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Deregulation of Indian Telecommunication: An Analysis of Customer Benefit

by

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Advisor: Dr. Douglas Hearth

**An Honors Thesis in partial fulfillment of the requirements for the degree Bachelor
of Science in Business Administration in Finance**

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Abstract

This study investigates whether mobile customers were made better off following the deregulation of the Indian telecommunications industry. It will establish a link between industry deregulation and affordability and accessibility for customers. Results indicate that as a result of deregulation and increased FDI, customers saw decreased usage charges and greater cellphone coverage and accessibility. Also covered is a case study of the Brazilian telecommunications industry.

I. Introduction

The purpose of this study is to examine the effect of deregulation after its implementation in 1999. In particular this study will attempt to determine whether mobile customers were made better off as a result of deregulation. Furthermore, the study will examine which customers in particular benefited most.

Prior to 1999, the Indian Telecommunication Industry was heavily regulated and allowed limited foreign direct investment (FDI). Originally FDI limits were imposed as a means to protect domestic companies during their infancy, however, the later restrictions were upheld because India's Intelligence Bureau opposed the increase because "that the hike in FDI caps was not good for security". As a result, the government saw the industry enter into a period of stagnant growth. Customers saw usage costs remain high and accessibility remain limited. The passage of New Telecom Policy 1999 (NTP 1999) would forever change the landscape of the industry as the government sought to provide affordable, accessible, and effective communication to all citizens. Other goals of NTP 1999 included transforming in a time bound manner, the telecommunications sector to a greater competitive environment in both urban and rural areas providing equal opportunities and level playing field for all players and enabling Indian Telecom Companies to become truly global players. It is evident that the Indian government has changed its philosophy in an attempt to foster growth in the telecommunication industry. However, with the recent developments in the industry many have asked the same question: Are mobile customers made better off by these changes? If so, which mobile customers specifically benefited the most from this deregulation?

To investigate the whether customers benefited from deregulation telecommunication data collected by the Telecom Regulatory Agency of India from 2006 – 2011 will be examined. The mobile usage data rates were collected from both CDMA and GSM networks and averaged within the telecommunication circles. CDMA networks are networks that layer digital calls over the same bandwidth while using different coding to facilitate calls. GSM networks divide the bandwidth into different channels and distribute calls within the different bands.

The balance of this paper is organized as follows. Section 2 discusses background information on the Indian telecommunications industry. Section 3 describes the research conducted for this study. Section 4 presents the findings of this study. Section 5 offers my conclusions.

II. Background

Recent History of Telecommunications in India

The Indian government began its initial deregulation of the telecommunications industry with the passage of National Telecommunications Policy 1994 (NTP 1994). The government opened local basic and value-added telecommunications services to competition, with commercial services opening later that year with the hopes of providing telecommunication for all by ensuring the availability of on demand telephone as early as possible¹. The country was divided into 21 “Circles” corresponding to the approximate potential value and population size of the geographic area.

Table 1: Regional Breakdown of Telecommunication Circles

| Geographic Breakdown of Telecommunication Circles | |
|--|---|
| Circle A | Andra Pradesh, Gujarat, Karnataka, Maharashtra, Tamil Nadu (incl. Chennai) |
| Circle B | Haryana, Kerala, Madhya Pradesh, Punjab, Rajasthan, UP (E), UP (W), West Bengal |
| Circle C | Assam, Bihar, Himachal Pradesh, J&K, North East, Orissa |
| Metro | Delhi, Mumbai, Kolkata |

** Chennai was included in Metro prior to 2010*

Source: TRAI Performance Indicator Report (Sept 2011)

The industry gathered further deregulatory momentum as the government passed a bill creating the Telecommunication Regulatory Authority of India, an independent and autonomous agency responsible for the regulation of the telecommunication industry, including: responsibly facilitating interconnection and technical interconnectivity between operators, regulating revenue sharing, ensuring compliance with license conditions, facilitating competition, and settling disputes between service providers². This separated powers between the TRAI and the Department of Telecommunications (DoT), which maintained responsibility for issuing and renewing provider licenses.

However, the progress made under NTP 1994 was not enough to open the market up for vast expansion. NTP 1994 lacked the support of the Indian Bureau of Intelligence because the bureau felt the increase in FDI was not good for national security as Telecommunications were of paramount importance to the government and country.

The passage of NTP 1999 truly began the new era in Indian Telecommunications. The Indian government recognized “that provision of world class telecommunications infrastructure and information is the key to rapid economic and social development of the country”, and that furthermore “it is of vital importance to the country that there be a comprehensive and forward looking telecommunications policy which creates an enabling framework for development of this industry”³. Through new policies, the government would attempt to provide a framework that enabled continued attraction of investment in the sector and allowed creation of communication infrastructure by leveraging on technological development. The new policy would allow cellular mobile service providers (CMSP’s) to provide their own long distance without additional

¹ NTP 1994.

² India Telecom Industry report by Balakrishnan and Daga

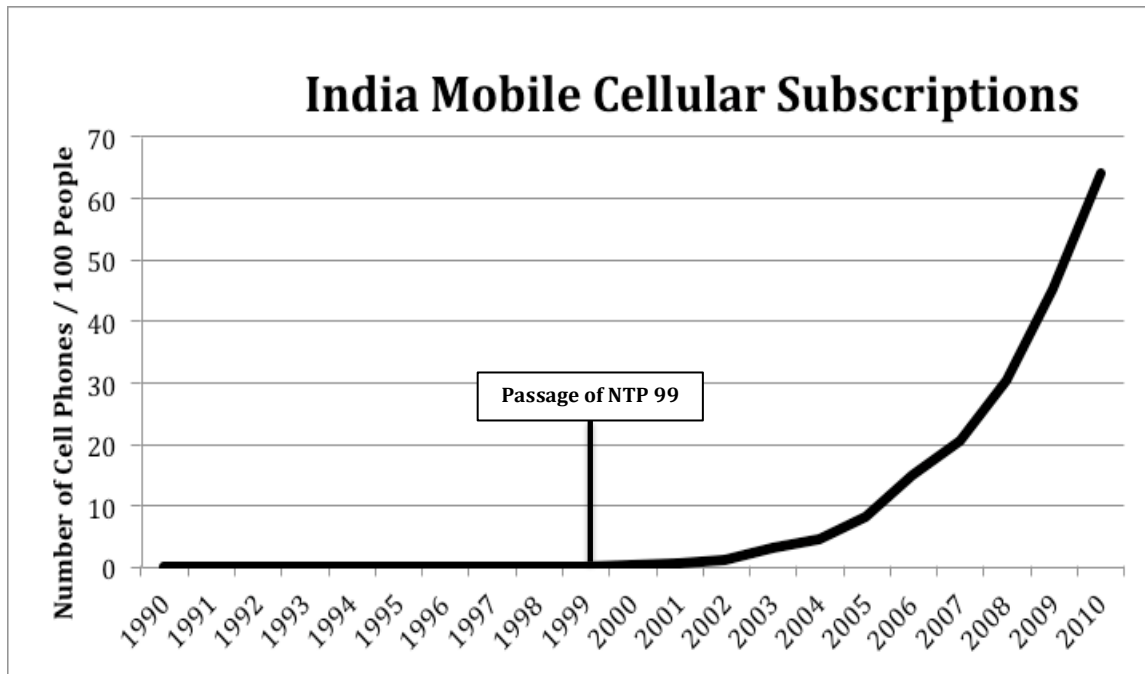
³ NTP 1999.

licenses, to share infrastructure to facilitate interconnectivity between different CMSP's, and to obtain licenses for any number of service areas listed in under NTP 1994.

