# Factors Affecting Choice of Cable Services in Small Towns of India

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# Factors Affecting Choice of Cable Services in Small Towns of India – Is it Affordability or something deeper?

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**Abstract**

Cable Services (CS) has characteristics of excludable public goods, which means they have externalities, but with a degree of excludability to those who are not willing to pay its price. The paper analyses choices for CS using household data from small towns of India. The analysis is structured to go beyond affordability issues. The findings from the analysis suggest that the reach of CS is considerably dampened by the demographics in these regions. This calls for policy interventions to address market failures.

**Key words**: Cable Services, DTH, Women Empowerment, Gender Bias, Educational Impacts, Multinomial Probit

**JEL Classification:** D12, D31, D71, H42, I29, J16

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## Introduction

The purpose of this paper is to analyse factors affecting choice for cable television services (CS)[1]. The analysis is based on a recent NCAER-CS household survey in five small towns of Odisha, Chhattisgarh and Bihar. At the preliminary level this survey data reflects that CS is availed of across households in all quintiles. In a different vein, it suggests that many affluent households that could easily afford CS are non-cable households. In contrast, many poor households have subscribed to CS. In our view this issue needs to be further explored. Our core hypothesis being is it affordability or something deeper embedded in demographic profile which governs the household choice for CS?

We believe that insights from NCAER-CS dataset could provide inputs for policymakers and in turn hasten the process of CS outreach, in particular, and television, in general, especially in semi-urban and rural areas. The research literature indicates that CS has ramifications for women empowerment, gender bias, educational attainment and asymmetry mitigations. In this connection, the recent policy directive from the Government of India (GOI) to digitalise CS in a phased manner throughout the country in the next couple of years, which is based on pricing according to the choice pattern of the household along with ensuring better quality services through set top boxes[2], is appropriate and timely. Most of the affordability issues would be addressed by this policy directive, as channel tariff rates is expected to drop significantly in this fiercely competitive market along with an increase in the number of channels with the digitalisation of CS. Further, mitigation of affordability barriers is being attempted through exemption of Cathode Ray Tubes (CRT) and LCD/LED TVs below 19 inches from basic custom duty, this would help weaker sections who cannot afford to buy more expensive flat panel TVs (Budget Speech 2014-15).

We have organised the paper in the following way. The first section gives an overview of the development of CS. The second section reviews the extant literature. The third section describes the sample methodology and highlights some of the descriptive statistics of the sample data. The fourth section presents the model findings and the last section offers concluding remarks.

## 1. Overview

## Origin of CS

In contrast to the general perception of cable being a urban phenomenon, cable television was originally developed in the United States of America (USA) to aid the transmission of over-the-air television to serve those who could not receive local broadcast signals, i.e., rural areas or areas with terrain obstacles.

Cable television, formally known as Community Antenna Television or CATV, was launched in the mountains of Pennsylvania in the late 1940s. At the time, there were only a few television stations, located mostly in larger cities. People who did not live in a city or in a location where signals could be received easily were unable to watch television.

[1] Cable Television Services are generally run by cable operators, who provide varieties of entertainment channels to their subscribers.

[2] Conditional Access System (CAS) is often mistaken as a component of digitalisation. CAS is encryption and decryption of programme material to ensure that only the authorised subscriber receives the programme. In contrast, digital transmission squeezes more channels into the space previously occupied by a single analog channel through video compression. Both technologies require a set top box so that they can be viewed on conventional television sets (TRAI, 2005).

## Development of CS in India

Cable television came to India in 1983 when Doordarshan started its services through cable in rural areas of Rajasthan. At the commercial level, in 1989 a few entrepreneurs set up small cable TV networks with local video channels that showed movies and music videos after obtaining the rights from film and music distributors.

Spurred by major international events, the first major break in cable TV came in 1991 when coverage of the Gulf War was telecast live in India by international news channels. After 1992, the proliferation of cable television was further fuelled with the broadcast of localised programming by various television channels.

In the initial years, all the channels were Free-to Air (FTA). In 1994, some foreign broadcasters began encrypting their channels even though they were FTA, making it imperative for a cable operator to obtain permission from the broadcaster to get access to the FTA channel and relay it to his customers using an Integrated Receiver Decoder (IRD). The first pay channel was introduced in India in 1995.

The major difference between the growth of pay TV in India and abroad is that broadcasters abroad encrypted their channels as early as 1994 even when they were FTA, and thus they had no difficulty in switching to the pay TV regime when market conditions enabled them to do so.

Television is now an integral part of day-to-day life. It is affordable and a cheap source of entertainment and knowledge. Recent developments in technology have made it possible to avail of alternative sources of connectivity and the large number of channels allows the customer to make choices based on picture quality and tastes.

There were around 150 million television (TV) homes in India (TRAI, 2011) and the number of Local Cable Operators (LCOs) in India is estimated to be 60,000[3]. They service a total of 71 million cable households, at an average of 1,100-1,200 cable subscribers per operator (TRAI 2008). The cable industry has grown in an unregulated framework; there is no provision for licensing of the cable distribution business. The Cable Television Network Regulation Act, 1995 under Clause 3 has a provision for compulsory registration. The registration process for an LCO is simple with a nominal annual fee of INR 500 to be deposited in the local head post-office. Needless to say, this has brought a large number of informal players into market, creating difficulties in assessing themarket size in terms of revenue collection and number of households being served. The difficulties are compounded by the prevalence of price discrimination and under-reporting of number of subscribers.

