Television Industry in the New Digital Environment in India – Some Issues

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Abstract

Abstract: This study sheds light on the future marketing strategies of television broadcasters in the context of the ongoig process of digitization of cable networks in India. A duopoly model with differentiated products in a two-sided television market is considered. Both viewing and advertising prices are considered to be optimally decided by the television channels (broadcasters) in a 'digital addressable' content distribution enviornment. In this short run model, viewers' tastes for content and advertisement, advertisers' preference for advertising medium and programme production cost of the duopolists are assumed to remain unchanged. It is observed that increased product differenctiation may or may not be profitable to the broadcasters when they have almost similar intrinsic values to the viewers. With unequal intrinsic values of the TV Channels to the viewers, low product differentiation will make the platform a monopoly platform endogeneously.

Key words: Cable network, Digitization, Duopoly, Product differentiation, Two-sided market

I. Introduction

India had started to experience a steady growth in the media and entertainment industry from the last decade of the twentieth century largely triggered by the growth in the television industry segment. But, before 1991, only Doordarshan, the state monopoly supplier of television content, operated in a terrestrial distribution system. It was in 1991 that satellite television was introduced in India coupled with cable distribution system, increasing television viewership enormously. However, in analog cable system, local cable operators have had the practice to underreport viewer base to the MSOs[1] having detrimental effect on the business environment of the sector. Of late, to address the problem, digitization of the analog cable distribution system has been taking place since 2012 following TRAI[2] regulatory measures to track down underreporting with required digital technological support. It is expected that the mandatory digitization process will be completed in a phased manner by 2015 for the entire country. This gradual digitization of the cable distribution system is unfolding a new dimension to the marketing of television content. So far advertising revenue has remained the principal source of revenue to the broadcasters as they have always been deprived of a significant chunk of subscription revenue by the local cable operators. Naturally, the so called pay channels which are included in any particular channel package along with some FTA[3] channels offered by a cable operator heavily depend on advertising revenue as well. Any significant experiment with 'pure pay channels' has not yet started in India. But now, to reap the benefit of yet to be completed DAS[4], broadcasters have to take a decision about how to optimally charge the viewers and the advertisers for the sale of content and viewers' attention respectively. An attempt has been made in the present paper to shed light on the future marketing strategies of the television content suppliers in the new digital environment.

The rest of this paper is organized as follows: An overview of television industry supply chain is presented in the next section followed by a brief review of literature on two-sided market competition. Then objectives of the present study are stated. After that, a theoretical framework has been presented along with equilibrium outcomes for an effective analysis of the probable marketing strategies. The last section concludes the paper.

II. An Overviwe of Television Industry Supply Chain in India

For any serious discussion about marketing strategies of television boradcsters, an overall understanding of the existing television industry supply chain is required. Three principal television channel distribution platforms in India are cable system, DTH[5] and IPTV[6]. In TRAI discussion paper on Implementation of Digital Addressable Cable TV Systems in India (August,2010), a comprehensive view of the existing supply chain corresponding to each distribution platform can be obtained.

The cable services supply chain comprises four main supply side entities i.e. broadcaster, aggregator, MSO and LCO. 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 to the satellite (from where they are 'down-linked' by the distributor). There are some large broadcasters that operate more than 10 channels, medium size broadcasters operating 2-10 channels and many small broadcasters that operate only one channel. 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 only to ensure reach to their target audience.

(2) Pay TV broadcasters have a dual source of income. The channels need to ensure reach not just to earn advertising revenue but are also dependent on the distribution network to collect subscription revenue from the consumer.

The television broadcasters are heavily dependent on advertising revenues. The industry size is split 66:34 in the favour of subscription revenue at the retail level. However the income of major broadcasters is roughly in the ratio of 35:65 in favour of advertising revenue. Alleged gross under reporting about subscriber base in the cable TV industry by the LCOs is causing such over dependence of broadcasters on advertisement revenue.

TV channels can be distributed by the broadcaster himself or through authorized distribution agencies to the distribution platforms. An aggregator is a distribution agent who undertakes the distribution of TV channels for one or more broadcasters. The role of the aggregator in the value chain is to provide bundling and negotiation services for subscription revenue on behalf of the broadcasters.