Throughout the early 2000's, the industry would further evolve with the corporatization of Bharat Sanchar Nigam Limited, formerly a state-owned enterprise and the addition of the Code Division Multiple Access (CDMA) networks. Prior to 2000, only Global System for Mobile Communication (GSM) networks were available in India. While CDMA networks represent a minority of mobile users, the networks provide unique qualities for those in the most rural of locations, including more efficient use of bandwidth and better voice quality. The next major milestone occurred in with the DoT allowing unlimited competition in the basic telecommunication services in 2001. Shortly thereafter, the CDMA networks were launched as a direct competitor to the GSM networks, which had monopolized the Indian market for the previous decade. In 2005, the Indian government further deregulated the industry by increasing the allowable FDI from 49% to 74%⁴. The evolutionary trend would continue with the spread of 3G services after the bandwidth auction held in 2010.

Through an examination of subscriptions per 100 inhabitants in Figure 1 one is able to see the immense growth that occurred following the NTP 1999. 2002 began the rapid growth era, where Mobile Subscriptions per 100 inhabitants would grow with a CAGR of 67.8%, reaching 64.2 in 2010.

Figure 1: Mobile Subscriptions per 100 inhabitants in India



Source: Gapminder

⁴ Dnb.co.in. Indian Telecom Industry

III. Research

The research process began by examining relevant literature utilizing ProQuest, Lexus Nexus, Google Scholar, and Ebsco Host. The literature focused the perceived costs and benefits associated with deregulation; including additional FDI, increased accessibility, and decreased costs, however the number one cost or threat identified was security, as the telecommunication industry is deemed vital⁵. After the completion of the literature research, the TRAI [www.trai.gov.in] and DoT [www.dot.gov.in] websites were examined to gather necessary data. The data analyzed is from September 2006 to present (September 2011) as it was the most accurate and provided the most uniform presentation. The data was collected from Performance Indicator Reports that publish Outgo Charge per Minute data on an annual basis for months July – September, a common measure of overall cost per minute of usage (combination of airtime usage and rental costs)⁶. These data are only available in the September reports from TRAI. The World Bank [data.worldbank.org] and Gapminder [gapminder.org] were utilized to gather general information regarding India's and Brazil's population, GDP, and mobile subscriber data.

⁵ NTP 1999

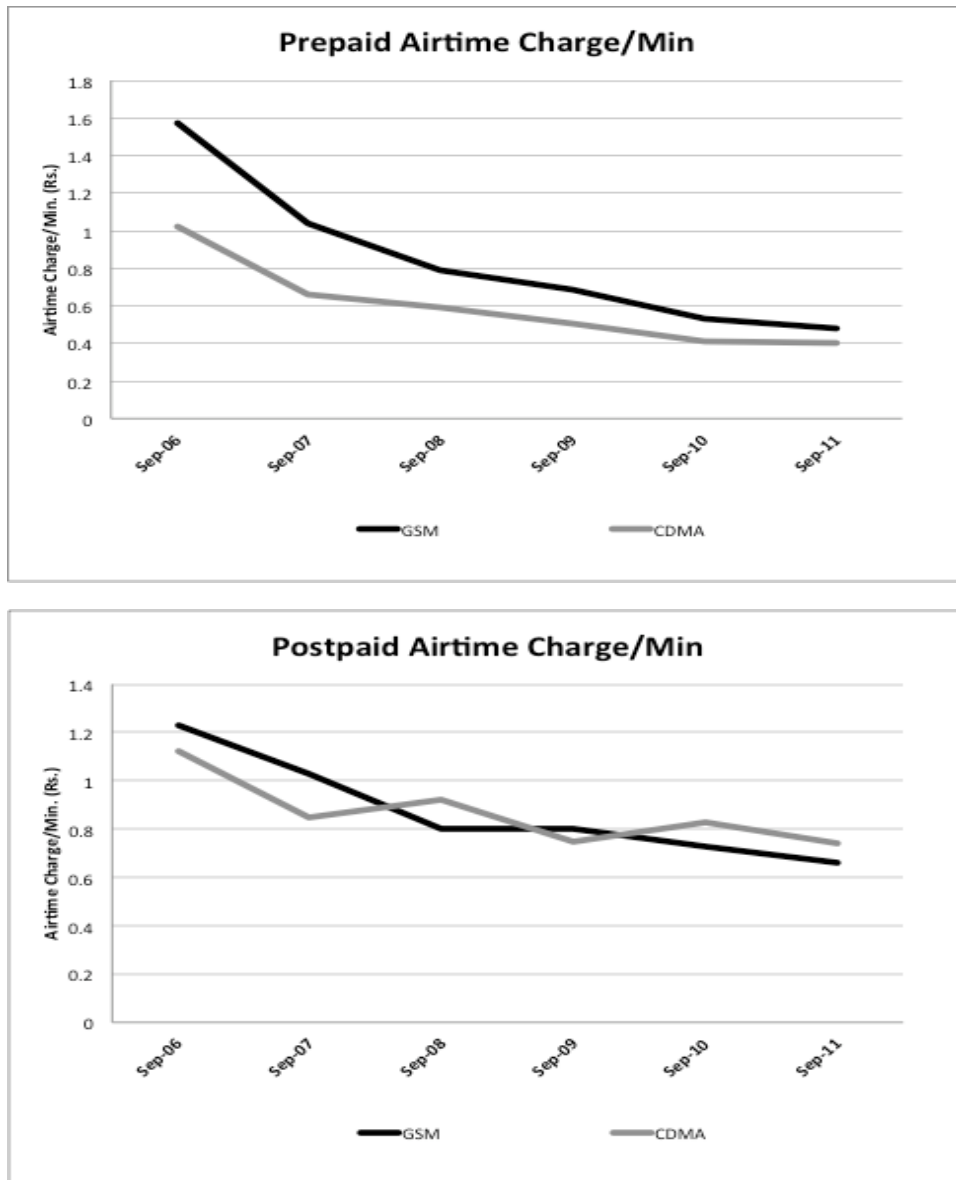
⁶ TRAI

IV. Results

This study will begin by examining which customers were made better off with regards to network type. India currently has two different network types: Global System for Mobile Communication (GSM) and Code Division Multiple Access (CDMA). Currently there are 14 GSM providers and 6 CDMA providers. One would expect that given the disparity of customers, GSM providers would on average provide service at a lower cost than CDMA providers.