With the growing importance of TV, the linkages between broadcasters, Multi-System Operators (MSOs), LCOs and end-consumers becomes extremely important, as this network serves as the basis for the distribution and revenue-sharing mechanism.

In general, the cable services value chain comprises four main supply-side entities and the end-consumer (Figure 1.1). The broadcaster owns the content to be televised and received by the viewer. The broadcaster's role in the supply chain includes transmitting or "up-linking" the content signals/beams to the satellite (from where they are "down-linked" by the distributor). In 1995 India had only 20 pay channels. At present, more than 800 channels are registered with the Ministry of

[3] Of which, the number of registered (LCOs) was 48,090 on July 12, 2012. State-wise distribution is presented in Table A-1 (TRAI website).

Information and Broadcasting of which around 160 are pay channels. These channels provide a mix of content across genres and languages. The broadcasting business in India is primarily driven by two sources of revenue: advertising and subscription. There are two main types of broadcasting business models:

(1) Free-to-Air (FTA) broadcasters rely on advertising revenue as their primary source of revenue, and thus are dependent on the distribution supply chain to reach their target audience.

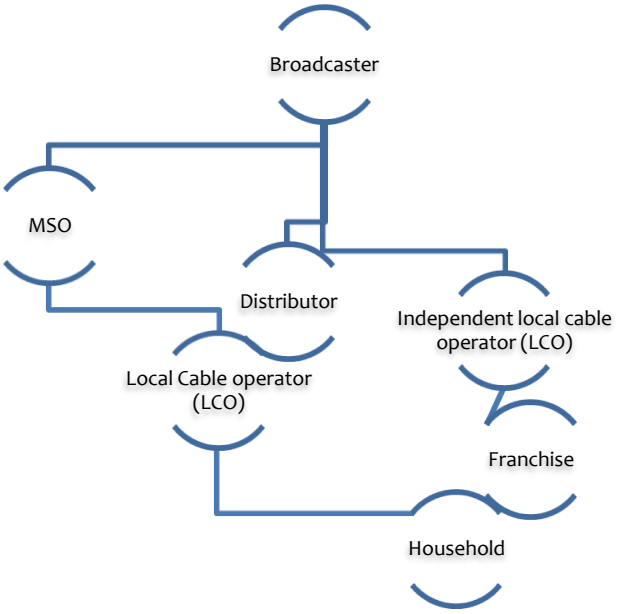
(2) Pay TV broadcasters have a dual source of income. The channels obtain advertising revenue and also collect subscriptions through their distribution.

Currently, the distribution chain in the cable TV industry consists of two independent paths: (i) Broadcasters to Multi-System Operators (MSOs) to their franchisees/distributors through local cable TV operators (LCOs) and (ii) Broadcasters and Independent local cable TV operators. The distribution chain is depicted in Figure 1.1.

The role of the distributor in the value chain is to provide bundling and negotiation services for subscription revenue on behalf of the broadcasters. However, not all broadcasters distribute through distributors. There are 24 distributors/agents of broadcasters that distribute the 129 pay channels available in the country. Of these, the main aggregators are Zee Turner (33 channels), Star DEN (19 channels), MSM Discovery (18 channels) and Sun Group's Channel Plus (15 channels). The aggregators charge the broadcaster a commission for distributing these channels across different platforms. The role of the Multi-System Operator (MSO) is to downlink the broadcasters' signals, decrypt any encrypted channels and provide the LCO with a bundled feed consisting of multiple channels. It is estimated that around 6,000 MSOs operate in the Indian market. The majority of these are small local (city-based) or regional (state-based) MSOs, with a subscriber base of a few thousand. However, MSOs such as Asia net, DEN Networks, Digi cable, Hathway Datacom, IndusInd Media and Communication, KAL Cables (Sumangali), Ortel and Wire and Wireless India Ltd (WWIL) have large networks and outreach in the country.

MSOs are observed to be gaining depth not just in their traditional markets, but are also looking at lateral growth by entering new regions. One way in which MSOs have tried to expand to new regions is by buying out LCOs. Since the number of channels in the market outnumbers the channel-carrying capacity, which is limited by the bandwidth, MSOs charge carriage and placement fees for channels to be carried on their networks.

**Figure 1.1: Plausible Distribution Network of Cable TV**




The role of the local Cable Operator (LCO) in the supply chain is to receive a feed (bundled signals) from the MSO/ distributors and retransmit this to subscribers in his/ her area through cables. The business model is largely based on providing services to specific areas/ localities within a city. There is significant variation in the size of different LCO networks, ranging from less than 100 to over 10,000 subscribers (TRAI, 2008).

Most cable TV networks in India deliver only analogue TV channels to subscribers. Over time, the channel-providing capacity has been enhanced by extending the bandwidth of the cable TV distribution system. From a bandwidth of 225 MHz in the earliest days of cable TV, the networks progressively enhanced capacity to 300 MHz, 450 MHz, 550 MHz, 750 MHz and ultimately 860 MHz, which is the largest available CATV bandwidth worldwide. A few international manufacturers have started offering CATV distribution equipment operating at 1000 MHz. The recent extension from 860 MHz to 1000 MHz will provide only 18 additional channels (TRAI 2011).

**Table 1.1: Maximum number of channels by bandwidth**

| Bandwidth | Maximum Number of Channels |
|---|---|
| 300 MHz | 36 |
| 450 MHz | 54 |
| 550 MHz | 67 |
| 750 MHz | 92 |
| 860 MHz | 106 |

*Source*: TRAI (2005).