In the DTH supply chain, the role of the broadcaster and the aggregator remain unchanged. Instead of a two-stage distribution value chain, there is a single distributor – the DTH operator. The DTH operator is responsible for both, negotiating with aggregators/ broadcasters and servicing the end consumer. The mode of transmission between the operator and the consumer is via satellite rather than cable. Required customer premises equipment includes a satellite dish (to receive signals) and a set top box to decode signals and provide conditional access to paid content. There are currently seven DTH operators operating in India. These include a) DD Direct Plus, which is owned by Doordarshan – a public service broadcaster and currently provides free DTH services and, b) six private players – Airtel Digital TV, Big TV, Dish TV, Sun Direct, Tata Sky and Videocon d2h – who provide pay DTH services.

A third emerging distribution platform i.e. IPTV is also mentioned in this paper. Its value chain is also organized similarly, i.e. there is a single distributor connecting the broadcaster to the last mile. IPTV technology combines television distribution with broadband and telephony. The signals for these services are transmitted through cable/ optical fibre networks. There are presently four major IPTV service providers in India – MTNL, BSNL, Bharti Airtel and Reliance Communications – who offer services either themselves or through their franchises. In some cases, these companies directly service the last mile as well as own the transmission head-end. In other cases, smaller service providers lease the transmission head-end and provide IPTV services to subscribers.

Therefore, given the present scenario, it is expected that successful completion of the process of digitization of the existing analog cable network will make the whole distribution system entirely addressable and thereby stop the leakage of subscription revenue from the system. Against this backdrop, compulsive over dependence on advertising revenue can be done away with by the broadcasters. Content and viewers' attention can be priced optimally. To get further insight into the matter, an appropriate framework of two-sided market competition is required.

III. Literature Review

Two-sided market structure as an area of research is more or less a decade old. Both general discussions and television broadcasting industry specific applications are available in literature. The OECD Policy Roundtable on Two-Sided Markets (June,2009) with analytical note by David Evans calls for a special mention here. Although the aim of this document is to shed light on implications of two-sidedness for competition policy, it effectively helps in understanding the economics of two-sided markets relevant for the present paper. It is noted in the document that there is no universally accepted definition of a two-sided market. The firms operating in such markets are often called 'platforms' and they are characterized by the presence of some common elements. The most important one is the presence of two distinct groups with indirect externalities across the groups who are served simultaneously by the platform. The next element is that transaction volume on the platform is sensitive to the way price is distributed between the consumers. Also there might be joint costs for providing services to both types of consumers. Therefore, traditional market definition cannot adequately shed light on market outcomes unless the linkages between the two sides of the market and possible

presence of joint costs are taken care of. Any single –sided multi-product firm is not characterized by such externalities and joint costs. So conditions for profit maximization have to be modified adequately. Commercial success of such platform depends on how optimally it coordinates the interdependent demands of two distinct groups by devising an optimal price structure. In the present paper, a duopoly platform model has been constructed.

Rochet and Tirole (2006) discuss usage and membership externalities separately and then build a model integrating the two. This is not done in any earlier literature. As a prerequisite to that, the nature of interaction between the two sides must be identified clearly. In the article, examples are drawn extensively from various types of two-sided platforms e.g. advertiser supported media, payment system like credit card, software platforms etc. To express in simpler terms, it is important to know whether any side of the platform is deriving benefit from merely the membership of the other side or the intensity with which the other side is using the platform. Accordingly, the price structure has to be devised. It is a very general model allowing for various possibilities. Platform competition is not allowed here. The price level or total price of the monopoly platform is determined by a standard Lerner formula. The optimal price structure is obtained by maximizing the volume of usage with respect to unit prices charged on two sides of the platform subject to the constraint that unit prices of the two sides add up to the total price determined by the platform. However such framework of monopoly platform does not apply to many of the examples of two-sided markets and especially in partly or fully advertising supported television broadcasting markets.