GSM vs. CDMA

Figure 2: Average Outgo Charge per Minute for All of India



Source: TRAI Performance Indicator Reports

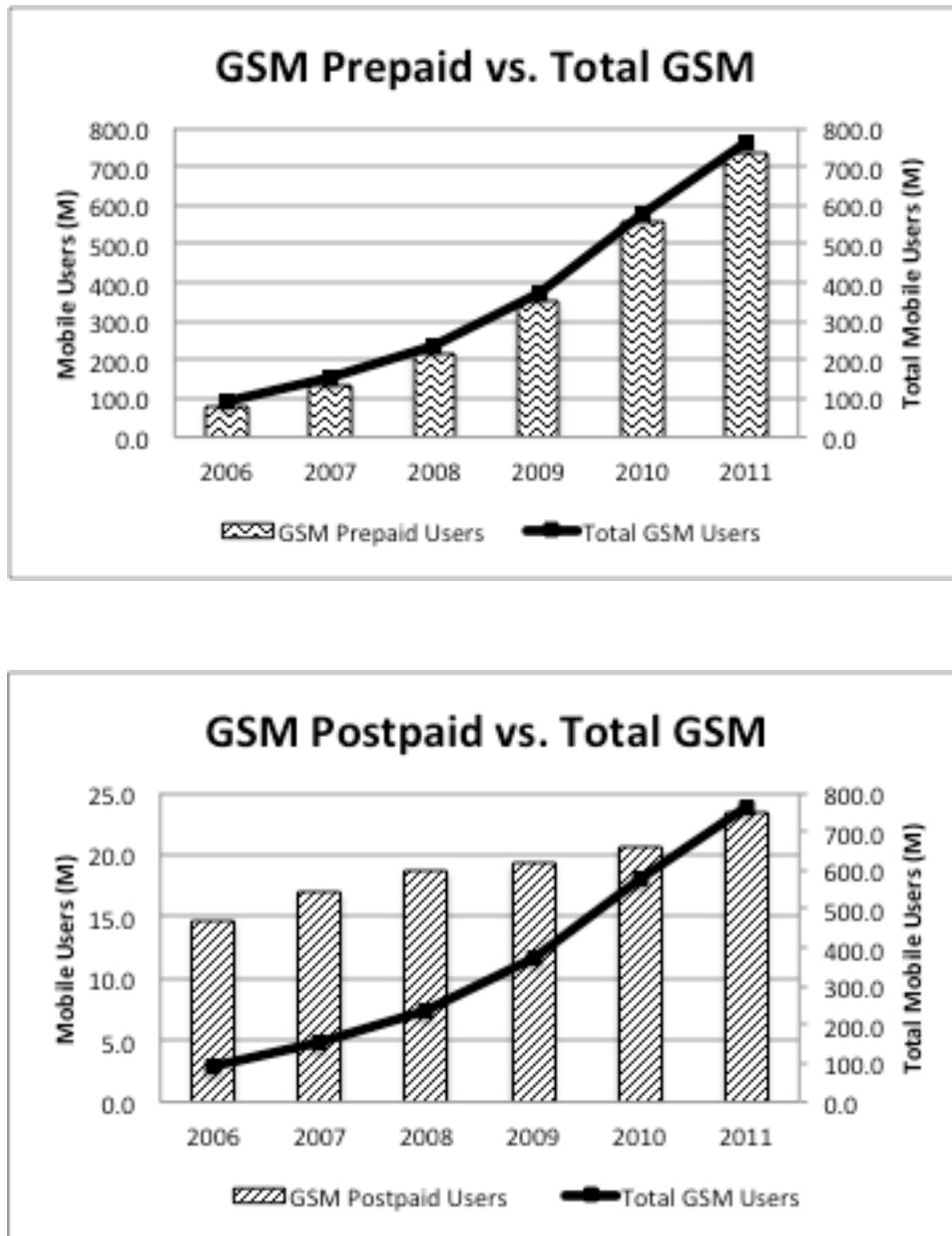
Prepaid customers on both GSM and CDMA networks have seen outgo charges continue to decrease, reaching what would appear to be a minimum outgo charge of around 0.40 Rupees/minute (Rs./min.). Postpaid customers have seen outgo charges decrease at slower paces, however, the rate of decrease seems to be far more sustainable. GSM prepaid users have seen outgo charges fall over 69.4% from 2006 to 2011, while CDMA prepaid users have seen outgo charges fall over 60.8% over the same time period. Postpaid customers have also seen outgo charges decrease significantly over the time period with GSM postpaid users seeing charges fall 46.3%, while CDMA users saw charges fall 33.9%.

Through this analysis one can see that CDMA prepaid users had lower outgo costs/min. than their GSM counterparts. This may contradict the proposal of economies of scale based on population density, however, one must keep in mind that CDMA users are often those in remote locations meaning they may not have the means to pay for an expensive service. Therefore, it would be logical for CDMA providers to charge lower rates as a way to target these rural customers. CDMA postpaid users saw rates slightly higher than those of their GSM counterparts. Overall, it is fair to say that both prepaid and postpaid users were made better off through deregulation, with both GSM and CDMA counterparts realizing similar benefits.

Prepaid vs. Postpaid

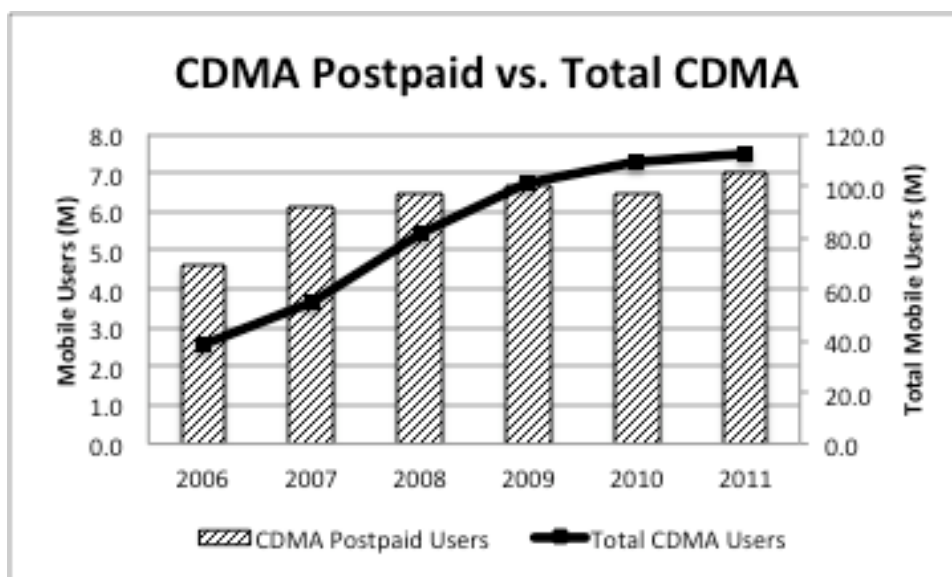
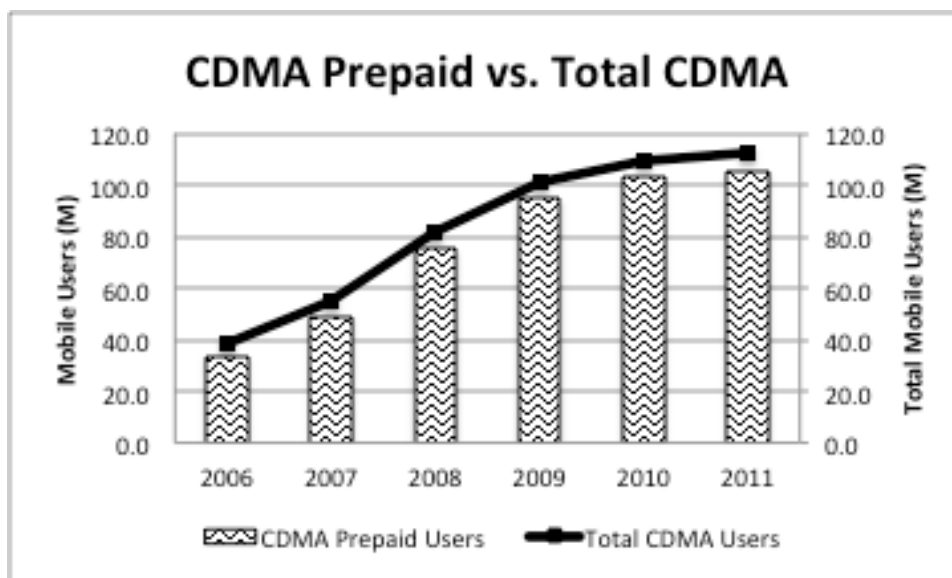
Next, this study will examine the whether prepaid or postpaid users benefited deregulation, and if so, who benefited the most. One would estimate that, since the majority of Indian customers are prepaid users, services would be tailored to them and there would be little to no growth in postpaid users.

