommunications in India were formerly provided by state-owned enterprises. The government companies provided all local and long-distance communications within India. Private investment, foreign and domestic was not permitted prior to the opening of the economy in the 1990s.

Determinants of FDI and the Indian market transition

The allocation of foreign direct investment is influenced by many factors including the quantity and quality of the host country's labor pool, the wage rate of the host country labor pool, the host or foreign country's regulatory and legal environment, the size of the host country

¹ Padma Desai, (ed)., *Going Global: Transition from Plan to Market in the World Economy* (MIT Press, 1997) and Athreye, S. and Kapur, S. "Private foreign investment in India: pain or panacea?" *World Economy*, vol. 24, no. 3 (2001):399-424.

² Report of the Committee on Compilation of Foreign Direct Investment in India. *Reports on investment approval and FDI in India*. New Delhi: Academic Foundation, 2004.

³ Balasubramanyam, V. and Mahambare. "FDI in India." *Transnational Corporations*, vol. 12, no. 2 (2003):45-72.

market for the product, the physical infrastructure of the host country, the political stability of the host country and the tax regime.⁴

The level of education and literacy of the labor pool can influence the amount of FDI received by the host country. Foreign firms would likely invest in locations and labor that can grasp complicated processes and maintain high standards of quality. A skilled and productive workforce can attract manufacturing facilities and services to the host country.

The state of the regulatory and legal environment can facilitate a firm's entry into a foreign economy. The location may be chosen to avoid tariffs or other protectionist measures employed by the host country to protect domestic industries. The foreign firm avoids measures to protect domestic industry by becoming part of the domestic industry through local incorporation or partnership with a domestic company.

The economy of the host country plays an important role in determining the allocation of FDI. Stable exchange rates, limited inflation, the size of the relevant market and potential for growth are key determinants in attracting investment. The foreign company may specifically choose to invest in order to meet domestic demand for their products.⁵

The political stability of institutions in the host country can be of significant importance in the investment decision. The quality of institutions, amount of corruption and their relationship to a functioning economy has an impact on the location of FDI. Some studies have found a negative relationship between levels of corruption and the inflow of FDI.⁶

⁴ F. Root and A. Ahmed, "Empirical determinants of manufacturing direct foreign investment in developing countries" *Economic Development and Cultural Change*, 27, no. 4 (1979):751-768. Peter Nunnenkamp, Julius Spatz, "FDI and economic growth in developing economies: how relevant are host-economy and industry characteristics?" *Transnational Corporations*, Vol.13, Issue. 3; (Dec 2004): 53. Foreign Direct Investment in Emerging Market Countries – Report of the Working Group of the Capital Markets Consultative Group -<http://www.imf.org/external/np/cm/cmcg/2003/eng/091803.pdf>

⁵ Foreign Direct Investment in Emerging Market Countries – Report of the Working Group of the Capital Markets Consultative Group

⁶ Wei, Shang-Jin (2000) – 2 articles – "How taxing is corruption on international investors?" *Review of Economics and Statistics*, 82(1):1-11, and "Local Corruption and Global Capital Flows" *Brookings Papers on Economic Activity* 0(2):303-46.; and Pournarakis, Mike and Varsakelis, Nikos. "Institutions, internationalization and FDI: the

The physical infrastructure of a country is very important in attracting foreign investment. The physical infrastructure includes the accessibility and level of telecommunications, transportation networks, electricity, water, sanitation and other related public goods. Countries lacking sufficient infrastructure may be unable to attract FDI and this may also impact the ability of the host country to act as an exporter of goods.⁷

A stable tax regime lowers the risk of investment to foreign firm. The new entrant may also be able to avoid tariffs by establishing a local subsidiary. There has been a substantial amount of literature examining the impact of taxation and exchange rates on the amount of FDI inflows to countries. The literature is mixed and indicates that the level of taxation in a country may encourage or discourage FDI.⁸ Similarly, exchange rates may play a role in the decision to initiate foreign direct investment in a country. Tax and other investment incentives may not have a significant impact on the decision to invest.⁹

Methods of Foreign Investment in India

There are several methods that a company can employ to enter an approved Indian sector. The options that are used the most include incorporating as an Indian company (a wholly owned subsidiary or joint venture with a local Indian company) or as a foreign company (e.g.,

case of economies in transition. *Transnational Corporations*, Vol.13, Iss. 2 (2004): 77.

⁷ Foreign Direct Investment in Emerging Market Countries – Report of the Working Group of the Capital Markets Consultative Group

⁸ NBER Working Paper 11299 April 2005, Bruce Blonigen pg 15

⁹ Foreign Direct Investment in Emerging Market Countries – Report of the Working Group of the Capital Markets Consultative Group. NBER Working Paper 9489 – “The Economics of Foreign Direct Investment Incentives” by Magnus Blomstrom and Ari Kokko

representative or branch office). Investment amounts in an Indian company are limited to the sector-specific caps on FDI that have been imposed by the government.¹⁰

The Indian government has an official policy of deciding on proposed foreign direct investment within 30 days. However, this process may entail checks and clearances from multiple agencies that delay the 30-day process. Additionally, the rationale for approving or rejecting proposals is often unclear.¹¹ India established the Foreign Investment Implementation Authority in 1999 to provide greater organization and improve the speed and transparency of the approval process.

Most FDI proposals are eligible for an automatic approval process. Using automatic approval firms can invest funds initially and then submit the appropriate documents to the central bank. Automatic approval can be granted up to the authorized investment limits for the particular industry sector.¹²

New Telecom Policies

In 1994 India recognized the importance of investment in the telecommunications sector and developed the 1994 New Telecom Policy (NTP). The policy contained several key features that would be necessary to improve India's economic competitiveness. Overall objectives included providing quality telecommunications access on demand for all Indians, ensuring coverage of all areas of the country and developing a viable base to manufacture and export

¹⁰ These caps are generically 74% in mining, 100% in specific petroleum exploration, 51% in trading, 74% for civil aviation, 100% in airports, 74% in banking, and 49% in insurance. Certain sectors are still closed to FDI including rail transport, atomic energy, most agriculture, retail trading, and real estate.

