

IT Spending: Potential and Prospects for Indian States

5.0 Introduction

The objective of this chapter is to estimate potential of IT spending across Indian States. In the case of Indian States there is no data on IT spending. However, some data is available on sales of personal computers for selected states, which have been compiled by the IDC. In view of the fact that any estimate of potential should have a comparator in terms of actuals, it is preferred to proxy IT spending of the states with Personal Computers (PC) sale. In fact PC sales can be considered as the closest proxy for IT spending as it covers a bulk of the hardware associated with the IT sector. Expansion of IT has to be associated with the expansion of the hardware supporting it. Therefore, in the current analysis, PC sales has been used to proxy IT spending of Indian States. Thus, IT spending is measured in terms of PC penetration per thousand of population. In order to estimate the potential PC penetration a global model of PC penetration is estimated first to identify global drivers of IT spending and then the estimated coefficients are applied on Indian States to project potential penetration of IT spending across Indian States.

In the absence of reliable data on computer penetration in different states of India, an alternative approach is adopted, whereby states are considered independent countries and computer penetration is calculated for each of them by simulating an estimated international model of computer penetration. The estimated penetration for India is assumed to be the potential penetration. Further, the simulation is done with corresponding data for states

to obtain potential penetration for 26 states for which data is available. Adjustment is made for the national effect so that the average penetration of states is matched with India's potential penetration. Both adjusted and unadjusted data are presented in this chapter.

The results indicate that actual penetration is lower than the potential for most states and also for the country as a whole. The actual data is available only for a few states, which has been compiled by the IDC.

5.1 Estimated global model and drivers of Computer Penetration

The data used in global model have been obtained from the World Bank data set for the period 2000-01 for 93 countries. The identification of drivers is done through a large number of model-searching regressions with a set of potential variables in the tradition of cross-country analysis. Based on the final model¹ the following drivers have been identified:

- **Per Capita Gross Domestic product (GDP) in PPP Terms (YPPC)**

Income of individuals in a country is one of the most important variables for determining per capita consumption of most goods and IT is no exception. However, considering the size of the data set and price variations of the same product across countries it was appropriate to choose national per capita income at purchasing power parity published by the World Bank. Per capita

¹The estimated model is as follows:

$$\text{LPCPOP} = - 8.383 + 1.131\text{LYPPC} + 0.0261 \text{YSERVK} + 0.0089 \text{UPOP} + 0.0045 \text{TRADEK}$$

(-20.4) (15.96) (4.97) (2.85) (4.44)

R-Squared 0.94; R-Bar-Squared 0.93; S.E. of Regression 0.45; F-stat. F (4, 88) 321.5 [0.00]; DW-statistic 1.66; Serial correlation LM (1) = 2.74 [0.10]; Heteroscedasticity CHSQ(1)= 2.19[0.14]

LPCPOP = log of personal computers per 1000 population. LYPPC = log of per capita GDP at purchasing price parity. YSERVK = services value added as percentage of GDP. TRADEK = trade as percentage of GDP. UPOP= urban population as percentage of total population.

income at purchasing price parity (PPC) is taken in log and therefore, the estimated coefficient of LYPPC is the income elasticity of PC penetration. This is estimated as 1.13 in this case. In other words, each per cent difference in per capita GDP (PPP basis) across two countries could result in a 1.13 per cent difference in PC penetration.

- **Services value added as percentage of GDP (YSERVK)**

Higher level of industrialisation generally leads to higher share of services sector, which together are expected to prompt increased demand in the IT sector for various operational and efficiency reasons. More industrialised nations consume more IT products both as new product as well as replacements. The semi-elasticity of PC penetration with respect to services sector share is 0.026.

- **Trade as percentage of GDP (TRADEK)**

Higher trade to GDP ratio is an indicator of higher level of international integration, which in turn means more spill over effects of technology and modernisation. Countries with higher trade intensity also use high technology products in their export basket and are thus expected to use more IT products for technology up-gradation, efficiency gains, product development and access to information. Thus, the trade variable is expected to have a positive relationship with PC penetration in the country and the analysis shows a semi-elasticity of 0.0045.