Platform competition is considered in Armstrong (2006). It starts with a monopoly platform and extends it to a model involving two competing platforms. No conscious effort is made in this paper to make a distinction between usage externality and membership externality. Two groups of agents are considered for two sides of the platform. It is found that emphasis on external benefit from one side when setting the price to the other side for a duopolist is twice as much as that of a monopolist under the restrictive condition that each agent chooses to join a single platform for exogenous reasons. Later in this paper, the model is further extended to relax the assumption of single-homing[7] by both groups of agents. Multi-homing on the part of one group of agents is considered. However, no competition is considered between platforms to attract agents of multi-homing group. Agents are assumed to be heterogeneous in nature. Each group is considered to be uniformly distributed along the Hotelling line. Two platforms are located at the two endpoints. Two product differentiation parameters are considered for the two groups that describe the competitiveness on the two sides of the platform. This is a standard practice in two-sided market literature to introduce platform competition (see, among others, Gabszewicz, Laussel and Sonnac 2004; Kind and Stähler, 2009 in the specific context of television industry). These Hotelling type models of product differentiation have some limitations. First of all, these models cannot be easily generalized to more than two firms. More importantly, products are differentiated on the basis of some attributes to lie on a particular point in the space of attributes. However specific measurement of attributes appears very artificial. Also, the set of attributes may not be exhaustive to measure differentiation. Therefore, such modelling may have academic value, but for all practical purposes, it is better to avoid identification of specific attributes. Therefore, a non-address type duopoly model[8] of product differentiation is more appropriate in the present context and this is done in the present paper following the framework of Dixit (1979). Network externality is added to the original framework with price taker viewers and advertisers on the two sides of the market.

In the context of network externality, one distinguishing feature of most media firms is that majority of media consumers dislike advertisements while advertisers would like to reach large number of consumers. It leads to a situation where there are negative externalities from advertisers to viewers, but positive externalities from consumers to advertisers. So media firms constitute a special segment in the class of two-sided markets and within this segment, the television industry demands special emphasis in terms of the time people devote to television viewing and the amount of advertising it transmits. In the context of television broadcasting, the above-mentioned feature of externality is discussed extensively. However in earlier papers (e.g., Beebe, 1977; Spence and Owen, 1977) number of advertisements in each programme was considered to be exogenously fixed. Later Anderson and Coate (2005) in their seminal paper on the TV market have considered level of advertisement as a decision variable taking into consideration nuisance value of the same. Also in Gabszewicz, Laussela and Sonnac (2004) and Kind, Nilssen and Sørgard (2007), opportunity cost or disutility related to the time devoted to watching advertisements is considered. The present paper takes almost a similar stand in this respect.

IV. Objectives of the Study

1. To derive conditions when two-sidedness is beneficial for the industry, given variable viewer price.
2. If it is beneficial, to examine how extent of product (programme mix) differentiation of television channels of a particular genre affects equilibrium outcomes.
3. To examine how similarity or dissimilarity of intrinsic values of the channels to the viewers affect the above results of 2.

V. The Model

Here a short run duopoly model with two competing television channels producing two differentiated products (programme mix) is considered, where each channel supplies programme mix to the viewers and viewers' attention to the advertisers. Here quantity competition is considered since it is found that in television broadcasting industry, the firms think in terms of underlying quantities.

Cost of supplying programme mix or content to the viewers is considered to be fixed in the short run. Whether the channel is outsourcing the production of programmes or producing it in its own production house does not make any difference so far as the purpose of the present paper is concerned. There is no marginal cost involved. Channel programmes reach the viewers via some digital addressable distribution platform. Channels might pay carriage fee to the distributors which may be considered as a fixed cost in the short run. To serve the advertisers, no additional cost is incurred by the channel. In fact, advertisers are purchasing viewers' attention and viewers are joining the platform to get entertained by the television programmes. Effectively, the content cost can be considered as the joint cost to serve both viewers and advertisers.

Viewers cannot watch the channels free of charge. Viewer price is a variable price in this model. They have to pay p_i to channel i per hour of viewing the channel. This is like usage charges as per the terminology used in their article by Rochet and Tirole (2006). Till today, this pricing scheme may not be a reality in general. However, pay-per-view provision is there, and in that sense this variable pricing reflects future of the television industry. Moreover in this paper, thrust is on cross group externality where usage is important and not membership of the platform. Advertisers will pay more to the channel for advertising if viewers intensively use the platform. Subscription fee paid by the viewers, if any, is ignored since such membership charge will not give any further insight regarding cross-group externality.