¹¹ Economist Intelligence Unit, "The operating environment: Major state-owned enterprises," Country Commerce-Main Report, November 1, 2004.

¹² Economist Intelligence Unit, "The operating environment: Major state-owned enterprises," Country Commerce-Main Report, November 1, 2004.

telecommunications equipment.¹³ Several specific goals were identified with the intent of achieving those goals by 1997. These targets included increasing the amount of telephone lines to 7.5 million.

The 1994 NTP had mixed results. The 1994 NTP goal of 7.5 million phone lines were exceeded in a few years when installed phone connections reached 8.73 million. However, the rural areas lagged behind in their access to telecommunications. The number of mobile phone customers has not increased as much as anticipated due to unrealized revenues and inability to obtain adequate financing. Private sector investment fell short of the 1994 NTP expectations.

Foreign direct investment in the telecommunications sector increased substantially between 1995 and 1997. The 1997 Asian crisis temporarily reduced the flow of foreign investment. Investment began to focus on the mobile phone service market and building manufacturing facilities for mobile phone handsets.

In 1999 India announced another NTP designed to further liberalize the telecommunications sector. The 1999 NTP was intended to build on the 1994 NTP and further promote the importance of telecommunications to the Indian economy. The 1999 NTP included the objectives of developing an infrastructure to handle media, information technology, telecommunications and other consumer electronics, improve efficiency and transparency, and strengthen telecommunications research and development and manufacturing to enable India to become a major global competitor.

¹³ The Telecom Regulatory Authority of India. National Telecom Policy 1994 - <http://www.trai.gov.in/ntp1994.htm.htm>

Current state of Indian Telecommunications and FDI

India has the second largest telephone network among the emerging economies (after China). The Indian telecommunications sector received 99.5 billion rupees (approximately \$2.3 billion) in FDI from August 1991 through March 2004.¹⁴ These inflows have largely funded mobile telephone manufacture and services. India is actively seeking additional inflows to provide universal telephone access for all Indian citizens.

Indian teledensity, representing the number of phones per 100 people, is very low compared to other nations of comparable population and GDP. India's teledensity is 9.13 percent.¹⁵ Presently, India has more than 85 million phones divided almost evenly between fixed and wireless phones.¹⁶ The major Indian cities account for most of the teledensity in the country. Teledensity in rural areas is quite low and the phone infrastructure that is available often does not work at least part of the time.¹⁷ It is estimated that less than six percent of the population actually owns a telephone.¹⁸ The Indian government has established a target of 250 million phones and teledensity of 22 percent by 2007.¹⁹

Teledensity is increasing; however, most of the new teledensity is related to mobile phones. Foreign direct investment in the private sector has focused almost exclusively on mobile phone operations and manufacturing. From April 2004 through March 2005 18.6 million mobile phone connections were added compared to 3.3 million fixed phone lines.²⁰ There are estimates

¹⁴ Indian Dept. of telecommunications <http://www.investindiatelecom.com/Investment%20Policy/FDI%20inflow-year-wise.htm>

¹⁵ Economist Intelligence Unit, "Mobile telephones connect," Business India Intelligence, Main Report, June 1, 2005.

¹⁶ Market Asia Pacific, "India optimistic for telecom growth.," January 01, 2005.

¹⁷ Businessline. Chennai: Oct 25, 2004. pg. 1

¹⁸ "FDI limit raised to 74%." India Telecom, vol. 11 no. 2: 1, February 2005.

¹⁹ Economist Intelligence Unit, "Mobile telephones connect," Business India Intelligence, Main Report, June 1, 2005.; and Market Asia Pacific, "India optimistic for telecom growth.," January 01, 2005.

²⁰ Economist Intelligence Unit, "Mobile telephones connect," Business India Intelligence, Main Report, June 1, 2005.

indicating that India will have 200 million mobile phone users by the end of 2007.²¹ There are a substantial number of mobile phone operators and this has promoted competition and benefited consumers through reduced cost of handsets and service contracts. Telecommunications growth by the state owned enterprises have primarily occurred in the area of fixed phone lines.

Recently, the Indian government has indicated that the telecommunications sector requires \$68.6 billion in investment to provide broadband services and 150 million new telecommunications lines.²²

Foreign firms wishing to invest in the Indian telecommunications sector are currently limited to owning 74 percent of local companies that provide mobile telephone access, basic, long-distance telephony and other related services. Internet-related services are excluded from the 49 percent cap and can be funded via FDI up to 100 percent. Up to 100 percent of FDI is permitted for manufacturing activities. Chief management is required to be Indian residents. The new policy includes restrictions on subscriber privacy.²³

However, it has been estimated that some companies have already made investments in Indian telecom companies beyond 74 percent via alternative financing methods.²⁴ Recently, there have been additional attempts to clarify regulations and improve coordination among the different branches of the Indian government responsible for regulating telecommunications investment.²⁵

New foreign direct investment is expected to come from current investors. Up to 32 telecommunications companies entered the Indian market through joint ventures in 1995.²⁶ Many

²¹ Cellular Operators Association of India

²² Telecomworldwire, March 22, 2005.

²³ "Increased FDI in telecoms" International Financial Law Review, vol. 24 (3): 125, March 2005. and Economist Intelligence Unit Country Report - Main report: March 10th 2005

²⁴ Knight Ridder Tribune Business News. Washington: Feb 3, 2005. pg. 1 and Businessline. Chennai: Oct 26, 2004. pg. 1

²⁵ "Norms for FDI in telecom." India Telecom, 11 (3): 4, March 2005.