## Recent Developments: Digitalisation of CS

The sophisticated head-ends available with MSOs are capable of delivering 60 to 90 channels without reverse path[4]. These channels are delivered in an analogue mode. The existing capacity of cable systems is far less than the demand. As more channels are being launched, there is a need to upgrade the system through digitalisation. With digitalisation techniques, video compression is possible to provide up to 12 digital TV channels in the bandwidth space occupied by one analogue channel. Digitalisation requires considerable investment by the stakeholders, which translates into additional costs for households[5]. This requires that the transition from an analogue network be gradual and spread over many years. Cross-country comparisons of timelines adopted for the conversion also suggest a gradual conversion by major countries[6] (Table 1.2).

**Table 1.2: Cross-country summary table for digitalisation**

| Market | Legislation | Launch | Conversion |
|---|---|---|---|
| Brazil | 2002 | 2006 | Not determined |
| China | 2000 | 2003 | 2015 |
| Hong Kong | 2000, 2004 | 2001 | 2012 |
| Germany | 2002 | 2010 | 2010 |
| Japan | 1998 | 2011 | 2011 |
| Korea | 2000 | 2010 | 2010 |
| Taiwan | 1998 | 2002 | 2008 |
| U.K. | 1999 | 1998 | 2006 – 2012 |
| U.S. | 1996 | 1998 | 2009 |
| India | 2011 | 2011 | 2014 |

*Source*: TRAI (2005).

Although the DTH and IPTV segment has been registering rapid growth for the past few years, a large part of the cable and satellite TV remains analogue. This has resulted in under-utilisation of the sector, besides creating stress among key stakeholders and revenue loss to the government. After considering these issues, in August 2010 TRAI recommended to the GOI a complete Digital Addressable System (DAS)[7] by December 2013 to be carried out in a phased manner. Digital transmission offers several advantages over analogue broadcasting. These include better reception quality, increased channel-carrying capacity, new features, such as programme guides, multi-view and interactive services, as well as the potential to provide Triple Play, i.e., voice, video and data. GOI accepted the TRAI

[4]The cable distribution plant can be uni-directional or bi-directional. A uni-directional system carries signals only from the head-end to the consumer. This path is also often referred to as the 'down-stream path'. Most types of cable TV delivery require only a downstream path. The bi-directional system carries signals both ways, that is, from the head-end to the consumer and back from the consumer to the head-end. The consumer to head-end path is often called the 'reverse path' or the 'upstream path'. The reverse path is essential for interactive TV services, VOIP, Internet, etc.

[5]Digitalisation can also lead to an increase in ARPU, especially when bundled with other broadband services such as Internet access and telephony.

[6]Until 2005, Berlin was the only city in the world that was 100 per cent digital.

[7] 'Addressable system' means an electronic device (which includes hardware and its associated software) or more than one electronic device put in an integrated system through which signals of the cable television network can be sent in encrypted form, which can be decoded by the device or devices that have an activated Conditional Access System at the premises of the subscriber within the limits of authorisation made through the Conditional Access System and the subscriber management system, on the explicit choice and request of such subscriber, by the cable operator to the subscriber (Gazette of India, 2011).

recommendations and issued an ordinance in October 2011 and notification in November 2011 for complete digitalisation with addressability in a phased manner to be completed by December 2014. Parliament has also passed the Bill to amend the Cable TV Act paving the way for the same.

**I.Literature review on Cable Services**

The extent literature mentions of few papers on CS its nature, penetration and positive externalities generated therein. This section briefly reviews these studies.

The extent literature describes CS to have to have characteristics of "excludable public goods"-goods that exhibit the public goods property of Samuelsonian Jointness (Samuelson, 1954) so that all consumers simultaneously may consume the total production, but for which price exclusion is possible, just as for conventional private goods.

Using panel data (Ronald L. Goettler and Ron Shachar,2001), estimate a discrete-choice model with latent-product attributes and unobserved heterogeneous consumer preferences. Their application of the methodology to the network television industry yields estimates that are consistent with experts' views. They compute Nash equilibria of a product location game and find that firms' observed strategies (such as the degree of product differentiation) are generally optimal. Discrepancies between actual and optimal strategies reflect the networks' adherence to "rules of thumb" and, possibly, bounded rationality behavior.

A paper by (Austan Goolsbee and Amil Petrin, 2004) examines direct broadcast satellites (DBS) as a competitor to cable. They first estimate a structural consumer level demand system for satellite, basic cable, premium cable and local antenna using micro data on almost 30,000 households in 317 markets, including extensive controls for unobserved product quality and allowing the distribution of unobserved tastes to follow a fully flexible multivariate normal distribution. The estimated elasticity of expanded basic is about -1.5, with the demand for premium cable and DBS more elastic. The results identify strong correlations in the taste for different products not captured in conventional logit models. Estimates of the supply response of cable suggest that without DBS entry cable prices would be about 15 percent higher and cable quality would fall.

Another influential paper by (Robert Jensen and Emily Oster, 2009) on CS covers wide gamut of issues. The paper on rural India highlighted the fact that Cable and satellite television have grown rapidly throughout the developing world. The availability of cable and satellite television exposes viewers to new information about the outside world, which may affect individual attitudes and behaviors. This paper explores the effect of the introduction of cable television on gender attitudes in rural India. Using a three-year individual-level panel dataset, they found that the introduction of cable television is associated with improvements in women's status. We find significant increases in reported autonomy, decreases in the reported acceptability of beating and decreases in reported son preference. We also find increases in female school enrollment and decreases in fertility (primarily via increased birth spacing). The effects are large, equivalent in some cases to about five years of education in the cross section, and move gender attitudes of individuals in rural areas much closer to those in urban areas. They argue that the results are not driven by pre-existing differential trends. These results have important policy implications, as India and other countries attempt to decrease bias against women.