Now, market domain needs clarification at this point. Television channels are categorised in accordance with their programme types, e.g., mass entertainment channels, news channels, infotainment channels, kids channels, sports channels, movies channels, music channels, lifestyle channels etc. Not only that, India being a multilingual country, there are Hindi and English language channels to cater the national market and regional language channels to cater the regional markets. Therefore against this backdrop, cross categorisation of channels (across language and programme type, e.g., Hindi general entertainment channels etc.) only make sense. In the present framework, inter-category channel competition is ruled out. This means to say, any viewer will choose between channels in a particular category and not between different categories. Even if he wants to see channels of other categories, time slot for such viewing will be different. So within a particular time slot there is no inter- category competition. This assumption is a simplifying one; however any relaxation of such assumption will only complicate the framework without any further insight. Also, extension of number of firms to more than 2 in a particular category will not serve the framework in a better way. One more thing needs to be mentioned here. Channel competition is considered here under normal circumstances. If there emerges mass hysteria for any programme like Kaun Banega Crorepati (especially season 1) or IPL matches, the concerned channel gains monopoly status temporarily during the telecast of that particular programme as no other programme can be substituted for that programme. Barring these special cases, duopoly platforms are considered in each cross category.

On the other side of the platform, advertisers are indifferent between the two channels so far as buying advertising time is concerned. They are willing to pay more if a channel is more intensively used by the viewers. This is the first externality content to be optimally internalised by a channel given the regulatory constraint in the form of maximum number of advertising time in seconds per hour of programming.

This is further to be mentioned that number of viewers is fixed in the short run. Short run is defined as a time period within which viewers' tastes will remain unchanged. So the same number of viewers will be there in each cross category of channels. Viewing hours devoted to a channel is variable in the model.

Viewers are identical in terms of the intrinsic value of a channel. However their valuations of advertisement which is coming in package with the programme to them may differ. Advertisements interrupt television programmes which involve costs to the viewers. They also have some benefits in the form of information and entertainment. Valuation of advertisements critically depends on the subjective weights attached to the costs and benefits. There may be three categories of viewers. For the first category, weight attached to costs is much higher than that to benefits. As a result advertisement is nuisance to them. So this category is paying an extra price for being interrupted by commercials. In that sense the concerned channel is facing a negative externality benefit. The second category shows neutrality to the commercial breaks or pop-ups. To them, weights attached to benefits and costs are compensating each other. This leads to a zero net effect of externality. For the third category of viewers, weight attached to programme interruption cost is much less than that to the benefits of advertisements. Therefore they derive a positive benefit from advertisements

and for them positive externality can be optimally internalised by the channel. However it is well documented in literature that the first category dominates the market.

Following Dixit (1979) and cross group externality (here between viewers and advertisers) as discussed above, inverse demand functions for the contents of the channels are

$p_1 = á_1 – âv_1 – ãv_2 – äa_1$ & $p_2 = á_2 – âv_2 – ãv_1 – äa_2$,

where p_i = per hour content price to the viewers,

v_i = viewing hours of channel i for a viewer per period of subscription for the channel,

$á_i$ = per hour intrinsic value of channel i to the viewer which is fixed in a single period of subscription,

a_i = advertising seconds per hour of programming on channel i, i=1,2

â = absolute value of own viewing time sensitivity of hourly viewing price,

ã = absolute value of cross viewing time sensitivity of hourly viewing price entering with a negative sign since the products are imperfect substitutes of each other,

ä = level of advertising sensitivity of hourly viewing price. ä>0 for the majority group of viewers who dislike advertisements, ä=0 for those who are neutral to programme interruption for advertisements, äÂ0 for the last group of viewers who like advertisements.

Inverse demand functions for the advertising spots of the channels are

$q_1 = ì\ v_1 - è\ a_1$ & $q_2 = ì\ v_2 - è\ a_2$,

where, q_i = price paid by advertisers to channel i per second of advertisement, i =1,2,

è = absolute value of advertising time sensitivity of advertising price,

ì = absolute value of viewing time sensitivity of advertising price.Viewing time indicates how intensively the platform is used by the viewers after taking the membership i.e. subscribing to the channel. Advertisers are interested in this intensity since they derive benefit from the intensity of use of the platform by the viewers and not merely from their membership.