- **Urban population as percentage of total population (UPOP)**

In most developing countries, IT is still confined to the urbanised population and rural masses are yet to reap its benefits, although the same may not be true in the case of developed countries. However, a higher level of urbanisation itself is an indicator of progressiveness of the society. More urbanised countries are expected to demand more IT products for various reasons of business, communication, learning and product development. Therefore, UPOP (urban

population as a percentage of total population) is included in the final model and semi-elasticity of PC penetration is 0.0089.

5.2 Potential PC penetration

Knowing the expected values of the explanatory variables, PC penetration can be calculated for any country in the sample. The average PC penetration of India, according to the World Bank data for the years 2000 and 2001 was 5.2. However, using the estimated coefficients for the above variables, the fitted value for India works to be 9.33. The latter could be considered as the potential penetration for India considering the average values of significant variables in India vis-à-vis the sample countries. As against this the actual PC penetration of comparable countries such as China and South Korea are much higher at 17 and 251, while their potential PC penetration works out to be 10.8 and 149 respectively.

Further, assuming that the coefficients would remain stable in the short run, the potential PC penetration in India for the year 2003-04 can be calculated by escalating the values of the variables for three years taking actual average growth rate between 2000-01 and 2002-03.² Accepting such assumption, the potential penetration rate for India as a whole is calculated as 11.1 PC per thousand population which corresponds closely with the IDC value of actual penetration of 9.5 for the year 2003.

In the case of states, exactly similar procedure cannot be adopted because state level data is available with longer delays. In such a situation, medium term average growth rates for income and latest possible values of the ratios are used to arrive at probable values of the variable during 2003-04. Data for trade variable is not available in the case of states, and therefore, country level data is used for all states. Since coefficient of this variable is small, the results and in particular, inter state comparisons will not be affected much. The base year income of the states is converted into PPP basis using the ratio of the national level data. The PC penetration of the states is used to recalculate the national level average potential penetration, which works out to be 10.5, much closer to the above value of 11.1.

² Since the per capita GDP for the base year is taken in PPP terms, the growth rate in real GDP is used to escalate the income variable. Other variables are ratio and therefore, expected normal change is applied.

However, a lower average from the state level data indicates that the ultimate potential of the states could be higher if resources are utilised in a more synergetic way. Thus, an adjusted potential for the states is also calculated by escalating the previous values by the ratio 11.1 to 10.5. The values of PC penetration for 26 states of India are plotted in Figures 5.1 and 5.2. Figure 5.2 presents the adjusted potential, which is higher than the normal values

(given in Figure 5.1) for all states. Figures 5.1 and 5.2 also plot the income differential among the states with respect to the national level average for the year 2000-01 (obtained from Economic Survey 2002-03), which demonstrates the high correlation between PC penetration and the income level. For selected states (for which data is available), the potential and the actual PC penetrations are also plotted in Figure 5.3.