Figure 3: Examination of GSM Users



Source: TRAI Performance Indicator Reports

Figure 4: Examination of CDMA Users



Source: TRAI Performance Indicator Reports

It is evident that prepaid users are driving GSM networks' growth. Prepaid users represent over 96% of all GSM networks as of Sept 2011. From 2006 to 2011, the prepaid users had a CAGR of over 195.2%, while the postpaid users saw a CAGR of only 44.0%.

CDMA networks saw similar results to GSM networks as prepaid users are also driving growth. However, CDMA prepaid users saw a CAGR of 103.2%, far less than the 195.2% of GSM prepaid users. CDMA postpaid users saw a CAGR of 15.7%, again far less than the 44.0% of GSM postpaid users.

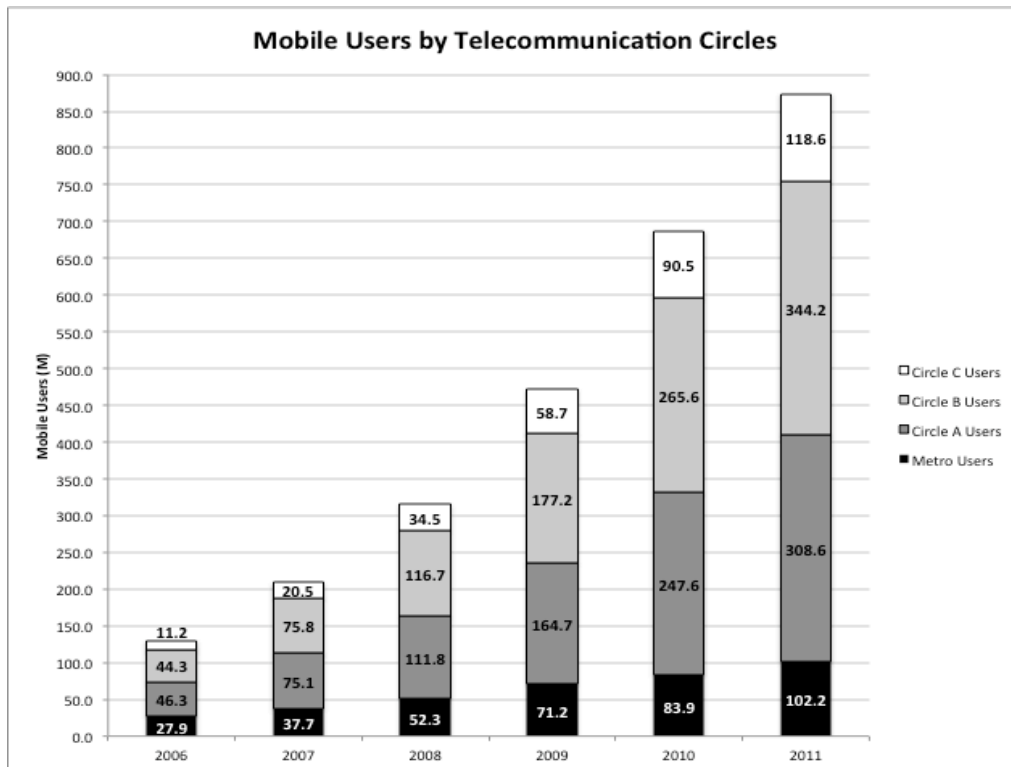
Through the above analysis, it is evident that prepaid customers grew at a more rapid pace than postpaid customers, meaning that services truly are tailored to prepaid customers. Using data

seen in Figure 2, it is evident that average outgo charges on GSM networks paid by postpaid users represent a 37.5% premium to those paid by prepaid users. The results are similar for CDMA networks, as outgo charges paid by postpaid users represent an 85.0% premium to those paid by prepaid users. One can conclude from this analysis that prepaid customers are better off than postpaid customers currently, however, it appears prepaid airtime charge per minute is hitting an asymptotically low price of 0.40 Rs./min., while postpaid outgo charge per minute appears to be decreasing at a more sustainable, linear pace. One might argue that within the next decade, if this trend continues, postpaid users will realize a lower outgo charge per minute than prepaid users, especially if the GSM postpaid subscriber pool continues to grow^[1].

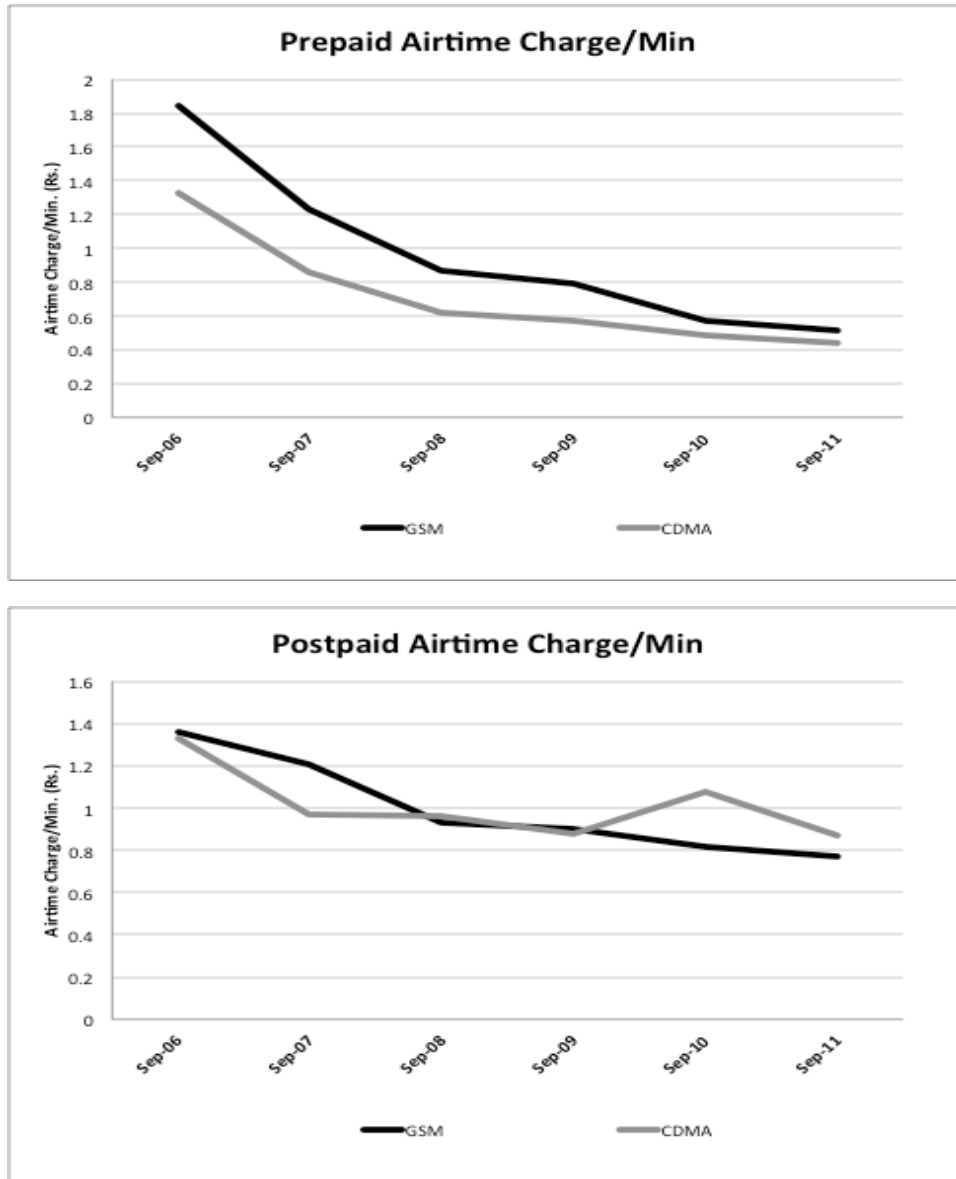
Finally, this study will examine whether the different telecommunication circles have benefited, and if so whether those benefits were equally recognized within the different circles. This study will also examine whether this growth has impacted the usage costs. Over the past 6 years each of the telecommunication circles has experienced rapid growth, as seen in Exhibit 6. One would expect those faster growing circles to experience a disproportionate benefit correlated to with their growth, as economies of scale are recognized.