Therefore profit functions for the duopoly TV channels are

$ð_1 = (á_1 – âv_1 – ãv_2 – äa_1)\ v_1 + (ì\ v_1 - è\ a_1)\ a_1 – f_1$ &

$ð_2 = (á_2 – âv_2 – ãv_1 – äa_2)\ v_2 + (ì\ v_2 - è\ a_2)\ a_2 – f_2$,

where, f_i is the fixed content cost of channel i calculated for a single period of subscription adjusted for the subscription fees collected from viewers during that period, i=1,2.

Each duopolist or television channel will try to maximize profit simultaneously treating viewing time of the other channel as given. Therefore, channel 1 will try to maximize $ð_1$ with respect to v_1 and a_1 treating v_2 as fixed. Similarly channel 2 will try to maximize $ð_2$ with respect to v_2 and a_2 treating v_1 as fixed.

VI. EQUILIBRIUM OUTCOMES

Simultaneous profit maximization by the two television channels will give the equilibrium outcomes of the model.

Profit function of channel 1 is

$ð_1 = (á_1 – âv_1 – ãv_2 – äa_1)\ v_1 + (ì\ v_1 - è\ a_1)\ a_1 – f_1$

Rearranging terms on the RHS, it becomes

$ð_1 = á_1 v_1 – âv_1^2 - ã\ v_1 v_2 + (ì – ä)\ v_1 a_1 – èa_1^2 – f_1$..... (1)

Similarly, profit function of channel 2 is

$ð_2 = á_2 v_2 – âv_2^2 - ã\ v_1 v_2 + (ì – ä)\ v_2 a_2 – èa_2^2 – f_2$..... (2)

Channel 1 tries to maximize (1) with respect to v_1 & a_1, treating v_2 as fixed, whereas channel 2 tries to maximize (2) with respect to v_2 & a_2, treating v_1 as fixed.

First order conditions for the maximization problem of channel i are

$$\frac{\partial \pi_i}{\partial v_i} = á_i – 2â\ v_i – ã\ v_j + (ì – ä)\ a_i = 0 \text{..... (3)}$$

$$= (ì – ä)\ v_i – 2\ è\ a_i = 0 \text{..... (4)}, \quad i, j = 1,2;\ i \neq j.$$

From equation (4), $a_i =$ v_i..... (5)

Putting this value in equation (3), v_i can be solved for á$_1$, â, ã, (ì – ä) , è and v_j. Putting that v_i value back in (5), a_i can be solved for á$_i$, â, ã, (ì – ä) , è and v_j. These values of v_i & a_i will be profit maximizing values of v_i & a_i i.e. and a_i^* provided the following second order conditions are satisfied:

$$\frac{\partial^2 \pi_i}{\partial v_i^2} < 0, \qquad \frac{\partial^2 \pi_i}{\partial a_i^2} < 0 \qquad \& \qquad \begin{vmatrix} \frac{\partial^2 \pi_i}{\partial v_i^2} & \frac{\partial^2 \pi_i}{\partial a_i \partial v_i} \\ \frac{\partial^2 \pi_i}{\partial v_i \partial a_i} & \frac{\partial^2 \pi_i}{\partial a_i^2} \end{vmatrix} > 0$$

Now, $\frac{\partial^2 \pi_i}{\partial v_i^2} = -2\hat{a} < 0$ & $\frac{\partial^2 \pi_i}{\partial a_i^2} = 2\grave{e} < 0$.

$$\begin{vmatrix} \frac{\partial^2 \pi_i}{\partial v_i^2} & \frac{\partial^2 \pi_i}{\partial a_i \partial v_i} \\ \frac{\partial^2 \pi_i}{\partial v_i \partial a_i} & \frac{\partial^2 \pi_i}{\partial a_i^2} \end{vmatrix} = \begin{vmatrix} -2\beta & \mu - \delta \\ \mu - \delta & -2\theta \end{vmatrix} = 4\hat{a}\grave{e} - (\grave{i} - \ddot{a})^2$$

$4\hat{a}\grave{e} - (\grave{i} - \ddot{a})^2 > 0$ can equivalently be stated as $4[\hat{a}\grave{e} - \{(\grave{i} - \ddot{a})/2\}^2] > 0$. Effectively the condition becomes $[\hat{a}\grave{e} - \{(\grave{i} - \ddot{a})/2\}^2] > 0$.