²⁶ Businessline. Chennai: Oct 26, 2004. pg. 10

of these companies have since exited the market including AT&T, British Telephone, France Telecom, Swisscom (Switzerland), and Telstra (Australia).²⁷ Presently, there are six major foreign telecommunications companies in the country and they are all from the Asia-Pacific region (Singapore, Hong Kong, and Malaysia).²⁸

There are six large telecommunications companies that have a nationwide presence in India and several smaller companies that focus on specific regions. One of the six large companies is a state-owned enterprise with a large fixed line network. The Telecom Regulatory Authority of India (TRAI) projects foreign and domestic investment of \$12 billion over the next two years in Indian telecommunications networks. It is anticipated that most of the new investment will be raised from financial institutions and public offerings.²⁹

Currently a small proportion of customers provide the largest shares of revenue.³⁰ Costs are projected to decline in both long-distance and mobile telephony along with an attendant reduction in revenues.

The telecommunications sector has received some useful tax incentives during the implementation of the New Telecom Policies. These incentives include amortization of telecommunications license fees, tax exemptions on venture capital finance and loans and favorable importation of some equipment at lower customs duty rates. Additionally, there are some exemptions from capital gains taxes.³¹

²⁷ Economist Intelligence Unit, "Foreigners Welcome.", Business India Intelligence, February 9, 2005

²⁸ Economist Intelligence Unit, "Foreigners Welcome.", Business India Intelligence, February 9, 2005

²⁹ Economist Intelligence Unit, "India Telecoms: A brave new world.", Business India Intelligence-Main Report March 24, 2004

³⁰ Indian Department of Telecommunications - <http://www.dotindia.com/plans/planindex.htm>

³¹ Report of the Committee on Compilation of Foreign Direct Investment in India.

Issues with Indian Foreign Direct Investment in the Telecommunications Sector

India has several positive attributes that attract FDI – a stable political environment, large consumer market, skilled labor force and access to the Asia-Pacific region. FDI inflows have assisted in helping India provide telecommunications access to more of its population than might otherwise have been possible.

There are, however, several barriers to growth in attracting foreign direct investment for the Indian telecommunications sector. These barriers include the cost of mobile phones and services, high infrastructure costs, tax policies, unclear FDI policy and regulation, the legal climate, the status of rural areas and corruption.

The cost of handsets and mobile services is high relative to the average income of Indians. The average mobile phone handset can cost almost \$66 and phone service can cost \$5 a month.³² The average Indian salary is generally low and this amount is even lower in rural areas where the bulk of the population (approximately 72 percent in 2003) lives.³³ In addition, the average monthly revenue per mobile phone customer has dropped noticeably to \$8 in 2004. The average Asia-Pacific mobile phone service provider receives \$17 in monthly revenue.³⁴ Average revenue per mobile phone subscriber is expected to decline 13 percent annually through 2008.³⁵ This may result in a reduction in handsets and services in India and jeopardize NTP and FDI goals.

The condition of roads, public transit and phone service unreliability may shift FDI to countries other than India. Only 57.35 percent of the road network was paved in India as of 1999.

³² Economist Intelligence Unit, “Mobile telephones”, Business India Intelligence – Main Report, June 1, 2005.

³³ World Development Indicators – World Bank.

³⁴ Economist Intelligence Unit, “Mobile telephones”, Business India Intelligence – Main Report, June 1, 2005.

³⁵ Economist Intelligence Unit, “India Telecoms: A brave new world.”, Business India Intelligence – Main Report, March 24, 2004.

This compares poorly to other major developing countries in the region including South Korea (74.5 percent), Malaysia (77.9 percent in 2001), and Thailand (98.5 percent in 2000).³⁶

The share of tax revenues received by the Indian government as a percentage of GDP has shifted between eight and nine percent.³⁷ This compares unfavorably with other developing nations over a similar time period such as Indonesia (13 to 16 percent) and Malaysia (14 to 20 percent). In addition, there is a large and vibrant underground economy in India that pays little or no taxes. These factors further exacerbate the problems of receiving tax revenues that can then be used to fund improvements to the public infrastructure.

The telecommunications infrastructure is lacking in comparison to other Asian countries. Indian telephone faults per 100 phone lines were 126 in 2002. This compares unfavorably to Malaysia (40 in 2001), the Philippines (5.2 in 1997), and Thailand (19.8 in 2001).³⁸ Indian fixed line phone connections have been growing slower than mobile phone connections. The slow growth of fixed phone lines also contributes to lower Internet penetration. As of 2003 India had 17.49 Internet users per 1,000 people and most of these users likely reside in urban areas. Other developing countries have higher Internet penetration rates – China (63.25 per 1,000 in 2003), Malaysia (344.1 per 1,000 in 2003), Philippines (44.03 per 1,000 in 2002), Thailand (110.5 per 1,000) and Vietnam (43 per 1,000 in 2003).³⁹ India's low teledensity and low growth in fixed telephones will likely hinder the provision and access to high-speed Internet services.

Tax policy has at times been disjointed and acted as a barrier to investment. It is estimated that Indian taxes exceeded other potential FDI destinations from at least 2000 through 2003.⁴⁰ There are multiple domestic taxes and these taxes especially impact mobile phone

³⁶ World Development Indicators – World Bank.

³⁷ World Development Indicators – World Bank.

³⁸ World Development Indicators – World Bank.

³⁹ World Development Indicators – World Bank.