Table 2 and Figure 6: Growth of Telecommunication Circles

| Circle | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 6 yr. CAGR |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| Metro | 27.9 | 37.7 | 52.3 | 71.2 | 83.9 | 102.2 | 105.0% |
| Circle A | 46.3 | 75.1 | 111.8 | 164.7 | 247.6 | 308.6 | 153.0% |
| Circle B | 44.3 | 75.8 | 116.7 | 177.2 | 265.6 | 344.2 | 158.7% |
| Circle C | 11.2 | 20.5 | 34.5 | 58.7 | 90.5 | 118.6 | 118.0% |
| Total | 129.5 | 209.1 | 315.3 | 471.7 | 687.7 | 873.6 | 201.0% |



Metro

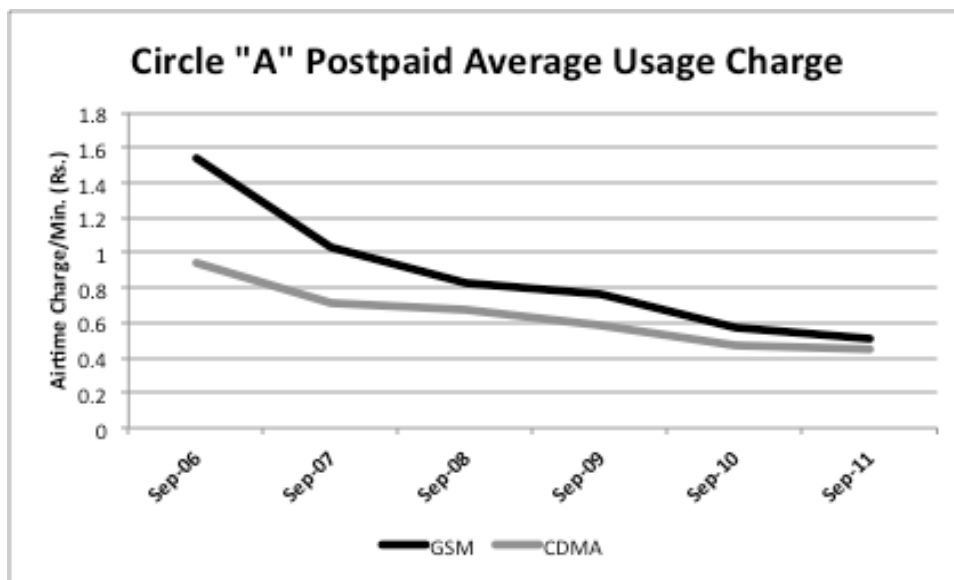
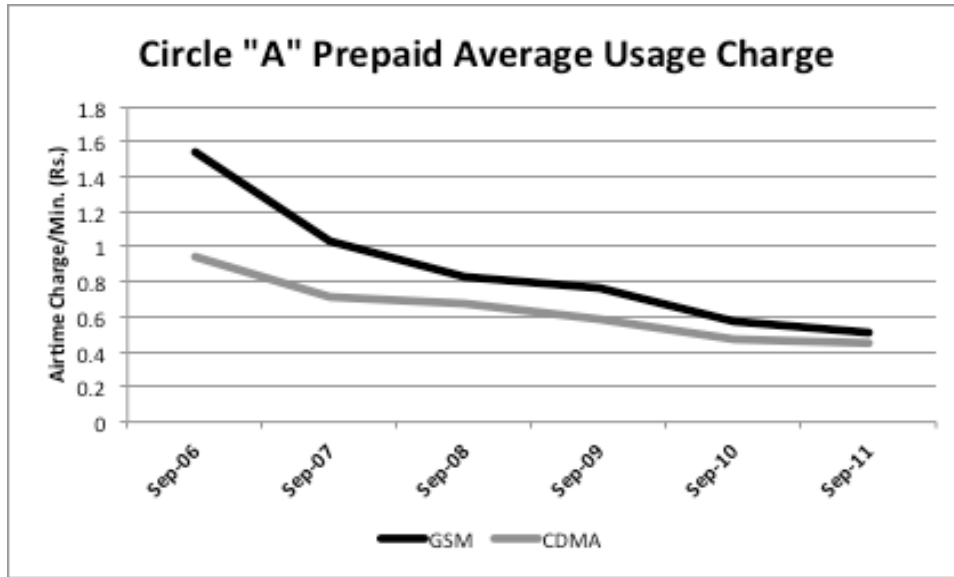


Source: TRAI Performance Indicator Reports

Prepaid and postpaid customers in the Metro Circle on both GSM and CDMA networks have seen outgo charges continue to decrease. GSM prepaid users have seen outgo charges fall over 72.3% from 2006 to 2011, while CDMA prepaid users have seen outgo charges fall over 66.9% over the same time period. Postpaid customers have also seen outgo charges decrease significantly over the time period with GSM postpaid users seeing outgo charges fall over 43.4%, while CDMA users saw charges fall over 34.6%.

The Metro Circle represents Mumbai, New Delhi and Kolkata, 3 of the most densely populated areas within India. As seen in Exhibit 6, the Metro circle has seen the slowest growth, with a CAGR of 105.0% from 2006-2011. While the dense population makes for greater economies of scale, the growth potential is far less than those of other circles.