In this model, $(\grave{i} - \ddot{a})/2$ can be interpreted as an average measure of cross-group network externality since, total externality effect that can be internalised by the platform is $\grave{i} - \ddot{a}$ and there are two sides of the platform. $\grave{i}$ reflects the strength of externality from the viewers' side to the advertisers' side and $(-\ddot{a})$ reflects the strength of externality from the advertisers' side to the viewers side. It is already mentioned that, for the majority of the viewers, $(-\ddot{a})$ is negative largely dampening the positive externality $\grave{i}$-. It is interesting to note that if $\grave{i}$ is exactly offset by $(-\ddot{a})$, a_i^* becomes zero and the two- sided market structure ceases to exist. Therefore, in this situation the channels endogenously become pure pay channels. It is very unlikely that this happens for the whole set of viewers of those channels. In that case, channels have to identify that particular market segment where presence of advertisers does not add any benefit in terms of non internalised externality benefits.

Proposition 1: *If $\grave{i} - \ddot{a} = 0$, the two-sided platform endogenously becomes a single-sided platform.*

Barring the above situation, it is most likely that $\hat{a}\grave{e}$, the product of direct quantity sensitivities of prices on the two sides of the platform, will surpass the product of the indirect average network externality effect taken twice leading to the fulfilment of the required condition stated above. If for some reason, $(-\ddot{a})$ is very low or it turns out to be positive for the category of viewers who like advertisements, there are chances that, $\hat{a}\grave{e} - \{(\grave{i} - \ddot{a})/2\}^2$ may turn out to be non-positive. In those situations indirect externality effect is much stronger or is equal to direct quantity effects on prices. In that case advertisement turns out to be more saleable than the content. The platform can theoretically keep on increasing profit by increasing level of advertisement, rendering the concept of maximization of profit unviable. However, they have to stop in practice either for the supply constraint of advertisement or for the regulatory measure about maximum level of advertisement on a channel per hour of programming, whichever is coming earlier. If the constraining factor is the regulatory measure, then new entrant can reap the benefit if entry barrier is not there. Entry barrier may appear in the form of huge content cost which is a sunk cost or brand value of the existing players. Neither appears very strong when the situation is such that content is less saleable than advertisements. In fact this situation may happen if the channels are broadcasting programmes of 'lowest common denominator' sort and at the same time to the advertisers, television is the best medium to advertise.

Proposition 2: *When advertisement is more lucrative than content in a particular channel category, existing channels can increase their profits by increasing level of advertisements until stopped either by advertisement supply constraint or regulatory measure on maximum level of advertisement and if stopped by the second reason, new entrants can do good business unless they are thwarted by the existing players by some unfair means.*

Given that the second order conditions are satisfied, the first order conditions of the two channels taken together will give two equations in v_1^* and v_2^* (eliminating a_1^* & a_2^*) using (5).

The equations are

$$\left[2\beta - (\mu-\delta)^2/2\theta\right]v_1^* + \gamma \quad v_2^* = \alpha_1 \quad \text{..... (6)}$$

$$\delta v_1^* + \quad \left[2\beta - (\mu-\delta)^2/2\theta\right]v_2^* = \alpha_2 \quad \text{..... (7)}$$

Therefore in vector-matrix form these two equations become

$$\begin{bmatrix} 2\beta-(\mu-\delta)^2/2\theta & \gamma \\ \gamma & 2\beta-(\mu-\delta)^2/2\theta \end{bmatrix} \begin{bmatrix} v_1^* \\ v_2^* \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix}$$

Applying Cramer's rule, v_1^* and v_2^* can be solved provided,

$$\begin{vmatrix} 2\beta-(\mu-\delta)^2/2\theta & \gamma \\ \gamma & 2\beta-(\mu-\delta)^2/2\theta \end{vmatrix}$$ is non-vanishing.

This requires $[2â - (ì - ä)^2 / 2è]^2 - ã^2$ to be non vanishing. This expression can further be reduced to $[âè - \{(ì - ä) / 2\}^2]^2 * [4/è^2 - ã^2 / [âè - \{(ì - ä) / 2\}^2]^2]$. Effectively,

$[âè-\{(ì - ä) / 2\}^2]^2 * [2/è + ã / [âè-\{(ì - ä) /2\}^2]]* [2/è-ã / [âè-\{(ì-ä) /2\}^2]]$has to be non vanishing.