⁴⁰ Report of the Committee on Compilation of Foreign Direct Investment in India.

operators. Indian states have implemented individual taxes and this has been a disincentive to the free movement of manufactured goods within India including mobile phones. Until recently India had implemented a time-consuming tax reimbursement policy whereby firms had to pay a central sales tax and then were reimbursed at a later date for their payment. Moreover, tax law has been unclear on the treatment of research and development and this may have discouraged this activity.⁴¹

Telecommunications licenses to private phone operators have been granted on an arbitrary basis at varying prices.⁴² Phone licenses have been issued separately for international service, long-distance service, basic and cellular mobile phone services. These licenses all have different fee structures and conditions.⁴³

The regulations on foreign ownership have been unclear and have led to confusion. Previously, foreign-owned firms are limited to 49 percent ownership of an Indian company providing telecommunications services. However, in the past it was technically possible for a foreign entity to have up to 74 percent total ownership in an Indian telecom firm through direct and indirect investment methods. The exploitation of this apparent loophole has caused some elements of the Indian government to oppose further increases to the FDI cap in the telecommunications area. The Indian government has recently clarified the discrepancy in investment and allowed companies in non-compliance with the 74 percent investment rule four months to reach compliance.⁴⁴

The legal and regulatory environment in India is relatively transparent but very slow. Litigation and enforcement of contracts can take years and even decades to resolve. This has

⁴¹ Report of the Committee on Compilation of Foreign Direct Investment in India.

⁴² Economist Intelligence Unit, "Economic Policy: Telecommunications Licensing Policy", Country Report – Main Report, December 1, 2004.

⁴³ Economist Intelligence Unit, "India's telecom troubles: Inching towards solutions", Business India Intelligence – Main Report, October 8, 2003.

⁴⁴ "Telecom Companies to get four months to comply with FDI norms.", India Telecom, 11 (4): 12, April 2005.

caused many foreign companies doing business in India to ensure that disputes are subject to international arbitration.⁴⁵ The legal system is fair but a backlog contributes to very slow resolution of cases. In addition, policies may also be implemented that have a greater benefit for domestic industries in comparison to foreign firms.

Rural areas are expected to account for the majority of future growth in mobile telephone subscribers.⁴⁶ However, persons living in rural areas are the poorest people in India and the least able to afford handsets or the telephone services. Currently, it is estimated that only 24 percent of towns with a population of 50,000 or less have mobile phone coverage. This is in sharp contrast to towns with populations of 50,000 or more who have mobile phone coverage of 94 percent or greater.⁴⁷ In March 2003 overall teledensity in urban areas was 15.16 and the teledensity in rural areas was 1.49.⁴⁸ It is estimated that approximately one third of the rural villages in India lack even basic telephone service.⁴⁹

India suffers from real and perceived government corruption and this has hampered the attraction of foreign direct investment. Transparency International, an organization that tracks corruption in countries via the use of surveys, currently assigns India a Corruption Perception Index of 2.8 for 2004.⁵⁰ An index rating below 3 indicates that the country is perceived to have serious and rampant corruption as a cost of doing business. In 1995 the index for India was 2.78. India has shown no discernable improvement in the perception of corruption in the country. This has likely had a negative effect on foreign direct investment to India.

⁴⁵ Economist Intelligence Unit, "Laws and regulations: working slowly through the system", Business India Intelligence - Main report, April 20th 2005.

⁴⁶ Businessline. Chennai: Oct 25, 2004. pg. 1

⁴⁷ Census of India and Nokia Corporation.

⁴⁸ Indian Department of Telecommunications.

⁴⁹ Indian Department of Telecommunications - <http://www.dotindia.com/plans/planindex.htm>

⁵⁰ The Corruption Perceptions Index reflects the perceptions of people doing business in the country and country analysts who may or may not reside in the country. The 2004 Corruption Perceptions Index uses 18 surveys received by Transparency International between 2002 and 2004, administered by 12 independent organizations.

The determinants of FDI in the Indian Telecommunications Sector

There are several factors that influence the amount of FDI present for a country and in specific sectors of that country. The determinants of foreign direct investment in economies have been examined by various authors.⁵¹ Many of these studies have identified very useful variables relating to the flow of FDI. However, the primary focus of their research has been estimating total FDI flows at a national level. I will examine some sector-specific determinants of FDI for the Indian telecommunications sector.

The variables below were chosen based on their potential relationship to the telecommunications sector and their use in previous studies of FDI country flows. Most of the variables below have been included in previous country studies of FDI determinants. All of the variables and data (except FDI) are taken from the World Development Indicators database produced by the World Bank.

- Data for foreign direct investment in the telecommunications sector was taken from the Indian Department of Telecommunications website.⁵² The original data in rupees was converted to US dollars at the Interbank exchange rate for comparative purposes.
- The gross domestic product (GDP) and changes in gross domestic product can indicate the relative health and market size of an economy. The Indian GDP in US dollars, annual percentage change in GDP, per capita GDP and percentage change in per capita GDP are examined in the model.

⁵¹ A sample of such authors include: F. Root and A. Ahmed, "Empirical determinants of manufacturing direct foreign investment in developing countries", *Economic Development and Cultural Change*, no. 27, vol. 4 (1979): 751-768; Romita Biswas, "Determinants of Foreign Direct Investment", *Review of Development Economics*, vol. 6, no. 3 (2002):492-504; and Hubert Janicki and Phanindra Wunnava, "Determinants of foreign direct investment: empirical evidence from EU accession candidates", *Applied Economics*, no. 36 (2004):505-09.

⁵² Website address is <http://www.investindiatelecom.com/Investment%20Policy/FDI%20inflow-year-wise.htm>

- The level of infrastructure and support for infrastructure in a country is an important factor in attracting FDI. Tax revenue as a percentage of GDP is used as a proxy for the level and support of infrastructure.
- The educational characteristics of the workforce play an important role in attracting FDI. The adult literacy rate of the population is used as a proxy to represent the educational level of the workforce.
- The urbanization of the population represents improved infrastructure and modernity. The urban population as a percentage of the total population is used as a proxy to represent the society's increasing modernization and ability to attract FDI.
- The degree to which the economy has been liberalized and is open to foreign trade should influence FDI. Imports as a percentage of GDP is used as a proxy to represent the economy's level of openness.
- A growing labor supply can indicate a growing and healthy economy. The annual amount of labor available in the workforce is used to represent this measure.
- High levels of government debt can signal poor governance and act as a disincentive to invest. The amount of public debt in US dollars is used to represent this aspect of the economy.

