CHAPTER VI

SUMMARY AND CONCLUSION

The organisation of this chapter is as follows: Section 6.1 summarises the theoretical and empirical studies covered in Chapter III. Section 6.2 sums up the major findings of the present study. The last section mentions a few limitations of the present study.

6.1 A Brief Survey of the Literature

The two most important dimensions of the demand for telephone service are access and usage. Most of the theoretical frameworks on telephone demand consider access and usage as joint demand. The other features which distinguish telephone demand from other demands are access and usage externalities and option values.

In Chapter II, the status and performance of the telecommunication sector in India was presented. Demand for telephone is projected by the DOT, to grow at an annual rate of 14.5 percent during the 10 year period from 1994-95 to 2005. During 1994-95, over 82 percent of the demand was met. This was a sharp improvement against the trend seen until 1993-94. The objectives of the National Telecom Policy and the functions of Telecom Regulatory Authority of India (TRAI) have been spelled out.
In Chapter III, a review of important studies on toll and access demand was presented for residential as well as business subscribers. The articles by Artle & Averous (1973), Squire (1973), Rohlf's (1974) and Von Rabenak and Stahl (1974) formed the theoretical base in early 1970's. Public good aspect of the telephone system was demonstrated with clarity by Artle & Averous. Utility was evaluated with and without access in Rohlf's study. Squire's model related the demand for access to the demand for use within a consumer surplus framework. He also provided a deep insight into the nature of access and call externalities and identified the dependence of demand for access on the benefits conferred by the users of the system. Taylor's model (1980) incorporated other features of telephone demand such as option demand, distance, duration and time of day pricing.

In 1980s, the focus has changed from toll demand to access demand. During this period, many studies brought out the socio-demographic effects on usage as well as access demand. Perl's (1978) study found that the price elasticity of demand was quite sensitive to the level of household income and to the age of the head of household. Perl (1983) updated his 1978 study with the data from the 1980 Census. His 1983 study showed that income became less important as the level of income increased. Canadian access demand in the Perl framework was analysed by Bodnar et al., (1988). He showed that the probability of having a telephone varied negatively with price and positively with income, age and education. Taylor and Kridel (1990) model is similar to Perl's but it takes into account differences in the distribution of income across Census tracts at the latter stage of the model.
The demand for local use under flat-rate or measured rate was considered in the studies of Beauvais (1977), Pavarini (1975, 1979) and Waverman (1974). Some studies examined how a shift from flat-rate to measured service affected economic welfare and households' calling pattern. Empirical studies found that the effect of the shift on demand was fairly small and it depended on the demographic characteristics of the households (Pavarini, 1979; Park, Wetzel and Mitchell, 1983; Park et al., 1983).

Garfinkel (1977a, 1977b, 1979a), Pavarini (1976a) and Gale (1971, 1973), examined the distribution of calls according to the time-of-day, day of week, duration and distance dimensions. Both Garfinkel and Pavarini focused on local use, while Gale focused on interstate toll demand. The studies of Garfinkel and Pavarini found that a) Business customers made more local calls per day than residential customers. b) Flat rate business classes had higher calling rates, in some area, than measured rate business customers.

6.2 Main findings of our research

The empirical analysis of this thesis uses the data from a specially designed cross section study of residential and non-residential telephone subscribers, for a bimonthly period from Haddows Road EIOB exchange at Madras. Engel specification is used to estimate income elasticity of demand for households and output elasticity of demand for business units by type of call. Residential and non-residential demand equations are specified in Chapter IV. Sampling procedure and definitions of the variables used are also given in the same chapter. The findings of this study are:
(i) The average bimonthly household incomes of residential subscribers are Rs.18015 in the local and total call demand models, and Rs.19587 in the STD and ISD call demand models.

(ii) The average number of employees working in business units is 21 for local and total call demand models; this number is 31 in STD and ISD call demand models.

(iii) The mean value of the bimonthly sales turnover for non-residential (business) subscribers is Rs.162148 in local and total call demand models and it is Rs.257311 in STD and ISD call models.

