Chapter VII

Conclusions and Policy Implications

India’s National economic reforms were initiated in July 1991. Telecommunication sector in particular has been an important component under this economic reform. This thesis focused its empirical analysis on the provisioning and pricing of telecom services in India during post reform years (i.e. 1991 to 2004). The key issues for the analysis included (a) an overview of evolution of policies and programmes, and institutions for the provisioning and pricing of telecom services; (b) growth and pattern of provisioning of telecom services, and their variations over time and across telecom circles; (c) estimation of economic contribution of telecom sector to India’s national economic growth; (d) estimation of determinants of usage demand for mobile telephony services, and assessment of impact of price changes on consumers’ welfare; and (e) estimation of cross-subsidisation through differential call charges by distance zones to finance access deficit, arising out of differential pricing of fixed telephone services.

Notwithstanding the limited previous empirical works on economics of India’s telecom services, and constraints of data in public domain, this study has come out with plausible approaches to modeling, measurement of variables, estimation of economic relations, and plausible empirical evidence on the above key issues. The major findings, conclusions, and policy implications from these analyses are summarised below.
Overview of evolution of policy and programme, and Institutions for Provisioning and pricing of Telecommunication Services

Post reform years in India have witnessed noticeable changes in the provisioning and pricing of telecom services. In addition, the establishment of various institutions involved in a) policy making (i.e. DOT), b) regulation (i.e. TRAI), and c) dispute settlement (i.e. TDSAT), of telecom services have affected the provisioning and pricing of telecom services in India.

Telecom policies such as NTP-94 and NTP-99 have provided the broad guidelines for the development of telecom service provisioning. Further, the policy initiatives to enhance the usage of internet services (Internet policy 1998) and to integrate the telecom sector with the broader ICT sector (through unified licencing) and broadband policy needs special mention.

On the other hand, TRAI is involved in the regulation of service quality, fixation of prices for various telecom services. In a way, the development of these multiple institutions, in particular, TRAI have contributed to the transparency and greater availability of database on various aspects of telecom services provisioning and pricing. However, as the policy making and regulatory functions are separated in India, a greater coordination is needed with regard to long term formulation of policies and programmes for development and regulation of telecom sector in general and telecom services in particular.

Growth and Pattern of Provisioning of Telecommunication Services

The nature and extent of the provisioning of telecommunication services are described in terms of the quantitative indicators (such as, teledensity, growth of
DEL etc.) by using the mean and standard deviation. Using qualitative indicators (such as, call completion rate, mean time to repair), telecom circles are ranked by using the rank score technique. Further, the relationship between quantitative and qualitative indicators are examined by using correlation coefficient. In addition, the trend in price changes in voice telephony has been analysed during the post reform years.

During 1991 to 2004, the all India tele-density has grown at an average growth rate of 20.97 per cent per annum. Moreover, the average growth in the tele-density in India in the post mobile period (1997 to 2004) is 23.82 per cent as against 16.4 per cent in the pre mobile period (1991 to 1996). This signifies the role of mobile telephony in accelerating the growth of tele-density.

Growth in tele-density is not uniform in post reform years, giving rise to a digital divide. For instance, the cross-country comparisons of provisioning of tele-density reveals that India’s tele-density and that of metros within India have remained below the tele-density of many developed countries. Digital divide persists between various categories of circles, between various service areas within the same category of circles, and between the rural and urban areas. If one takes into account the value added services, the digital divide is even wider. This is because, areas with higher tele-density is generally served by more sophisticated exchanges resulting in the availability of more diversified supply of value added services. The persistence of the digital divide is indeed a matter of concern for the policy makers. However, availability of diversified telecom services, options of competitive service providers and their price packages is a positive development in the provisioning and pricing of telecom services during the post reform years. In a way, the remarkable growth in the extent of
provisioning of telecom services can also be attributed to a steep fall in the usage price of telecom services during the post reform years.

In addition to quantitative growth, the focus on service quality regulation has improved the telecom service provisioning positively during the post reform years. Yet, this is an area of concern, as many of the cellular service providers are unable to meet the prescribed service quality benchmarks for various service quality indicators. In the case of cellular services, the service quality of circle category with higher income and higher tele-density is not always better than the service quality of the circle with low income and low tele-density. In addition, the rank correlation between the service quality index of the basic service provider, namely BSNL and tele-density is found to be negative (-0.02). These results indicate that the service quality and quantity indicators in the case of telecom service provisioning are not always positive.