Circle A

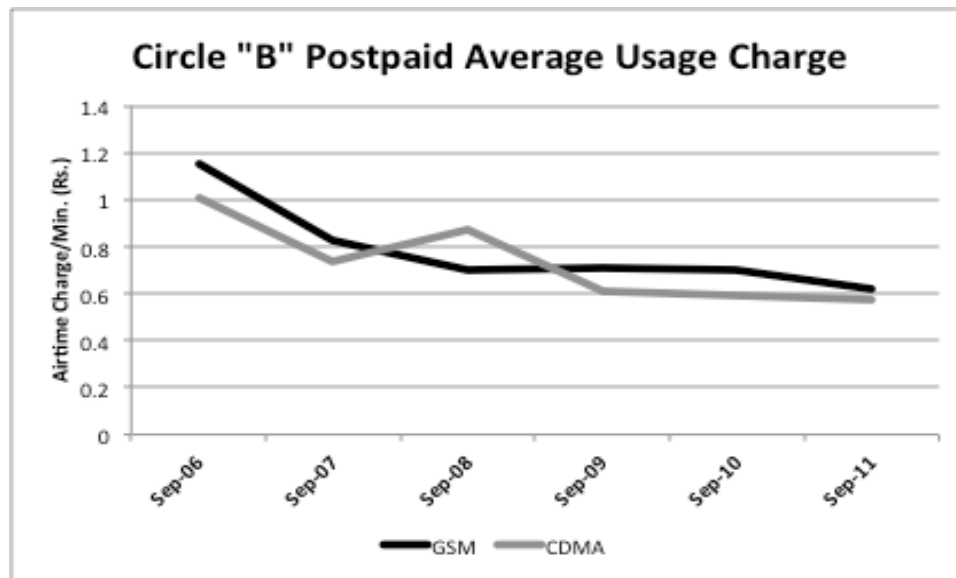
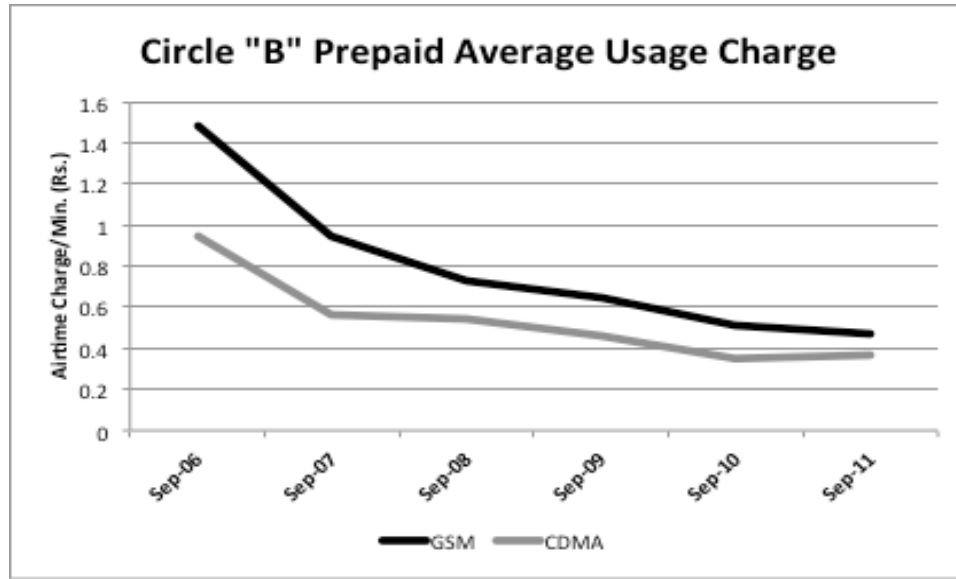


Source: TRAI Performance Indicator Reports

Prepaid customers on both GSM and CDMA networks have seen outgo charges continue to decrease, reaching what would appear to be a minimum outgo charge of around 0.40 Rs./min. GSM prepaid users have seen outgo charges fall over 66.9% from 2006 to 2011, while CDMA prepaid users have seen charges fall over 52.1% over the same time period. Postpaid customers have also seen charges decrease significantly over the time period with GSM postpaid users seeing charges fall over 44.1%, while CDMA users saw rates fall over 17.8%.

Circle A represents densely populated circles that are still developing. As seen in Exhibit 6, Circle A has seen the second fastest growth, with a CAGR of 153.0% from 2006-2011.

Circle B

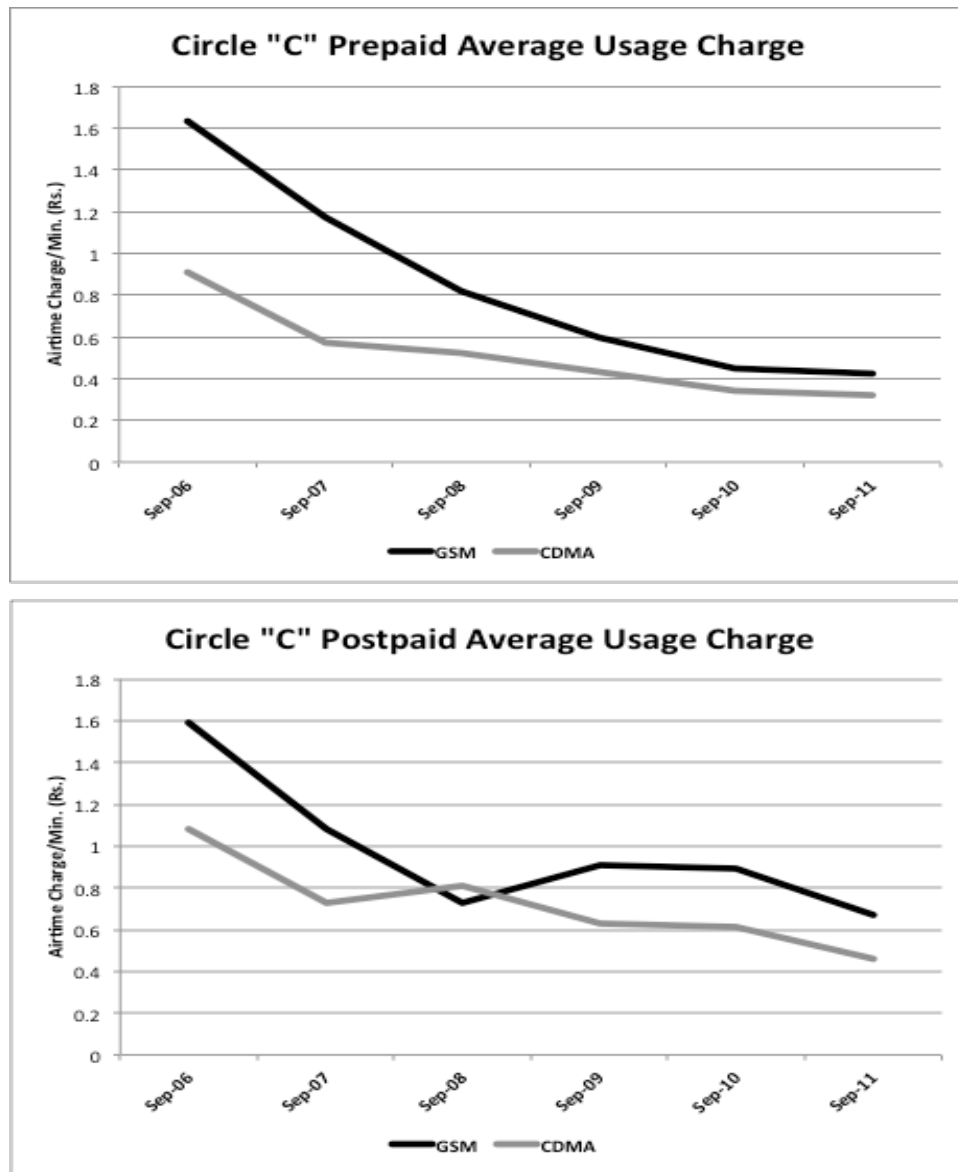


Source: TRAI Performance Indicator Reports

Prepaid customers on both GSM and CDMA networks have seen outgo charges continue to decrease, reaching what would appear to be a minimum outgo charge of around 0.40 Rs./min. GSM prepaid users have seen outgo charges fall over 68.2% from 2006 to 2011, while CDMA prepaid users have seen outgo charges fall over 61.1% over the same time period. Postpaid customers have also seen outgo charges decrease significantly over the time period with GSM postpaid users seeing outgo charges fall over 46.1%, while CDMA users saw outgo charges fall over 43.6%.