For the residential subscribers we find that:

(a) Family size is smaller for the low income group than for the high income group.

(b) Nearly 93 percent of the subscribers in the low income group are charged 1200 pulses or less for local calls while percentage is 62 for the high income group.

(c) The percentages of subscribers who make STD calls account for 47.9 percent and 61.7 percent for the low and the high income groups respectively. In the case of ISD calls the percentages are 12.4 percent and 31.9 percent respectively for the low and the high income groups.
(d) Around 73 percent of the low income group and only 29 percent of the high income group subscribers are charged 1000 pulses or less for total calls (aggregate). It is significant to note that 18.2 percent of the subscribers in the high income group, who are self employed, are charged 4000 pulses or more for the total calls.

The observations for the non-residential subscribers are as follows:

a) In the low sales turnover group, three-fifths of the subscribers do not have STD facility, whereas in the high sales turnover group except one all have STD facility.

b) In the low sales turnover group the percentage of subscribers who have metered 2400 pulses or more, account for 13.7 percent, 10.7 percent and 4.7 percent in terms of local, STD and ISD calls respectively; whereas in the high sales turnover group, the percentages are 46.3, 87.9 and 34.2 for local, STD and ISD calls.

The major findings from the estimation of call demand functions for residential subscribers are:

1) The economic variables logarithm of household income and its square have expected signs, except in the ISD call demand but none of them is statistically significant.
2) Educational and occupational dummies do positively influence the STD call demand. More number of STD calls are made by the subscribers who are in the age group 35-40 years.

3) Subscribers with a family size of four or less make lesser number of total calls.

4) The estimated income elasticities are greater than one for all types of call demands.

In case of non-residential subscribers, the major findings of the regression analysis are:

i) The output variables, logarithm of bimonthly sales turnover and its square, significantly influence all types of call demands with the exception of square of the logarithm of bimonthly sales turnover variable (SLBST) in total call demand model.

ii) Business category dummies and age of phone connection do not influence call demands significantly, with the exception of trade dummy in the total call demand model.

iii) The logarithm of number of employees and its square are included in the demand models as an alternative for the output variables of firms. The size variable logarithm of number of employees has positively and significantly influences local, STD and total call demands.
iv) The output elasticities are more than one in the STD and ISD call demands while the elasticities are less than one in all call types in the alternative specification.

In Chapter V, a non-linear demand model is derived along the lines of Land and Lundgren (1991), to estimate the own price elasticity of STD call demand exploiting the variability in temporal and time of day prices of pulses. The major findings of the STD call demand model for residential subscribers are:

a) Both the income groups made more number of calls in day time than in night time even on working days. This implies that residential subscribers are not sensitive to price and that longer the distance higher would be the number of calls.

b) The estimated coefficients of price variable have negative signs, as expected, but they are not statistically significant from zero for both the income groups. The estimated own price elasticities are 0.01 and 0.02 for the low and the high income groups respectively.

Findings of the STD call demand in the case of non-residential subscribers are:

a) The estimated coefficients of dummies for longer distance zones are positive and statistically significant in the low sales turnover group; where as in the high sales turnover group all distance dummies have
positive signs and are statistically significantly different from zero, except in the case of shorter distance zones.

b) The estimated coefficients of the price variable have the right sign and are statistically significant. The estimated own price elasticities are 0.45 and 0.15 for the low and the high sales turnover groups respectively. For the combined group (aggregate), the own price elasticity is 0.20.

6.3 Limitations

Even though we have reviewed the extensive literature dealing with various aspects of telephone demand, we could not apply most of the models to India mainly due to the non-availability of the data. With the aggregate time series data we could undertake only one study on aggregate demand for telephones incorporating multipart tariff, as reported at the end of Chapter III.

Our analysis of the determinants of the demand for telephone calls, by type of call, for residential and non-residential subscribers reported in Chapter IV and the estimation of own price elasticity by exploiting price variations due to temporal and distance factors in a cross section study reported in Chapter V, are based on a specially designed study for our research. Due to resource and time constraints, we could undertake the study only for one exchange in a metropolitan city.