## III. Data description

The empirical analysis is based out on an NCAER –CS dataset collected from 66,186 households in five small towns in Odisha (Balangir and Kendujhar), Chhattisgarh (Raigarh) and Bihar (Bhagalpur and Motihari). Sample households were randomly selected from these towns except for Kendujhar in Odisha where we undertook a census of the entire town.

Results of sample surveys are less accurate than the results obtained from studies of the entire population due to inevitable errors in the sampling process, the size of the sample and multidimensional heterogeneity, which are difficult to control. The size of the sample is constrained by the resources as well as the willingness of respondents to share information. Random selection of samples produces minimum error. Therefore, attempts were made to randomise the sample selection process to reduce systematic biases. At the same time, in a geographically dispersed area it may be pragmatic to select samples from all the areas to give a minimum representation. Accordingly, in this study the process of sampling was left open to field conditions and time constraints, while keeping the emphasis on randomisation and a sample size of as much as 25-30 per cent of the household population. A detailed discussion on sampling is given in the section for each of the five towns. The broad guidelines are given below:

Three stage procedures were adopted for geographical coverage of this survey. To get proper representation of TV and non-TV household population approximately one-third of the total number of households in the sponsored city with a minimum of one-third household in each ward of the city was selected. The three stages are: Stage 1: Ward (number of wards in the city); Stage 2: mohalla of the ward; Stage 3: each lane/gali of the mohalla.

The survey considered only urban habitants within the municipal limits of the city. First, the total number of households for the year 2010 in each city was estimated. This is done by taking the growth of households between 2001 and 1991 and assuming the same growth for the period 2001 to 2010; the ward-wise population for 2001 is available with municipal authority of the city. After the number of households in 2010 was calculated, it was proportionately allocated to each ward of the city.

The next step was to single out each lane in the Mohalla. This was done by giving an identification mark and recording the owner of the first two or three households in the lane and the last household of the lane. Generally, this exercise is readily available with the health department of the city, as it adopts this method for the polio drops programme.

The interviewer was instructed to start canvassing the questionnaire from the first household in each lane and then to canvass every third household in that lane so that approximately 30 per cent of the total households in each lane is covered and, in turn, 30 per cent of the households in each ward is covered.

Each mohalla was divided into five segments comprising lanes. This was done to facilitate canvassing by the five teams, which generally consisted of two members in each team for each mohalla. Depending on the size of the sample for a city, generally five mohallas were covered simultaneously.
The NCAER-CS survey in these sample towns was carried out from May 6, 2010 to August 10, 2010 and the reference period was April 2009 to March 2010.

**Table 3.1: Urbanisation, housing conditions and TV ownership in sample towns**

| Place | Urbanization (%) | Permanent Houses (%) | TV Ownership (%) | MPCE consumption on Food (%) |
|---|---|---|---|---|
| India | 28 | 79 | 64 | 42.6 |
| | | | | |
| A) Odisha | 14 | 64 | 55 | 45.4 |
| i) Balangir District | 9 | 62 | 48 | |
| a)Balangir Town | | 68 | 52 | 56.8 |
| ii)Kendujhar District | 13 | 20 | 10 | |
| a) Kendujhar City | | 63 | 55 | 49.0 |
| | | | | |
| B) Chhattisgarh | 19 | 61 | 53 | 42.2 |
| i) Raigarh District | 31 | 20 | 29 | |
| a)Raigarh Town | | 42 | 54 | 60.0 |
| | | | | |
| A) Bihar | 11 | 74 | 42 | 50.5 |
| i) Bhagalpur District | 17 | 74 | 41 | |
| a)Bhagalpur Town | | 79 | 47 | 51.8 |
| ii) Motihari District | 6 | 67 | 34 | |
| a) Motihari City | | 77 | 50 | 62.0 |

*Source*: 1.Census of India 2001. 2. NCAER CS Survey; 3.Key Indicators of Household Consumer Expenditure in India, 68 R, June 2013

The status of the sample towns on the criteria of urbanisation, housing condition and TV ownership is considerably lower than the national or even the state average[8]. As far as MPCE consumption of food is concerned, in all the sample towns it is above the national and state average, which reflects that these regions are relatively poor regions of India, where more than half of MPCE is spent on food.

In order to decipher the above, a time-bound and focused survey was conducted at household level spanning five towns. The questionnaire contains more than 100 questions that cover issues affecting the cable TV business. The variables chosen for the survey were household information, demographic, education, occupation, religion & social grouping, asset ownership, infrastructure facilities, income, expenditure pattern, preference for entertainment, most viewed program, time duration, mode and type of connections and payment made to the dealers for viewing programmes, service condition, grievances redressal mechanism, etc.

The average monthly charges for CS range from INR 140 in Bhagalpur to INR 196 in Kendujhar, whereas for DTH it ranges from INR 189 in Bhagalpur to INR 213 in Raigarh. The mode values for installation of CS range from INR 300 in Bhagalpur and Raigarh to INR 500 in Balangir, Kendujhar and Motihari. The charges for DTH are more than double, as it requires buying a setup box along with a dish antenna, which costs between INR 1,000 and INR 2,000 depending on the brand of the

[8]Except for Bhagalpur town, which represents the national average vis-à-vis the criterion of pucca houses.

equipment. The number of channels telecast along with the number of franchises of CS in the sample towns is given in Table 3.2.