These variables were combined in a variety of models for the time period 1993 through 2003. FDI or the log of FDI in the telecommunications sector was the dependent variable in all cases. In all of the models presented below the first two years of data were excluded and in some cases the last year as well. This data was excluded because the data most likely reflects the initial opening of the telecommunications sector to FDI and therefore the FDI inflows were very low

relative to the size of the economy and the variables used to model FDI. In addition, the last year of available data (2003) was excluded from some models because it appears to reflect only partial FDI inflows.

Labor supply and debt proved to be largely insignificant in all of the models and was excluded from further analyses. The models below had the most statistically significant t-values and provided some interesting results.

Model 1 - Imports and Urban Population (sample size of 9)

	Parameter Estimate	T-value	Standard Error
Intercept	-25401	-2.85	8910.92571
Urban Population	1097.25958	2.80	391.29683
Imports	-325.18537	-2.34	139.13828
R-square	0.5911		
Adjusted R-Square	0.4743		
F-Value	5.06		

Model 2 - Imports, Urban Population and Tax revenue as a percentage of GDP lagged by one year (sample size of 9)

	Parameter Estimate	T-value	Standard Error
Intercept	-27348	-3.41	8910.92571
Urban Population	1062.01638	3.04	391.29683
Imports	-265.90883	-2.07	139.13828
Tax Revenue lagged by one year	238.46164	1.68	128.75042
R-square	0.7223		
Adjusted R-Square	0.5835		
F-Value	5.20		

Model 3 - Urban Population, Tax revenue as a percentage of GDP lagged by one year and the Literacy rate of the population (sample size of 8)

	Parameter Estimate	T-value	Standard Error
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Intercept	1471.29791	0.26	5708.57917
Urban Population	-492.12340	-1.66	295.68930
Tax Revenue lagged by one year	311.58786	2.24	138.89634
Literacy rate	167.63648	3.07	54.67690
R-square	0.8742		
Adjusted R-Square	0.7798		
F-Value	9.26		

Model 4 - Tax revenue as a percentage of GDP lagged by one year, the Literacy rate of the population and percent change in GDP lagged by one year (sample size of 8)

	Parameter Estimate	T-value	Standard Error
Intercept	-6800.82622	-5.82	1167.72389
Tax Revenue lagged by one year	463.42232	4.81	96.40312
Literacy rate	61.51872	4.42	13.91101
GDP percent change lagged	-87.66079	-3.25	26.98749
R-square	0.9414		
Adjusted R-Square	0.8975		
F-Value	21.44		

Model 5 - Logs of FDI (dependent variable), Tax revenue as a percentage of GDP lagged by one year and the Literacy rate of the population lagged by one year (sample size of 8)

	Parameter Estimate	T-value	Standard Error
Intercept	-78.04604	0.0025	15.70120
Log of Tax Revenue lagged by one year	28.95562	4.34	6.67738
Log of Literacy rate lagged by one year	30.23391	4.69	6.44842
R-square	0.8136		
Adjusted R-Square	0.7514		
F-Value	13.09		

Model 6 - Logs of FDI (dependent variable), lagged Tax Revenue, Literacy rate and GDP per capita percent changed lagged by one year (sample size of 8)

	Parameter Estimate	T-value	Standard Error
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Intercept	-77.12267	-4.60	16.76610
Log of Lagged Tax Revenue	29.50331	4.12	7.16280
Log of Literacy rate	29.56908	4.25	6.95450
Log of GDP per capita percent change lagged by one year	-0.47770	-0.56	0.85324
R-square	0.8246		
Adjusted R-Square	0.7193		
F-Value	7.83		

Model 7 - Logs of FDI (dependent variable), lagged Tax revenue and GDP lagged by two years
(sample size of 8)

	Parameter Estimate	T-value	Standard Error
Intercept	-90.45893	-5.16	17.53134
Log of Tax Revenue lagged by one years	20.48931	3.61	5.66837
Log of GDP lagged by two years	6.32536	4.88	1.29732
R-square	0.8248		
Adjusted R-Square	0.7664		
F-Value	14.12		

Literacy and lagged tax revenues indicate that labor skill and infrastructure are important factors in attracting FDI to the telecommunications sector. Urban population as a percentage of total population provided mixed results alternatively indicating that urban population had a positive and negative impact on FDI. GDP provided counter-intuitive results as most models incorporating GDP indicated that it had a negative impact on FDI in the telecommunications sector. However, this might represent that foreign investors pursue other investment opportunities as the economy expands. Only in model seven does GDP (lagged by two years) have the expected positive sign and indicates that a one percent increase in lagged GDP increases telecommunications FDI by just over six percent.

While some of the t-statistics are significant at the .05 or .10 level care should be taken when interpreting these results. The model was constrained by the short time series of the data (1993 through 2003) and two or three years were removed in all of the models present. The small number of explanatory variables could limit the accuracy of the regression model. It is possible that some models exhibit some degree of multicollinearity due to the small sample size. In addition, the lack of some data (e.g., secondary and tertiary education graduation rates) required that other related information be used as a proxy for the unavailable data.

There were several variables that were not included in the regression model due to a lack of data. These variables include the number of days it takes to open a new business (representing the regulatory and legal environment), the reliability and safety of the public transportation network (rail, bus and air transport), the amount of students graduating from secondary and tertiary educational institutions (to represent the skill level of the labor force).