**Role of telecommunication in Economic Growth**

The role of communication services in India’s economic growth is analysed using National Income approach and Input-Output approach. The national income approach shows that for the period 1991-92 to 2003-04 the AAG of a) GDP at factor cost from the communication sector (18.57 per cent); b) the share of communication sector in GDP (2.08 per cent); and c) the share of communication sector in GDP from the tertiary sector (4.39 per cent). Thus, the contribution of communication sector to India’s economic growth is positive for the post reform years as a whole. This finding supports for empirical results in Narayana (2005) on the positive, and remarkable contribution of ICT sector in general, and that of India’s national economic growth.
The input-output analysis shows that the contribution of equilibrium level of output from the communication sector to gross value added is 1.2 per cent. Further, an exogenous ten per cent increase in the final demand of communication sector would result in 0.03 per cent increase in the equilibrium level of output through inter-industry linkages. Thus, the magnitude of the impact of communication service sector on economic growth is estimated to be smaller than most other sectors. On the other hand, the total linkage indicator (Schultz index) indicates that the growth in the provisioning of communication services is dependent on economic growth. This implies that economic growth would influence the growth in the communication services including telecom services.

The above results are not strictly comparable with the existing empirical evidence from various country regressions. Nevertheless, it may be noted that studies such as Torero et al (2005) shows that the growth implications are higher for country with tele-density ranging between 5 to 11. The input-output data used in this study pertain to 1993-94 when India’s teledensity was only 0.9. This low level of tele-density could be attributed to the lower level of growth implications for communication sector.

In essence, the empirical evidence of the present study confirms the results of related studies such as Roller and Waverman (2001) that an inadequate provisioning of telecommunication services impedes economic growth. This finding is supported by the fact that the growth of industries such as construction, trade and other transport sectors are the major contributors to gross value of output as well as depend on the growth of communication services.
Price Elasticity of Usage Demand

This study has used two alternative specifications of price and quantity variables that are aggregated at the circle category level for the pre and post paid cellular mobile services. In the first specification (i.e. model 1) minutes of usage per subscriber per month and revenue realized per minute of usage are used as the usage demand and price variable, respectively. In the second specification (i.e. model 2) outgoing minutes of usage and revenue realised per minute of outgoing minutes of usage are used as the usage demand and the corresponding price variable, respectively. Using the standard technique of linear panel data models, namely,( a) Pooled Regression Model, (b) Fixed Effect Model and (c)Random Effect Models, and LM statistics and Hausman statistics (for the choice of model); the usage demand has been estimated for the pre and post paid cellular mobile service subscribers of India. Further, using the estimated slope coefficients of the chosen model, the price elasticities of usage demand are estimated.

It is observed that the price elasticity of usage demand in both the models has registered a sharp decline in March 2004 as compared to March 2003 for the pre and post paid subscribers. This decline is noticeably large for poorer categories of circles. During this period the price elasticity of usage demand has fallen from \(-5.11\)\((-0.78)\) to \(-0.32\)\((-0.20)\) for the pre paid (post paid) subscribers of C category of circles. On the other hand, the price elasticity in model 2 has fallen from \(-16.21\)\((-1.23)\) to \(-0.33\)\((-0.34)\) for pre paid (post paid) subscribers of C category of circles. Though these elasticities are estimated for the cellular services and are not strictly comparable with existing studies in the literature, it is observed that in both the models the price elasticities of usage demand for pre and post paid mobile service subscribers (except in model 2 for pre paid subscribers in metro category of circles) by the end of March 2004, are within the range of \(-0.02\)
to – 0.38 - the range of price elasticities of local usage obtained in various short run and long run models included in the thirteen studies reviewed in Taylor (1994). These elasticities thus obtained are useful indicators not only for the providers but also for the regulator and policy makers for current and future pricing of mobile telephone services at the national level.

**Welfare implications for the Subscribers**

Using the price elasticities obtained in model 1 and model 2 above, the welfare implications for the pre and post-paid cellular mobile subscribers in India are computed by adopting the measurement of change in consumer surplus framework in Das and Srinivasan (1999). These changes in consumer surplus vary between –11.43 (-51.54) to 231.77 (207.64) and –301.81(–58.76) to 782.24 (225.16) in model 1 (model 2) for the pre-paid (post-paid) subscribers, across all category of circles during the study period. For pre-paid cellular mobile subscribers, the maximum change in consumer surplus is observed as a result of change in usage price in model 1 (model 2) in circle category ‘C’ to the extent of Rs 231.77 (Rs. 207.64) for the quarter ending at December 2003. For post-paid subscribers, the maximum change in consumer surplus is observed as a result of change in usage price in model 1 (model 2) in ‘C’ category of circles to the extent of Rs. 782.24 (Rs.225.16) for the quarter ending at March 2004.