Circle B also represents densely populated circles that are still developing. As seen in Exhibit 6, Circle B has seen the fastest growth, with a CAGR of 158.7% from 2006-2011.

Circle C



Source: TRAI Performance Indicator Reports

Prepaid customers on both GSM and CDMA networks have seen outgo charges continue to decrease, reaching what would appear to be a minimum outgo charge of around 0.40 Rs./min. GSM prepaid users have seen outgo charges fall over 74.2% from 2006 to 2011, while CDMA prepaid users have outgo charges fall over 64.8% over the same time period. Postpaid customers have also seen outgo charges decrease significantly over the time period with GSM postpaid users seeing outgo charges fall over 57.4%, while CDMA users saw outgo charges fall over 57.9%.

Circle C also represents less densely populated circles that are largely undeveloped. As seen in Exhibit 6, Circle C has seen the third fastest growth, with a CAGR of 118.0% from 2006-2011.

After reviewing the data from the four different circles it is evident that the initial thought about the faster growing areas receiving a disproportionate benefit from the deregulatory environment is proven wrong. The circle experiencing the greatest cost reduction for prepaid customers during our time frame was Circle C, the least densely populated of all circles, followed by the Metro Circle, the most densely populated of the circles. The fastest growing regions, Circle A and Circle B, were represented the smallest cost reductions for prepaid customers during the period, however, all prepaid customers experienced significant reductions in cost. For postpaid customers, Circle A, B, and C all saw significant reductions in cost, while the Metro Circle saw a very controlled steady decline, with prices remaining over 30% higher than the other circles. The common theme among all customers in all circles is that costs were reduced making mobile phones more accessible to the population. This was the goal set out in NTP 1999

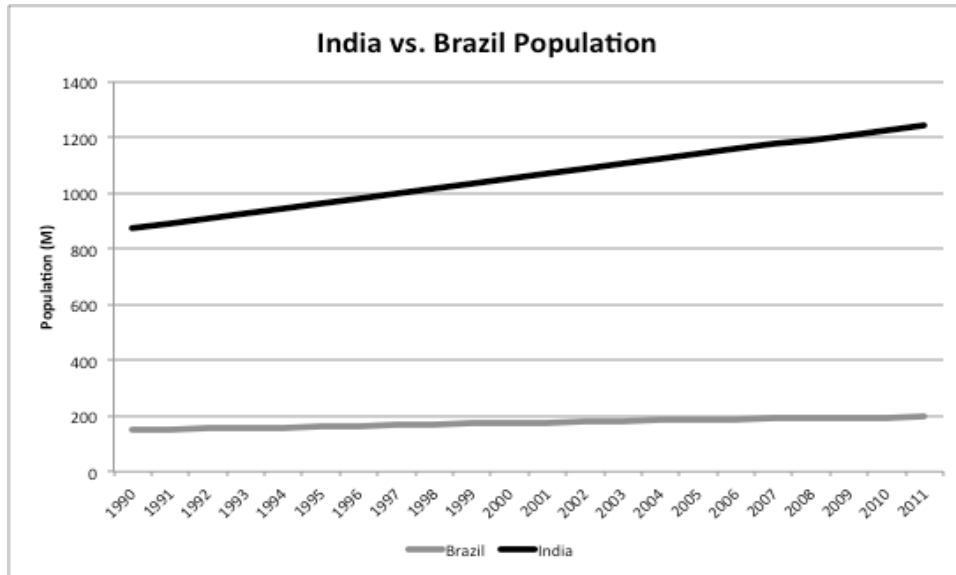
V. Case Study – Brazil

Brazil provides an ideal comparison to India as it precedes India in telecommunication deregulation by approximately 2 years. Using Brazil's progress as a case study for the impact of deregulation on a large, densely populated population, one would be able to extrapolate what will likely occur in India in years to come. India has already faced one additional hurdle in the financial crisis, and while the crisis indeed was felt globally, the data shows that Brazil reached its wireless telecommunications maturation before the implications of the crisis were felt. India was not so lucky.

Recent History of India & Brazil

India and Brazil are two of the most populous and rapidly growing countries in the world. Over the past two decades Brazil has seen its population grow from 149 million (1990) to 195 million (2010), a CAGR of 20.1%. While Brazil's growth during this time period is rapid, it pales in comparison to the growth of India. In 1990, India had a population of 873 million. India's population in 2010 was 1.2 billion, adding nearly 400 million citizens during the past two decades, a CAGR of 34.0%.

Figure 7: India and Brazil Population Growth 1990 - 2010



Source: Gapminder

With this immense population growth, both countries became a target for companies looking to expand. In Exhibit 8, one can see how FDI has played an integral role in further enabling this rapid expansion.

Figure 8: FDI Investment as % of GDP

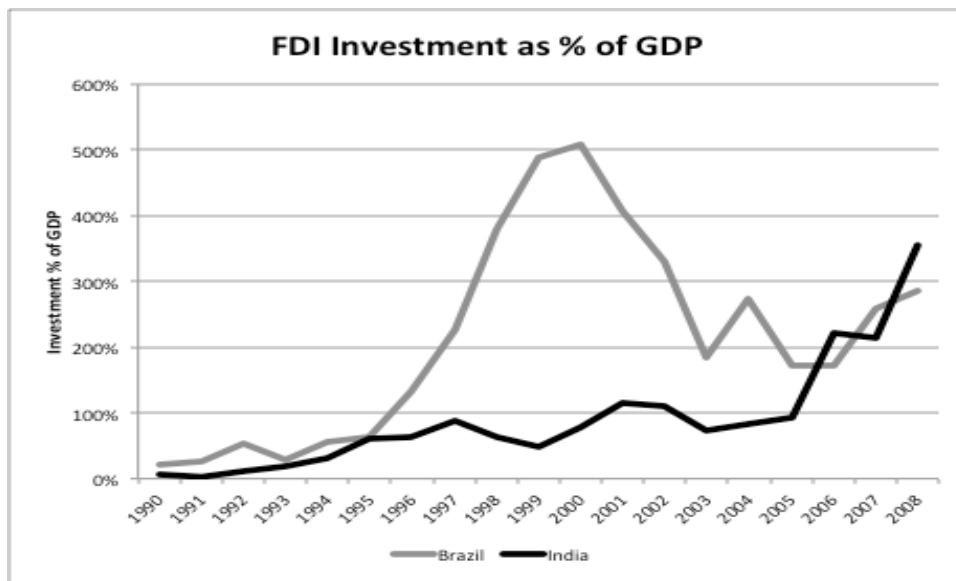
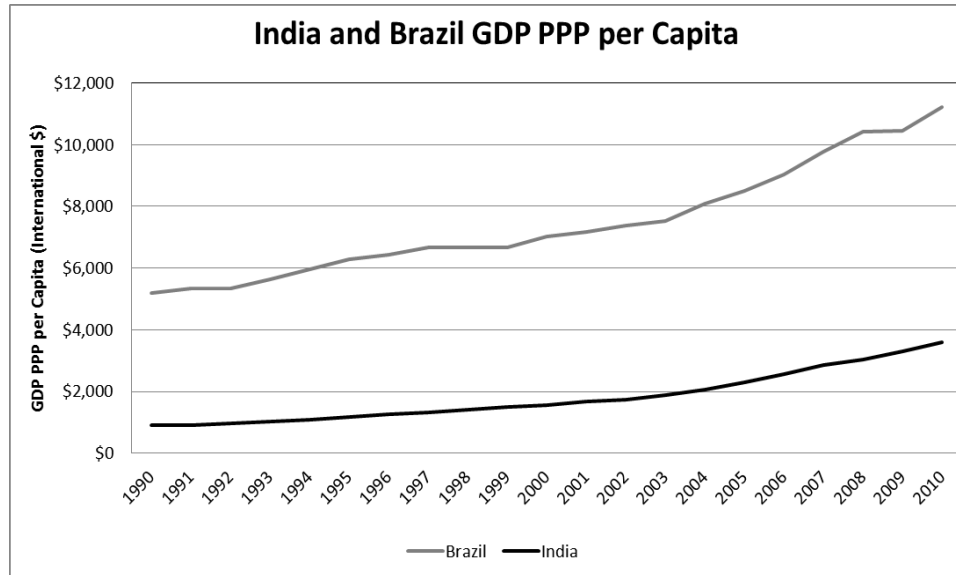