Conclusion

Foreign direct investment in the Indian telecommunications sector has increased substantially since early 1991. Much of this growth can be attributed to foreign firms entering into partnership with local mobile telephone operators to serve customers across the country. Some of the growth represents multi-national companies establishing mobile telephone manufacturing facilities within India to better serve the country and produce goods for regional exports.

However, Indian telecommunications FDI, like FDI in all Indian sectors, has suffered from phased implementation, an ambiguous legal and regulatory environment and inadequate

physical infrastructure. Consequently many foreign companies entered and then exited the Indian telecommunications sector within a few years.

Indian rural areas represent the greatest growth area for telecommunications. However, this growth is limited by the extreme poverty of the persons living in the rural areas, where there may be a greater focus on life's basic necessities of food, health, sanitation and water. The present cost of telecommunications access may exceed the affordability of rural residents.

Foreign direct investment in the Indian telecommunications sector would likely increase further if limits on investment were removed, regulations were clarified and the physical infrastructure was improved. These actions would improve regulatory transparency and entail additional costs.

Appendix

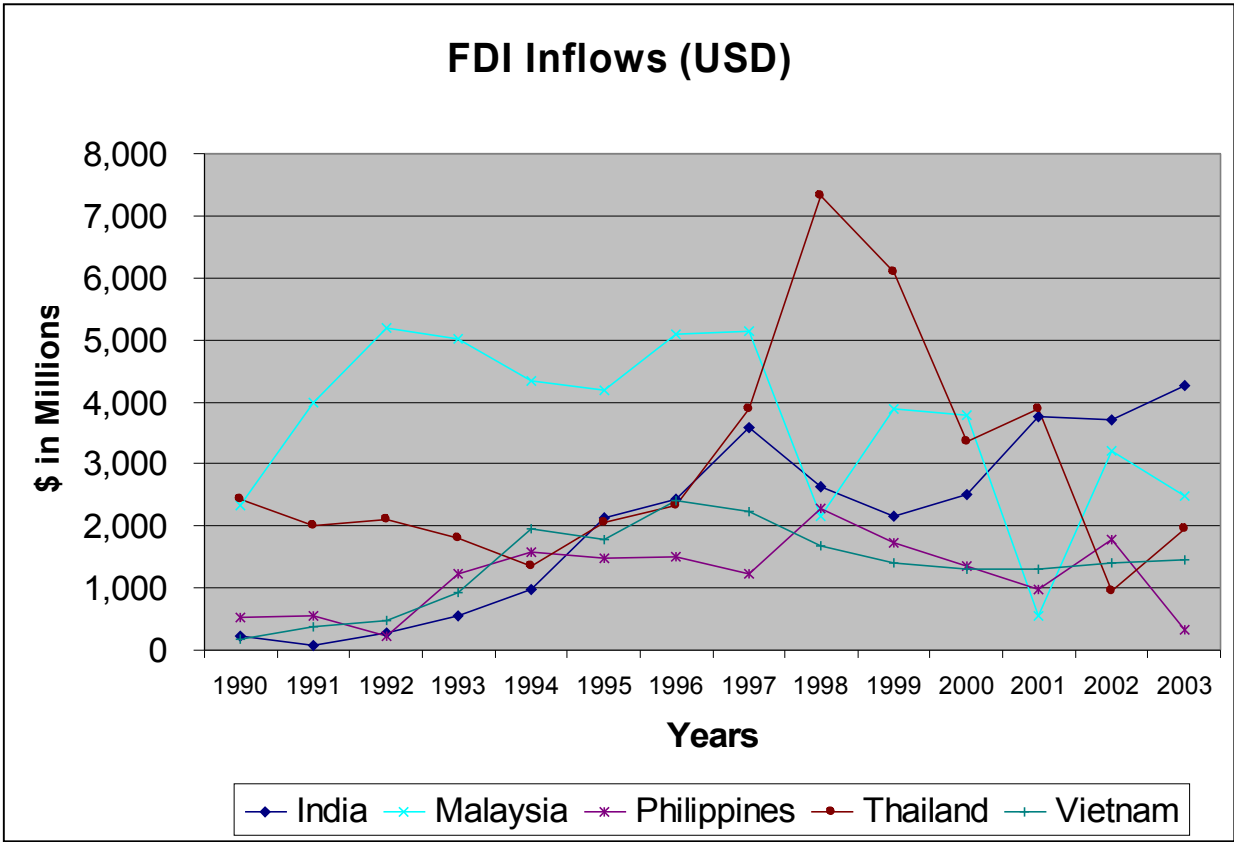


Figure 1

Source: World Development Indicators (World Bank).