The above results indicate that the competition in the provisioning of telecommunication services and the resultant fall in usage price in the last three quarters of the study period have benefited the subscribers of the ‘C’ category circle which is relatively poor in terms of economic criteria such as per capita net state domestic product. This result reinforces the fact that the distributive implications of changes in usage price is positive for India. In fact, despite the
differential level of competitions in the provisioning and pricing of telecom services across various circles, reforms in the telecommunication sector seem to have successfully transferred the benefit of competitions to the subscribers in poorer circles. This is reflected in the higher level of change in consumer surplus; due to change in usage price for the pre and post paid subscribers in ‘C’ category of circles, which is relatively poorer. In this context, India’s experience highlights the success of the government and the regulator in protecting subscribers’ interest under competitive telecom service provisioning in terms of transferring the benefit of reform to the circles with low per capita NSDP.

**Cross Subsidy in Telecommunication**

In order to analyse the issue of cross subsidy, the present study has developed a simple computational framework and estimated the nature and extent of cross subsidy financed through differential call charges at the national level. Further, the framework is extended for the computation of the financing of access deficit at the exchange level. In addition the operational feasibility of the empirical framework developed for the computation of cross subsidy at the exchange level is demonstrated by using a small survey data for the rural and urban exchanges.

The study finds that at the national level, 96 per cent of the total access deficit is financed from various long distance zones. At the urban exchange level, the long distance zone finances 58.95 per cent of the access deficit whereas, it is only 11.5 per cent in the case of rural exchange. In this analysis, the exchange level call revenue information excludes non-residential subscribers. Accordingly, the discrepancy between national and exchange level figure for the extent of cross subsidy financed through long distance call charges could be attributed to the non-inclusion of non-residential subscribers. These findings offer initial evidence of
the residential subscribers being subsidised by the non-residential subscribers in rural and urban areas.

The provisioning of telecom services financed through cross-subsidy has distributive implications for the access and usage demand of telecom services as the fund thus collected from access deficit charge is being used to subsidise rental, local calls and free calls. The findings of the study reveals that threat of cross subsidised financing by differential call charges due to competitions can be overcome through regulatory intervention in the form of introduction of an explicit access deficit charge. In short, the empirical finding from the cross subsidy analysis demonstrates the success of India’s telecom policies in continuing with the traditional source of cross subsidy namely, the long distance calls.

**Policy Implications**

The study contributes to the existing literature in many ways and offers unambiguous evidence for the positive impact of reforms in the provisioning and pricing of telecommunication services in India. From the perspective of government policy, the empirical findings suggest that adequate provisioning of telecom services is essential for fostering economic growth, as telecommunication has become the strong backbone for growth and application of information and communication technology (ICT). The application of ICT is widespread in primary secondary and tertiary sectors in both rural and urban India. In a way, the growth of ICT sector is a major source of demand and growth of telecom services. This is a form of derived demand for the telecom sector. This suggests that the policy and programme for the provisioning and pricing of telecom services need to be integrated with the ICT sector.
The reforms and introduction of competition benefits the poorer circles to a greater extent in comparison with the richer circles, thereby fulfilling the equity objective. This result suggests for the continuation of the reform process on spatial redistributive consideration.

The negative price elasticities indicate that the future fall in price would result in an increase in the usage demand for telecom services. In order to induce larger usage, the future policy reforms regarding the provisioning and pricing of telecom services should facilitate introduction of new efficient technologies that are cost efficient. The regulatory and licensing framework should make the operators free to choose the best and cheapest networks and technology through Unified Licence. In fact, introduction of a unified licence holds the promise of dealing with the converging technology and to promote the wider use of latest technology (for e.g. VoIP) in the future provisioning of telecommunication services. This is essential for the overall economic growth. This highlights the wider and more challenging role of regulator in the future provisioning of telecommunication services with regard to setting new service quality standard for the new services and to develop a monitoring mechanism for the service quality delivery by providers of telecom services.

The empirical framework for the role of telecom sector in economic development, price elasticity of demand, consumer welfare, and alternative ways of financing the access deficit charge presented in this study, are replicable with two purposes: First, to reconfirm the operational feasibility of the frameworks for alternative data sets. Second, to offer alternative evidence (either supporting or confronting) for the relationship tested in the study. Accordingly, the generality of the results in this study can be confirmed. In this regard this study’s results shall serve as useful benchmarks for future policy purposes.