$âè-\{(ì - ä) / 2\}^2$ is already assumed to be positive barring a few exceptional cases. $ã / [âè-\{(ì-ä) /2\}^2$can be interpreted as a measure of product differentiation, the value of which lies between 0 and 1. ã reflects strength of cross quantity sensitivity of viewer price only, as to the advertisers, differentiation is immaterial. The denominator reflects, as mentioned above, direct own quantity sensitivities of prices on both sides of the platform net of indirect cross group externality effect. Therefore, $ã / [âè-\{(ì-ä) /2\}^2] \lessdot 0$ as the channels become more and more differentiated as perceived by the viewer. On the contrary, $ã / [âè-\{(ì-ä) /2\}^2] \lessdot 1$ when the channels become closer substitutes of each other. Next, è, the own quantity sensitivity of advertiser price cannot be very high, since network externality plays a bigger role in that respect. So 2/è, in all probabilities will be greater than 1. Therefore it is intuitively very clear that $2/è-ã / [âè-\{(ì-ä) / 2\}^2]$ will be positive.

Given that $[âè - \{(ì - ä)/2\}^2] > 0$, the first two terms are positive. So the third term has to be non- vanishing. If this condition is satisfied, then the following solution values will be obtained.

Profit maximizing values of viewing hours for the two channels are

$$v_1^* = \frac{\alpha_1\left[\frac{4\beta\theta-(\mu-\delta)^2}{2\theta}\right]-\alpha_2\gamma}{\left[\frac{4\beta\theta-(\mu-\delta)^2}{2\theta}\right]^2-\gamma^2} \quad , \quad v_2^* = \frac{\alpha_2\left[\frac{4\beta\theta-(\mu-\delta)^2}{2\theta}\right]-\alpha_1\gamma}{\left[\frac{4\beta\theta-(\mu-\delta)^2}{2\theta}\right]^2-\gamma^2}$$

Putting these values in equation (5) for both the channels, profit maximizing advertising levels for the two channels are

$$a_1^* = \frac{\mu-\delta}{2\theta} v_1^* \quad , \qquad a_2^* = \frac{\mu-\delta}{2\theta} v_2^* \quad .$$

Then, putting these optimum quantities in price equations, profit maximizing values of viewer prices are

$p_1^* = \alpha_1 - \beta v_1^* - \gamma v_2^* - \delta a_1^*$, $p_2^* = \alpha_2 - \beta v_2^* - \gamma v_1^* - \delta a_2^*$ and those for advertisers are $q_1^* = \mu v_1^* - \theta a_1^*$, $q_2^* = \mu v_2^* - \theta a_2^*$.

Putting all the above values in the profit equations, maximum profits for the two channels are

$\pi_1^* = p_1^* v_1^* + q_1^* a_1^* - f_1$ and $\pi_2^* = p_2^* v_2^* + q_2^* a_2^* - f_2$.

Now, the equilibrium outcomes can be analysed in a greater details. For the denominator is positive. The numerator will be positive, provided, 2/è * [âè–{(ì–ä) /2}²]/ ã > á_j/á_i, where i,j=1,2; i ≠ j. Now , it is already stated that ã / [âè–{(ì–ä) /2}²] lies between 0 and 1. Therefore, [âè–{(ì–ä) /2}²]/ ã is greater than 1. Also, 2/è is greater than 1. Therefore, normally 2/è * [âè–{(ì–ä) /2}²]/ ã will exceed á_j/á_i. However, if á_j is much higher than á_i, and [âè–{(ì–ä) /2}²]/ ã is very close to 1, then may turn out to be non-positive. It implies that, if channels are not much differentiated and viewers have very low intrinsic value for a channel compared to its rival, then the channel with very low intrinsic value will cease to exist and the platform will endogenously become a monopoly platform. At this point a clarification is required about the difference between product differentiation and intrinsic values of the channels. Channels are considered to be differentiated in terms of programme variety in that particular genre whereas in most of the cases intrinsic value of a channel is determined by programme quality. Brand value of a channel may play an important role in the context of channel quality to the viewers. It may also be determined by programme variety if some varieties are available on that channel only and not on the rival channel. Quality in those cases may not matter much if viewers have prior demand for those varieties or start liking new programmes introduced on that channel. Different combinations of values of [âè–{(ì–ä) /2}²]/ ã and á_j/á_i yield different results for . One combination is considered above where [âè–{(ì–ä) /2}²]/ ã is close to 1 and á_j/á_i is much greater than 1.