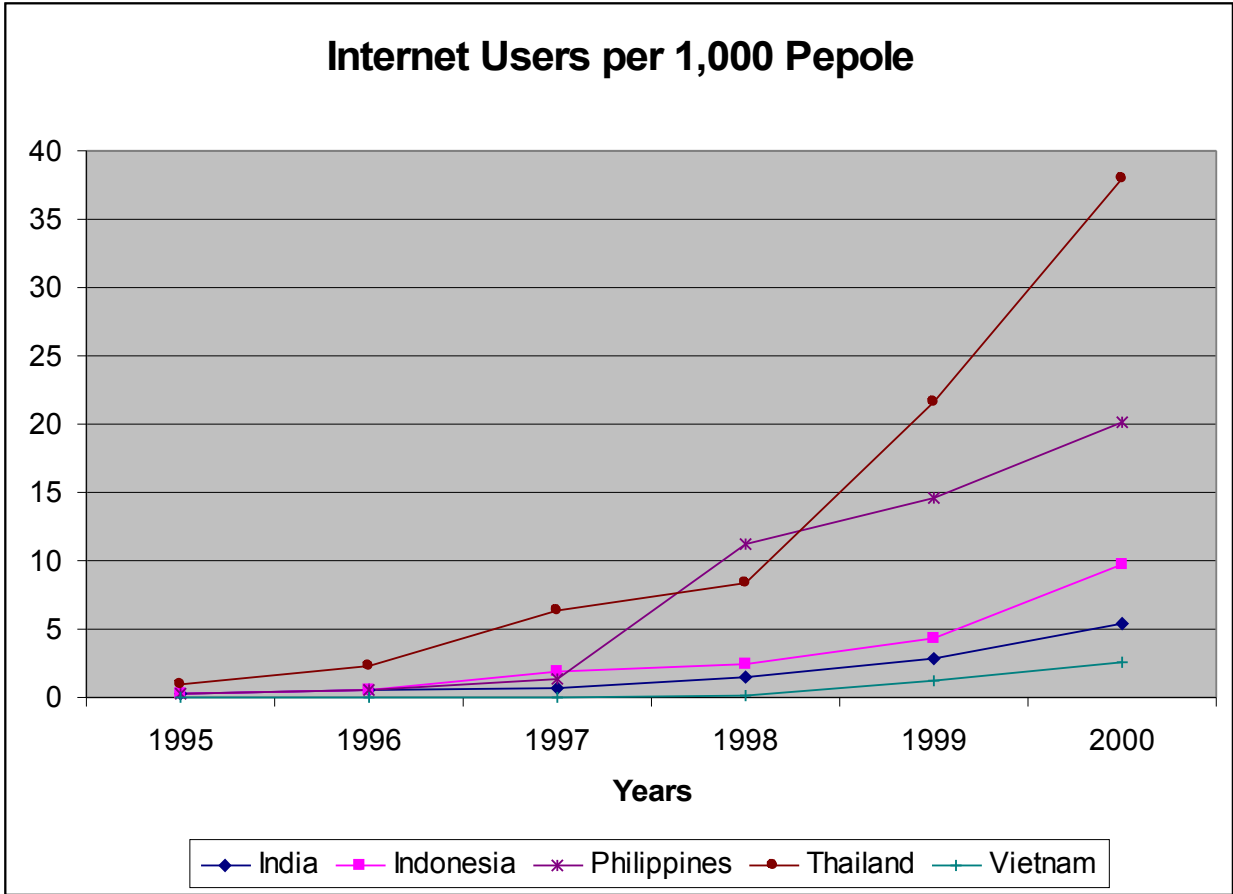


Figure 2

Source: World Development Indicators (World Bank).

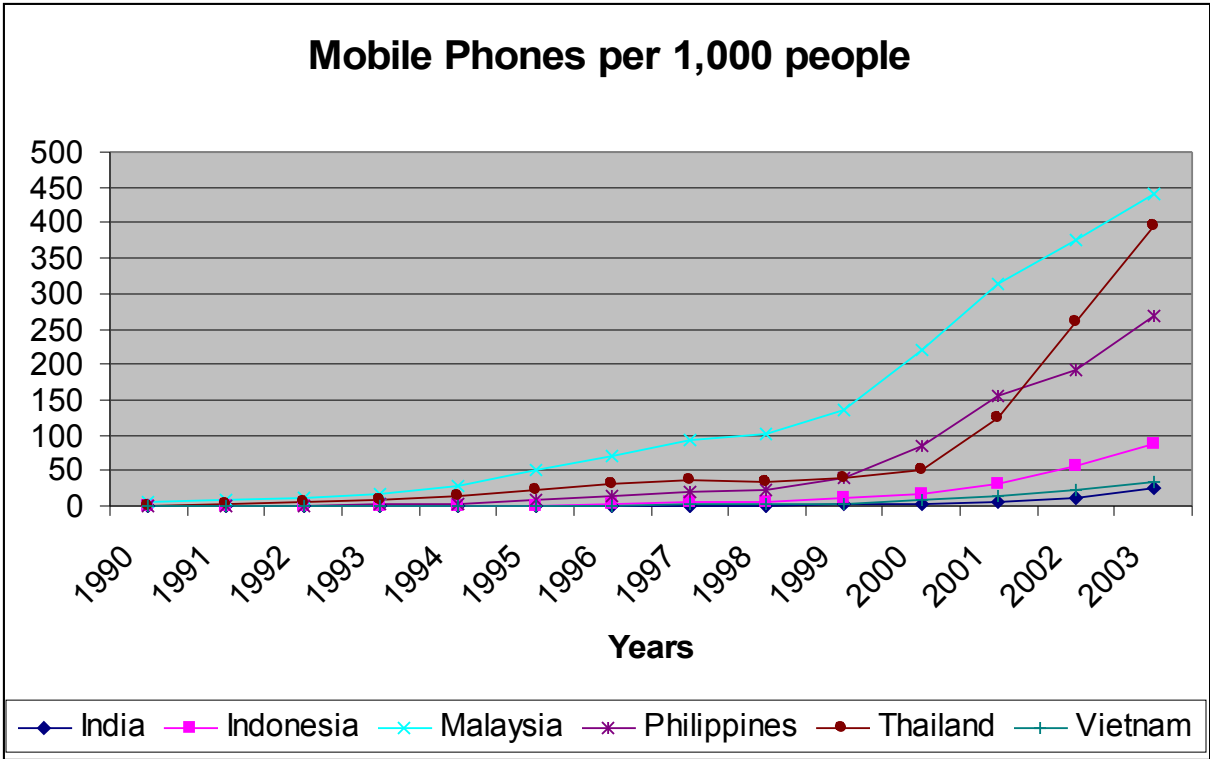


Figure 3

Source: World Development Indicators (World Bank).