**Table 3.2: Summary statistics of CS in sample towns**

| Town | Sample | Average Monthly Charges | | Installation Charges (INR) | | Channel_ CS | Franchise _CS |
|---|---|---|---|---|---|---|---|
| | No. | Cable (INR) | DTH (INR) | Cable (INR) | DTH (INR) | No. | No. |
| Balangir | 5,750 | 169 | 201 | 500 | 1000 | 64 | 22 |
| Bhagalpur | 17,437 | 140 | 189 | 300 | 1750 | 97 | 64 |
| Kendujhar | 12,284 | 196 | 203 | 500 | 2000 | 108 | 1 |
| Motihari | 20,684 | 154 | 196 | 500 | 2000 | 85 | 18 |
| Raigarh | 10,031 | 185 | 213 | 300 | 1500 | | 22 |

*Source*: NCAER-CS survey.

To get a better understanding of the correlation strength between CS and other consumer durables, correlation matrices were generated for each sample town[9]. Table 3.3 can be interpreted in the following way:

1) The correlation coefficients of CS are positive and significant at 0.05 levels for most of the sample towns, though it is weak with other consumer durables.
2) The relationships for TV are positive and strong in the entire sample town, as TV is required for CS.
3) In Raigarh, the negative coefficients for all consumer durables could be attributed to the large number of migrant labourers who, though devoid of many consumer durables, avail of CS to a large extent.

The relationship of CS with house ownership is very weak in all the sample towns. This indirectly implies the likelihood that subscription to CS is greater for rented dwellings.

[9]Presented in Appendix A-2 to A-6.

**Table 3.3: Correlation coefficients of CS with other household assets**

| Towns | Balangir | Bhagalpur | Kendujhar | Motihari | Raigarh |
|---|---|---|---|---|---|
| **TV** | .471** | .744** | .454** | .495** | .623** |
| **House** | .067** | .027** | .033** | .015* | -.151** |
| **Telephone** | 0.022 | .085** | .126** | .084** | -0.014 |
| **Mobile** | .251** | .233** | .306** | .177** | -.110** |
| **Two Wheeler** | .201** | .228** | .312** | .188** | -.087** |
| **Washing Machine** | .120** | .142** | .199** | .131** | -0.48** |
| **Fridge** | .261** | .226** | .359** | .186** | -.083** |
| **Four wheel Vehicle Other than Car** | .88** | .040** | .087** | .034** | -.051** |
| **Car** | .057** | .069** | .104** | .083** | -.018 |
| **Obs(Nos)** | 5750 | 17431 | 12284 | 20684 | 10031 |

*Source:* NCAER-CS

*Note:* ** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed).

## IV. Findings of the Model

We know that theoretically demand function ($D_f$) depends on income[10]( $\rho$ ) and prices ($\sigma$ ) and preference ($\psi$) for CS as shown in equation [1]. The NCAER- CS survey data reflects whether the household subscribes to CS, monthly per capita expenditure ($\lambda$) and monthly subscription charges paid ($\mu$) by the household. The demand function for CS can be represented as in equation [2] in a log-log regression framework, where $\beta_1$ and $\beta_2$ are the elasticity coefficient.

$$D_f = f(\rho, \sigma, \psi) \quad \ldots\ldots [1]$$

$$\ln(Y) = \alpha + \beta_1 \ln(\lambda) + \beta_2 \ln(\mu) + \xi \quad \ldots\ldots [2]$$

**Table 3.1: Log-Log OLS results across sample towns**

Dependent Variable: Logarithm of number of cable households

| Variable | Balangir | Bhagalpur | Kendujhar | Motihari | Raigarh |
|---|---|---|---|---|---|
| MPCE_log | 0.92 | -0.598** | 0.589 | 0.404 | -0.795 |
| MChgs_log | -0.035 | 0.287 | -0.503 | 0.221 | -1.08 |
| Constant | -1.82 | 11.004* | 3.86 | 1.5 | 16.44* |
| $R^2$ | 0.27 | 0.11 | 0.09 | 0.02 | 0.15 |
| F-Statistics | 2.48 | 3.58 | 2.87 | 0.42 | 2.24 |
| Wards(Nos)/Obs | 21 | 51 | 21 | 38 | 40 |

*Note*: Robust HC3 results. * denotes significant at 1%, ** significant at 5%, *** significant at 10%.

*Source*: Estimation from NCAER-CS dataset.

The inferences from the OLS results are:

[10] Its proxy is expenditure (which is more reliable variable than income in household surveys in India).

1) The signs for monthly per capita expenditure (MPCE) coefficients are positive on the priori for Balangir, Kendujhar and Motihari, but are not significant. In contrast, the signs are negative for Bhagalpur and Raigarh, which implies that in these two large towns, in relatively poor wards the penetration of CS is greater. This could be said with much confidence for Raigarh, but for Bhagalpur it could be said with 95 percent confidence. Incidentally, these two towns have a huge migrant population with a relatively stable source of income.
2) The signs for monthly subscription charges for CS are negative on the priori for Balangir, Kendujhar and Raigarh, but not significant. On the other hand, the signs are positive for Bhagalpur and Motihari, implying that prices do not play much role to determine the number of Cable households. The caveat is that it cannot be said with much confidence, as this relationship is not significant for any of the sample towns. These results firm up our views that affordability matters little in determining household preference for CS. This calls for exploring beyond affordability issues to identify the factors responsible.