If value of [âè–{(ì–ä) /2}²]/ ã also increases from 1 following increased product differentiation, then in the above situation ith channel may survive.

If [âè–{(ì–ä) /2}²]/ ã is close to 1 and also á_j/á_i is close to 1, then 2/è being greater than 1, both channels will survive and enjoy almost equal market shares.

If [âè–{(ì–ä) /2}²]/ ã is increasing from 1 and á_j/á_i is close to 1, then both channels will gain from higher product differentiation in terms of quantities, both viewing and advertising time so long as the total time devoted by the viewers to that particular category of channels, which is fixed in the short run, is exhausted. Consequently, equilibrium viewer price on both the channels will fall. Net effect on profit from viewers' side of the platform depends on relative strengths of quantity rise and price fall. However, price change on the advertisers' side of the platform remains ambiguous. If externality effect is stronger than direct quantity effect, then there might be price rise as well. So the net effect on profit depends on all these factors. If it is positive, then it is beneficial for both the channels to increase differentiation, if the intrinsic values are not very different.

Proposition 3: (i) *When the television channels have dissimilar intrinsic values to the viewers, low product differentiation will make the channel with lower intrinsic value unviable and the platform will endogenously become a monopoly platform.*

(ii) *When the television channels have similar intrinsic values to the viewers, increased differentiation may or may not be profitable for the channels.*

VII. CONCLUSION

This paper deals with a duopoly market with two commercial television channels broadcasting differentiated programme mix in the short run to shed light on future marketing strategies of the broadcasters after complete implementation of digital addressable system of cable distribution in India. Market is defined for a particular category of television channels, where category is defined on the basis of programme type and language of communication. Cross category competition is avoided here. The existing framework can be extended allowing for more than two competing channels in a category and cross category channel competition.

Within the given framework, if intrinsic values of the channels to the viewers are very close, product differentiation may or may not pay in terms of profits. This conclusion is different from that of a single-sided duopoly model of product differentiation where more and more differentiation surely increases profits of both the firms and each firm in effect becomes a monopoly. In the present framework, one of the duopoly firms may become a monopolist in the

particular cross category if viewers attach more intrinsic value to the channel's programme mix compared to its competitor where product differentiation is low. Therefore, to survive in this situation and to retain competition, the channel with lower intrinsic value has to increase product variety leading to higher differentiation.

Lastly, one important limitation of the study has to be mentioned here. Any application of the above discussed theoretical possibilities about broadcasters' strategies critically depends upon market readiness in this regard. Viewers' awareness about intrinsic value of a channel with willingness to pay for the content and precise disutility from commercial breaks has to be assessed first. There are high possibilities that the viewers who are familiar with a fixed subscription amount per month for a particular channel package, may not be able to understand worth of each individual channel precisely. Discussion in this paper presumes a mature consumer market for television service in India which may be found only in a few segments of the market and not in general Also there is another possibility that viewers are looking for some specific contents demand for which is not yet satisfied by the existing programme variety and they are willing to pay a high price for any niche channel catering their demand. For that matter, a primary field survey is required to understand the level of maturity of the market along with prominent market segments for different programme categories. Future research has to explore these areas to devise broadcasters' strategies more effectively.

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(Footnotes)

[1] Multi System Operators

[2] Telecom Regulatory Authority of India

[3] Free-To-Air

[4] Digital Addressable System

[5] Direct-to-Home

[6] Internet Protocol Television

[7] When an agent chooses to use only one platform, it is commonly said that the agent is single-homing. On the contrary, if an agent chooses to use several platforms, the act is termed as multi-homing.

[8] In the address-type models, goods are characterised by their attributes. Consumers have different tastes for these attributes. In equilibrium, the optimum degree of product differentiation is determined, that is, whether firms decide to produce goods that are close substitutes or that have attributes far apart in the space of attributes.

In the non-address-type models, there is a set of goods that can be produced and consumed. All or a subset of the available range of goods will be produced in equilibrium.