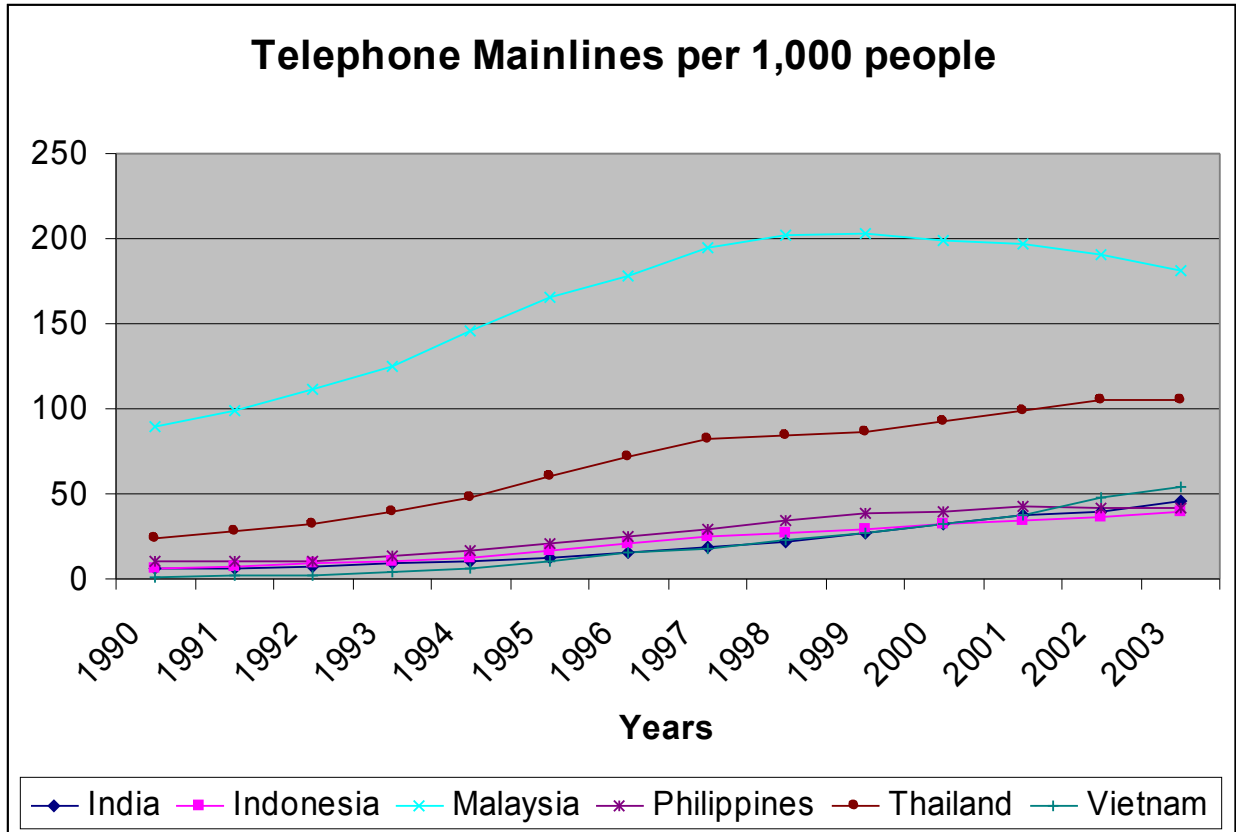


Figure 4

Source: World Development Indicators (World Bank).

Bibliography

Athreye, S. and Kapur, S. "Private foreign investment in India: pain or panacea?" *World Economy*, vol. 24, no. 3 (2001):399-424.

Balasubramanyam, V., Salisu, M. and Sapsford, David. "Foreign Direct Investment and Growth in EP and IS Countries." *The Economic Journal*, no. 106, (1996):92-105.

Balasubramanyam, V. and Mahambare, V.. "FDI in India." *Transnational Corporations*, vol. 12, no. 2 (2003):45-72.

Biswas, Romita. "Determinants of Foreign Direct Investment." *Review of Development Economics*, vol. 6, no. 3 (2002):492-504.

Desai, Padma (ed)., *Going Global: Transition from Plan to Market in the World Economy* Cambridge, Massachusetts, 1997.

Root, F. and Ahmed, A. "Empirical determinants of manufacturing direct foreign investment in developing countries." *Economic Development and Cultural Change*, vol. 27, no. 4 (1979):751-768.

Janicki, Hubert and Wunnava, Phanindra. "Determinants of foreign direct investment: empirical evidence from EU accession candidates." *Applied Economics*, no 36 (2004): 505-509.

Nunnenkamp, Peter and Spatz, Julius. "Determinants of FDI in developing countries: has globalization changed the rules of the game?" *Transnational Corporations*, vol. 11, no. 2 (2002):1-34.

Nunnenkamp, Peter and Spatz, Julius. "FDI and economic growth in developing economies: how relevant are host-economy and industry characteristics?" *Transnational Corporations*, Vol.13, Issue. 3; (Dec 2004): 53.

Report of the Committee on Compilation of Foreign Direct Investment in India. *Reports on investment approval and FDI in India*. New Delhi: Academic Foundation, 2004.

Singh, Harinder and Jun, Kwang. "Some new evidence on determinants of foreign direct investment in developing countries." *World Bank Policy Research working paper; no. WPS 1531*, World Bank, Washington, D.C., 1995.

United Nations Conference on Trade and Development, Programme on Transnational Corporations. *Explaining and forecasting : regional flows of foreign direct investment*. New York: United Nations, 1993.

Working Group of the Capital Markets Consultative Group." Foreign Direct Investment in Emerging Market Countries", September 2003. Website is located at:
<http://www.imf.org/external/np/cm/cg/2003/eng/091803.pdf>

Yasmin, Bushra, Hussain, Aamrah and Chaudhary, Muhammad. "Analysis of factors affecting Foreign Direct Investment in Developing Countries." *Pakistan Economic and Social Review*, vol. 41, no. 1-2 (2003):59-75.