Figure 5.1: Estimated Potential of PC Penetration for 26 States in India

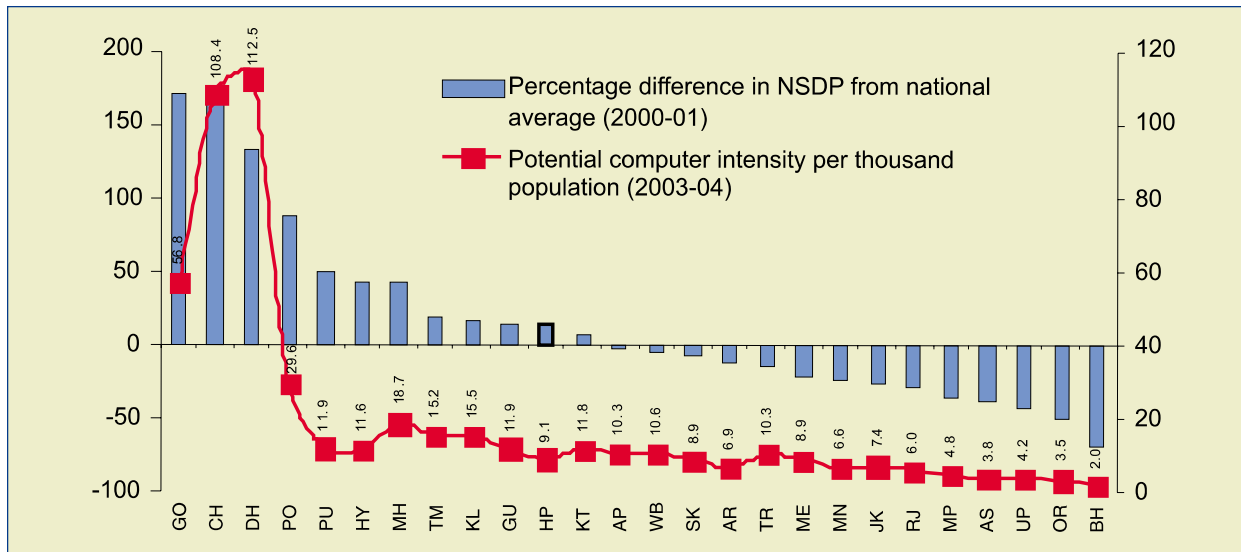


Figure 5.2: Estimated Potential of PC Penetration for 26 States in India after Adjustment for National Affect

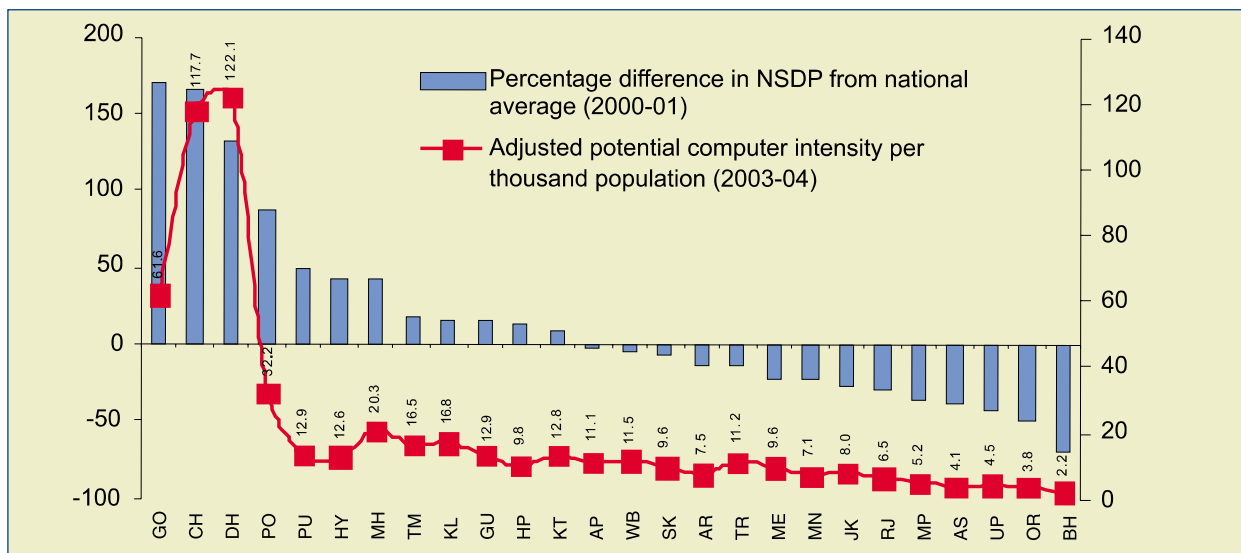
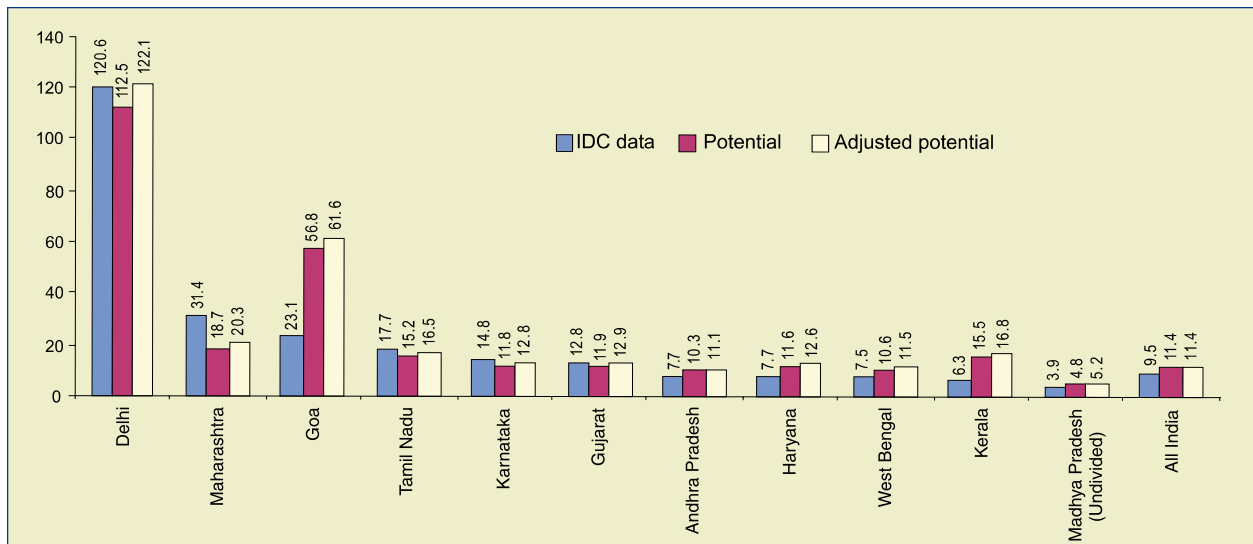