We used a multinomial probit technique for the analysis using the unit-level survey data of television-owning households with further disaggregation into CS, DTH and analogue households. We clubbed the entire dataset for all five sample towns, which aggregate to 64,431 households, after adjusting for households with non-responses on some of the model variables. The model equations are presented below.

Multinomial probit is often written in terms of a latent variable model:

$$Y_i^1 = \beta_0.X_i + \xi 1$$
$$Y_i^2 = \beta_1.X_i + \xi 2$$
$$\ldots\ldots\ldots\ldots$$
$$Y_i^m = \beta_2.X_i + \xi m$$

where

$$\xi \sim N(0, \sum)$$

then

$$Y_i^m = \begin{cases} 1 \text{ if } Y_i^1 > Y_i^1, Y_i^2, \ldots\ldots\ldots Y_i^m \\ 2 \text{ if } Y_i^2 > Y_i^1, Y_i^2, \ldots\ldots\ldots Y_i^m \\ m \quad other\ wise \end{cases}$$

i.e.,

$$\text{Yi=arg } max_{h=1}^{m} Y_i^h \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [3]$$

The model variables are household size, age of the household head, number of literate members in the household, number of female children in the household, number of male senior citizens in the household and the MPCE of the household as a proxy for income. In addition, three dummy controls were used, namely, gender and literacy of head household (1 for male household head, 0 otherwise and 1 for literate household head, 0 otherwise) and households with a member with regular employment (1 for households with at least one regular employment member, 0 otherwise). Appropriately, the probit coefficients were generated in the form of four models. Model I without controls, Model II with gender control, Model III with gender and literacy controls, Model IV with all three controls.

The summary statistics of the model variables is presented in Appendix A-7

The findings from the model are presented below (table 3.2)[11]:

a) One of the main foundation of the paper is reflected in the results is that there are factor beyond affordability that matters, or affordability matters little. The relationship between MPCE and choice of connection is significant but inelastic to a MPCE of Rs 5000, which is fairly high by Indian standards.. Thereafter the relationship is elastic which means affordability plays a significant role in a sense that it increases the likelihood of CS for the households in the upper quintiles. This remains across Model I to IV. This validates our core hypothesis, that affordability is not a limiting factor as far as choice of CS by the poor household.

b) Regarding factor other than affordability, one of the most striking finding is that preference for CS is hampered by presence of "Girl Child" in the household. If we control for gender and education of household head the household becomes indifferent for the Analog Connection, though household has negative reservations for either CS / DTH services. If we further control for regular income flow for the household, the probability of household availing an analog connection turns positive and household's hesitancy for CS/DTH reduces.

c) Preference to television decreases with the increase in household size. One of the plausible reason could be many of these households are joint family households which have traditions and customs that hamper the preferences for TV or CS.

d) Literacy increases the preference for television more so with CS/DTH.

e) Presence of Senior citizens in the household increases preference for television

f) Preference to television decreases with age of Head household.

[11]Though the MNP regressions were explored with several model variables, only significant variable relationships were finally considered.

**Table 3.2: MNP regression results**
**Dependent Variable: (type of connection)**

| Variables | Model_I | Model_II | Model_III | Model_IV |
|---|---|---|---|---|
| **BASE CASE: NO TELEVISION** | | | | |
| **CS** | | | | |
| Household size | -0.07* | -0.07* | -0.03* | -0.02* |
| Age_Head | -0.02* | -0.03* | -0.02* | -0.02* |
| Literacy | 0.31* | 0.31* | 0.20* | 0.19* |
| Female children | -0.09* | -0.09* | -0.05* | -0.05* |
| Male senior citizens | 0.18* | 0.18* | 0.18* | 0.18* |
| MPCE | 0.00* | 0.00* | 0.00* | 0.00* |
| _cons | -0.17* | -0.26* | -0.59* | -0.61* |
| | | | | |
| **DTH** | | | | |
| Household size | -0.12* | -0.12* | -0.06* | -0.05* |
| Age_Head | -0.01* | -0.01* | -0.01* | -0.01* |
| Literacy | 0.30* | 0.30* | 0.18* | 0.17* |
| Female children | -0.09* | -0.09* | -0.06* | -0.05* |
| Male senior citizens | 0.20* | 0.20* | 0.21* | 0.22* |
| MPCE | 0.00* | 0.00* | 0.00* | 0.00* |
| _cons | -0.42* | -0.48* | -0.80* | -0.81* |
| | | | | |
| **ANALOG** | | | | |
| Household size | 0.16* | 0.16* | 0.12* | 0.12* |
| Age_Head | 0.00* | 0.00* | 0.00* | 0.00* |
| Literacy | 0.24* | 0.24* | 0.14* | 0.13* |
| Female children | -0.02* | -0.02** | 0.00 | 0.09 |
| Male senior citizens | 0.20* | 0.20* | 0.20* | 0.21* |
| MPCE | 0.00* | 0.00* | 0.00* | 0.00* |
| _cons | 0.29* | 0.25* | -0.05** | -0.06** |
| **CONTROLS** | | | | |
| Gender_Head Household | X | √ | √ | √ |
| Education_Head Household | X | X | √ | √ |
| Regular employment | X | X | X | √ |
| | | | | |
| Observation(No.) | 64431 | 64431 | 64431 | 64431 |

*Note*: * denotes significant at 1%, ** significant at 5%
*Source*: Estimation from NCAER-CS.