Figure 9: GDP PPP per Capita



Source: Gapminder

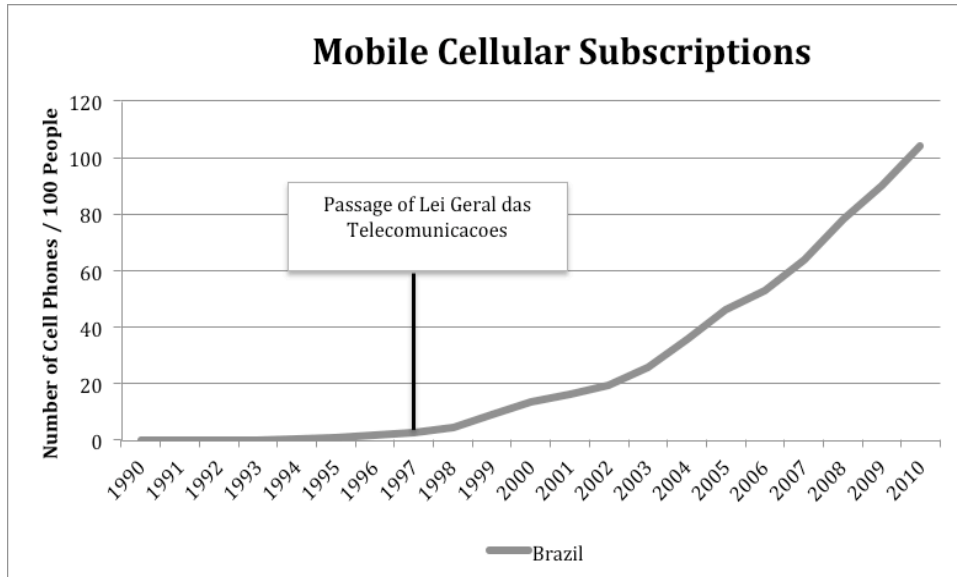
Brazil has seen GDP per capita in international dollars (adjusted for Purchasing Power Parity [PPP]) increase from I\$ 5,181.80 in 1990 to I\$ 11,210.36. This increase represents a CAGR of 54.5%. India has seen similar growth, with GDP per capita increasing from I\$ 898.19 in 1990 to I\$ 3,582.48, a CAGR of 48.4%.

Recent History of Telecommunications in Brazil

Prior to 1997, the Brazilian government ran 28 independent subsidiaries under the holding company known as Telebras. With the passage of General Telecommunications Law, the government established a new regulatory framework and initiated the process of deregulation of the state telecommunications holding company Telebras⁷. Under “Lei Geral das Telecomunicacoes” ~ No. 9472/97, the Agencia Nacional de Telecomunicacoes (Anatel) was created to develop rules for the privatization of the industry. Brazil was divided into 10 areas and the rights to each area were subsequently sold as a means to fund social programs like education and healthcare. Through an examination of subscriptions per 100 inhabitants in Exhibit 9 there is immense growth that occurred following the passage of Lei Geral das Telecomunicacoes. 1998 began the rapid growth era, where Mobile Subscriptions per 100 inhabitants would grow with a CAGR of 42.17%, reaching 104.1 in 2010.

⁷ Historical Evolution of Telecommunications in Brazil

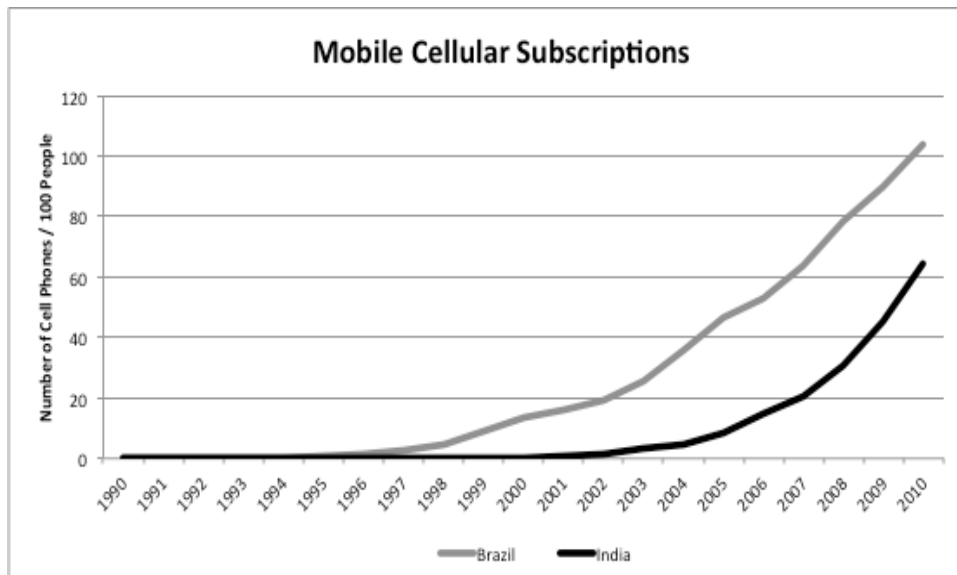
Figure 10: Mobile Subscriptions per 100 inhabitants in Brazil



Source: Gapminder

Brazil reached 20 mobile subscriptions in 2002, 5 years after Lei Geral das Telecomunicacoes. India reached 20 mobile subscriptions in 2007, 8 years after the passage of NTP 99. Brazil has continued at an almost linear pace 2002 to 2010 adding approximately 9 phones per 100 inhabitants. India has seen almost exponential growth from 2002 to 2010. Through Exhibit 9 it is safe to say the Brazilian government was able to properly facilitate the privatization of their telecommunications industry thus increasing mobile accessibility and making customers better off. While India’s market was already private, the government’s stance on increasing population has had similar effects and has made customers better off.

Figure 11: Comparison of Mobile Subscriptions per 100 Inhabitants



VI. Conclusion

After our examinations of networks, customer type, and telecommunication circles, it is evident that the policies implemented by the Indian government were successful in opening the market up for competition and providing lower cost more accessible services to the population as a whole. Over the coming years, the Indian government will be forced to make decisions regarding the opening up of other markets, such as retail, in hopes of achieving similar success. The true challenge will lie in how much FDI to allow. It is evident that an increase in allowable FDI can facilitate a change in an industry and as a result improve the well being of the population. However, this increase comes at a price: protecting domestic companies and security.

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