Figure 5.3: Actual and Potential PC Penetration for Selected States (for which actual data is available)



The highest potential in PC penetration is demonstrated by regions of Delhi and Chandigarh followed by Goa. Delhi and Chandigarh have all the favourable parameters (income, urbanisation and services share), Goa has high scores in only income and services share. Other states with higher ranking are Punjab and Maharashtra, where important attribute is income, while other parameters are weaker. The potential penetration in states such as Bihar, Orissa and Uttar Pradesh are very poor as these states suffer on account of all the driving parameters of PC penetration. Many of the North-Eastern states have higher potential of PC penetration than these large economies.

Importantly, highly populated states such as Uttar Pradesh, Madhya Pradesh, Bihar and Orissa have extremely lower potential, driving down the overall score of India as a whole.

5.3 Analysis, Implications and Conclusion

A comparison of actual penetration with the potential penetration (Figure 5.3) is important as it reveals the outcome of possible extra efforts taken by some states in promoting information technology. While the actual penetration of Delhi, Maharashtra, Gujarat, Karnataka and Tamil Nadu are above their potential, states such as Goa, Kerala, West Bengal, Madhya

Pradesh, Haryana and Andhra Pradesh are much behind their potential.

In fact the so called booming software industry of India is concentrated in few cities such as Bangalore (Karnataka), Delhi, Mumbai and Pune (both Maharashtra), Chennai (Tamil Nadu) and Hyderabad (Andhra Pradesh), which is a clear reflection of the initiative taken in these states in promoting IT sectors and hence the application of computers. The exception is Andhra Pradesh (AP), where actual is less than the potential despite promotional policies of the AP government. Some initiatives are also taken in Kolkata (West Bengal) and NOIDA (Uttar Pradesh) in developing IT industry but these states are too big compared to the efforts made in popularising the application of computers to general masses. It appears that the utility of computers in these states is yet to be understood in the right perspective. In addition, PC sales is also linked to export potential and developments in the world economy (refer chapter 6). Progressive states are trying to harness such opportunities.

The vital initiative to utilise developmental potential of computer application has to come from the government through e-governance. While such efforts generate employment, reduce costs in terms of time saved and increased efficiency, more importantly, IT could be the Bramhastra in reducing corruption if

applied with a fail-safe mechanism. Further, government initiatives in this direction would also prompt private sector to network and increase total IT application manifold.

It is worth noticing that India spent US\$ 13 per capita (2.8 per cent of GDP) as information and communications technology expenditure during 2002, countries like China and South Korea spent US\$ 58 per capita (5.8 per cent of GDP) and US\$ 645 (6.5 per cent of GDP) respectively during the same period. This expenditure as a percentage of GDP in the case of Australia, Japan, United States and United

Kingdom was 6.4, 5.3, 6.5 and 6.1 respectively. Why would such progressive and cost and growth conscious countries spend lavishly on IT if there were no tangible and intangible returns?

It is ironical that some Indian states do not foresee the developmental potential of PC power, while talents from the same states find viable opportunities in advanced nations. A positive attitude towards IT is a clear sign of progressiveness. Its intangible benefits far exceed the tangible benefits and that is what states should try to appreciate, particularly those having PC penetration less than the potential.





Drivers of IT Spending in Indian Market: An Aggregated Time Series Analysis



CHAPTER 5

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