## V. Remarks

The extant literature highlights significant positive externalities of television on women empowerment, gender bias, educational attainments and asymmetry mitigation. The model findings discussed in the previous sections imply limited connection between affordability and preference for paid or unpaid television services. Considering these facts, the issue then emerges is, what is the nature of public policy to facilitate the outreach of television in general and CS in particular? The

solution to this complex issue is provided by the other determinants which are hampering the deep penetration of media among the masseslike increase in literacy, or number of Girl child in a family. This could be better handled through public policy interventions like improving the literacy levels, and instilling confidence in the society especially crimes against the Girl child (they being the most vulnerable sections in the society). As the externalities involved in these issues are huge, they warrant attention in the light of empirical evidence.

The theoretical underpinning points towards improvements in governance highlighted in the concept of *common triple* that encompasses order, conflict and mutual gain (Commons,1932***),*** *i.e.,* establishing *order* would mitigate *conflict* and bring about *mutual gain* to society at large. This calls for policy interventions to address market failures, dampened by girl child and illiteracy. Sensitisation of the administration and stricter enforcement of laws towards women and the girl child in particular could bring about much-needed changes in societal attitudes.

To conclude, though we understand the limitation of the data set in terms of its Pan India representativeness, but we firmly believe that such public policy intervention would have ramifications across the nation.

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# Appendix

**Table A.1: Number of Registered Cable TV Operators as on 10/7/2012**

| S.No. | Postal Circle | Number |
|---|---|---|
| 1 | Andhra Pradesh | 3361 |
| 2 | Assam | 259 |
| 3 | Bihar | 273 |
| 4 | Chhattisgarh | 421 |
| 5 | Delhi | 2247 |
| 6 | Gujarat | 1373 |
| 7 | Haryana | 2111 |
| 8 | Himachal Pradesh | 208 |
| 9 | Jammu & Kashmir | 524 |
| 10 | Jharkhand | 516 |
| 11 | Karnataka | 1319 |
| 12 | Kerala | 3461 |
| 13 | Madhya Pradesh | 1407 |
| 14 | Maharashtra | 8542 |
| 15 | North East | 378 |
| 16 | Odisha | 882 |
| 17 | Punjab | 1460 |
| 18 | Rajasthan | 960 |
| 19 | Tamil Nadu | 14371 |
| 20 | Uttar Pradesh | 1975 |
| 21 | Uttarakhand | 577 |
| 22 | West Bengal | 1465 |
| | All | 48090 |

*Source*: TRAI.

**Table A-2: Correlation Matrix of Household Assets for Balangir**

| Assets | CS | TV | House | Telephone | Mobile | TW | WM | Fridge | VOTC | Car |
|---|---|---|---|---|---|---|---|---|---|---|
| CS | 1 | | | | | | | | | |
| TV | .471(**) | 1 | | | | | | | | |
| House | .067(**) | .028(*) | 1 | | | | | | | |
| Telephone | 0.022 | 0.018 | -.463(**) | 1 | | | | | | |
| Mobile | .251(**) | .258(**) | .264(**) | -.116(**) | 1 | | | | | |
| TW | .201(**) | .190(**) | -.143(**) | .309(**) | .342(**) | 1 | | | | |
| WM | .120(**) | .102(**) | -.215(**) | .333(**) | .129(**) | .551(**) | 1 | | | |
| Fridge | .260(**) | .214(**) | .150(**) | 0.022 | .541(**) | .458(**) | .290(**) | 1 | | |
| VOTC | .088(**) | .064(**) | -.234(**) | .306(**) | -.028(*) | .384(**) | .463(**) | .045(**) | 1 | |
| Car | .057(**) | .042(**) | 0.018 | .068(**) | .125(**) | .139(**) | .149(**) | .129(**) | .090(**) | 1 |

*Source*: NCAER-CS.

*Note*: Acronym TW: Two wheeler; WM: Washing Machine; VOTC: Vehicle Other Than Car.

** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed).

**Table A-3: Correlation Matrix of Household Assets for Bhagalpur**

| Assets | CS | TV | House | Telephone | Mobile | TW | WM | Fridge | VOTC | Car |
|---|---|---|---|---|---|---|---|---|---|---|
| CS | 1 | | | | | | | | | |
| TV | .744(**) | 1 | | | | | | | | |
| House | .027(**) | .016(*) | 1 | | | | | | | |
| Telephone | .085(**) | .060(**) | .044(**) | 1 | | | | | | |
| Mobile | .233(**) | .198(**) | .099(**) | .113(**) | 1 | | | | | |
| TW | .228(**) | .168(**) | .054(**) | .173(**) | .413(**) | 1 | | | | |
| WM | .142(**) | .100(**) | .051(**) | .219(**) | .255(**) | .336(**) | 1 | | | |
| Fridge | .226(**) | .157(**) | .052(**) | .178(**) | .319(**) | .446(**) | .433(**) | 1 | | |
| VOTC | .040(**) | .020(**) | .021(**) | .067(**) | .071(**) | .083(**) | .130(**) | .118(**) | 1 | |
| Car | .069(**) | .044(**) | .059(**) | .164(**) | .155(**) | .184(**) | .264(**) | .204(**) | .128(**) | 1 |

*Source*: NCAER-CS

*Note*: Acronym TW: Two wheeler; WM: Washing Machine; VOTC: Vehicle Other Than Car

** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed).

**Table A-4: Correlation Matrix of Household Assets for Kendujhar**

| Assets | CS | TV | House | Telephone | Mobile | TW | WM | Fridge | VOTC | Car |
|---|---|---|---|---|---|---|---|---|---|---|
| CS | 1 | | | | | | | | | |
| TV | .454(**) | 1 | | | | | | | | |
| House | .033(**) | .064(**) | 1 | | | | | | | |
| Telephone | .126(**) | .129(**) | .030(**) | 1 | | | | | | |
| Mobile | .306(**) | .340(**) | .238(**) | .122(**) | 1 | | | | | |
| TW | .312(**) | .318(**) | .170(**) | .267(**) | .518(**) | 1 | | | | |
| WM | .199(**) | .163(**) | .093(**) | .342(**) | .315(**) | .383(**) | 1 | | | |
| Fridge | .359(**) | .316(**) | .221(**) | .209(**) | .551(**) | .532(**) | .392(**) | 1 | | |
| VOTC | .087(**) | .060(**) | 0.006 | .163(**) | .097(**) | .225(**) | .203(**) | .097(**) | 1 | |
| Car | .104(**) | .069(**) | .053(**) | .123(**) | .199(**) | .206(**) | .286(**) | .188(**) | .182(**) | 1 |

*Source*: NCAER-CS

*Note*: Acronym TW: Two wheeler; WM: Washing Machine; VOTC: Vehicle Other Than Car

** Correlation is significant at the 0.01 level (2-tailed);* Correlation is significant at the 0.05 level (2-tailed).

**Table A-5: Correlation Matrix of Household Assets for Motihari**

| Assets | CS | TV | House | Telephone | Mobile | TW | WM | Fridge | VOTC | Car |
|---|---|---|---|---|---|---|---|---|---|---|
| CS | 1 | | | | | | | | | |
| TV | .495(**) | 1 | | | | | | | | |
| House | .015(*) | .033(**) | 1 | | | | | | | |
| Telephone | .084(**) | .062(**) | .035(**) | 1 | | | | | | |
| Mobile | .177(**) | .238(**) | .116(**) | .088(**) | 1 | | | | | |
| TW | .188(**) | .224(**) | .101(**) | .136(**) | .394(**) | 1 | | | | |
| WM | .131(**) | .115(**) | .095(**) | .217(**) | .220(**) | .353(**) | 1 | | | |
| Fridge | .186(**) | .154(**) | .081(**) | .172(**) | .284(**) | .441(**) | .551(**) | 1 | | |
| VOTC | .034(**) | .037(**) | .021(**) | .105(**) | .056(**) | .137(**) | .170(**) | .155(**) | 1 | |
| Car | .083(**) | .060(**) | .031(**) | .172(**) | .179(**) | .216(**) | .313(**) | .299(**) | .243(**) | 1 |

*Source*: NCAER-CS

*Note*: Acronym TW: Two wheeler; WM: Washing Machine; VOTC: Vehicle Other Than Car

** Correlation is significant at the 0.01 level (2-tailed);* Correlation is significant at the 0.05 level (2-tailed).

**Table A-6: Correlation Matrix of Household Assets for Raigarh**

| Assets | CS | TV | House | Telephone | Mobile | TW | WM | Fridge | VOTC | Car |
|---|---|---|---|---|---|---|---|---|---|---|
| CS | **1** | | | | | | | | | |
| TV | **.623(**)** | **1** | | | | | | | | |
| House | **-.151(**)** | **-.172(**)** | **1** | | | | | | | |
| Telephone | **-0.014** | **-0.014** | **.190(**)** | **1** | | | | | | |
| Mobile | **-.110(**)** | **-.142(**)** | **.428(**)** | **.357(**)** | **1** | | | | | |
| TW | **-.087(**)** | **-.113(**)** | **.381(**)** | **.315(**)** | **.624(**)** | **1** | | | | |
| WM | **-.048(**)** | **-.043(**)** | **.200(**)** | **.404(**)** | **.372(**)** | **.417(**)** | **1** | | | |
| Fridge | **-.083(**)** | **-.116(**)** | **.311(**)** | **.338(**)** | **.545(**)** | **.623(**)** | **.483(**)** | **1** | | |
| VOTC | **-.051(**)** | **-.050(**)** | **.067(**)** | **.155(**)** | **.054(**)** | **.081(**)** | **.139(**)** | **.098(**)** | **1** | |
| Car | **-0.018** | **-0.001** | **.055(**)** | **.043(**)** | **.070(**)** | **.083(**)** | **.067(**)** | **.093(**)** | **.254(**)** | **1** |

*Source*: NCAER-CS

*Note*: Acronym TW: Two wheeler; WM: Washing Machine; VOTC: Vehicle Other Than Car

** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed).

**Table A-7: Descriptive statistics of the model variables**

| Variable | Unit | Mean | SD | CV | Min | Max |
|---|---|---|---|---|---|---|
| Age_Head Hhd | Yrs | 37.75 | 13.68 | .36 | 10 | 101 |
| Gender_Head Hhd | DUM | 0.78 | 0.4 | 0.51 | 0 | 1 |
| Female children | Nos | .44 | .71 | 1.63 | 0 | 6 |
| Male senior citizens | Nos | 0.09 | .31 | 3.29 | 0 | 4 |
| Literacy_Head | DUM | 0.86 | 0.35 | 0.41 | 0 | 1 |
| Literate members | Nos | 3.33 | 1.59 | 0.48 | 0 | 13 |
| Regular salary earners | Nos | 0.3 | 0.54 | 1.83 | 0 | 5 |
| MPCE | INR | 2276.22 | 2226.09 | 0.98 | 15 | 57371 |

*Source*: Estimation from NCAER-CS