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Abstract

This paper examines the welfare effects of conglomerate mergers in the cable TV markets. Using Korea's regional market share data of individual cable and DBS service packages, we estimate a hierarchical (or nested) choice model in which consumers face two stages of sequential selection in the multi-channel video programming distribution (MVPD) market: the choice of delivery platforms (e.g., CATV vs. DBS) in the first stage and the choice of individual service packages in the second stage. Our estimation results show that the inclusive value of the CATV platform was significantly impaired in the monopoly markets compared to that in the competitive markets. On a strategic sense, this finding implies insufficient inter-platform (cable vs. DBS) competition in the MVPD market in Korea because the increased monopoly powers of CATV operators via a merger could not be otherwise exercised against the competitive constraints by the alternative DBS platform. We suggest it is necessary to promote more effective inter-platform competition in order to save both consumer welfare and the possible scale efficiency of voluntary mergers.

Keywords: Cable TV, DBS, Inclusive values, Multi-channel Video Programming Distribution (MVPD), Consumer choice theory, Nested logit model, Inter-platform competition.

Introduction

Will horizontal mergers of competing cable TV operators, recently observed worldwide, harm consumer welfare? The economic answer to this question is probably yes if the market of interest is properly delineated. It is simply because the monopolized firms would use the increased market powers for their interests by increasing prices and/or diminishing the quality of the market offerings (the products and services as a whole). This naïve conjecture in fact provides a basis for traditionally *per se* illegal attitudes toward conglomerate mergers in antitrust regulation around the world. However, the recent lawsuit cases emphasize the rule of reasoning perspectives for mergers by examining case-by-case economic rationale for the effective working of monopoly powers in a properly defined relevant market (U.S. DOJ and FTC 2006). Furthermore, what is critical in reasoning is not just the merger itself, but a through understanding of the underling market environments and the predictable consequences of the merger, fundamentally on the welfare of consumers.

In the cable TV industry we focus in this paper, it has been traditionally believed that local monopolies are inevitable because of the natural monopoly structure of the industry. Were the natural monopoly claim really true, a single big player will serve social welfare, in principle, by driving down the cable TV rates to the lower average cost than with competition. However, the effectiveness of the locally monopolistic cable market has been the major subject of economic inquiries in the previous literature. The literature has mostly endeavored to identify the effects of monopoly on some observable characteristics of the cable TV service, especially on the retail prices by comparing them across the regions with different market structures. For example, we list only a few among many others: Hazlett (1986) suggested that the cable TV prices were on average $ 1.82 lower when cable operators were subject to a competition. On the same ground, Merline (1990) argued that competition was feasible and beneficial to consumers by analyzing a number of overbuilt cable markets in the United States. Levin and Meisel (1991) also provided empirical evidence that

cable consumers pay less in competitive markets. Specifically, they applied an empirical model of 'reduced-form' price equation with a competition dummy index, and found that cable consumers in competitive markets pay about $3 less per month than in monopolized markets. In addition, there exist a lot of studies which supported the existence of intra-competitive constraint of the cable TV operators from charging supra-competitive prices, such as Levin and Meisel (1991) and Beil, et al. (1993) for instance. From a policy perspective on the while, Rubionvitz (1993) argued that the observed decrease of the price elasticity for cable TV service after deregulation would imply an increase in the market powers of the monopolized operators. Using data for 489 cable TV system operators in the US from 1984 to 1990, he contended that about 18 percent of the increase in the cable TV price since 1986 can be attributable to the increased exercise of market powers. It is also noteworthy that FCC (2001, 2003, 2005a, 2005b, 2006) observed that the cable price for the most popular services has dropped in the presence of competitors on one hand, but the overall cable prices continue to rise on the other hand at a rate much higher than the general inflation rate even in the presence of DBS (direct broadcasts satellite).

The other strand of literature has focused on the question whether the DBS platform exerts significant competitive pressure on the cable TV prices. The results are quite mixed up however. For example, Hausman (1999) contented that the DBS seems not to be a substitute for cable TV services based on the historical fact that the cable TV prices have only responded to the prices of other cable over-builders but not to the price of DBS. To explain the fact, he pointed out DBS's inability to provide the local terrestrial broadcast signals, high start-up costs, and so on. On the similar vein, General Accounting Office (2002) also examined the inter-platform competition between DBS and cable TV with a negative conclusion. Recently, however, we observe some studies in support of the DBS-CATV competition. For example, Karikari, et. al. (2003) found that the head-to-head competition among cable over-builders disturbs the penetration and entry of DBS operators by lowering the cable prices and also increasing the number of channels in a package.

Goolsbee and Petrin (2004) found that DBS works as a close substitute for premium cable services and the cable subscribers thereby enjoy substantial welfare gains from the entry of DBS. Wise and Duwadi (2004) contended that the key determinant of DBS-CATV substitutability is the level of switching cost such as inconvenience in the transition period, and the penalty of violating long-term contracts. On this ground, they contended that the cable TV consumers are immobile to small changes in service attributes but are ready to turn to DBS as a substitute when they face a significant increase of quality–adjusted cable prices.

Standing on these two strands of literature, we examine the welfare consequence of cable TV monopolization in Korea and the effectiveness of DBS' competitive constraint on the cable TV. In particular, we contend that a failure to identify any change in observable post-merger characteristics (price, for example.) is neither a sufficient nor a necessary condition for dismissing the presumed anticompetitive effect of conglomerate mergers. This is because the real world pricing and marketing practice often take a disguised form such as shifting a popular channel formerly included in the basic tier to the high-price premium tier. Because the detail of channel compositions and the level of customer services are often unobservable to researchers and regulators, it is very likely to end up with no significant post-merger changes at all. However, as we argue in this paper, the merger of competitive firms can harm consumer welfare in a more fundamental ground even without necessarily changing the price and/or quality of the product/service in concern. From consumers' perspective, the reduced choice set (i.e., the number of alternative service packages) usually following a merger is by itself a tremendous challenge to their welfare in terms of the rationality principle of "the more, the better". Though straightforward, this choice-set perspective has not been fully exploited in the previous literature on the subject.

An example is helpful to clarify the point. Suppose a typical consumer had J cable TV service packages before a merger. If she derives the utility U_j from each individual package j, she actually enjoys

the maximum of the utilities, $U = \underset{j}{Max}\{U_j\}$. After a merger, it is very often for the merged operator to streamline its service packages (i.e., reducing J) to save operating costs. This reduction of choice set surely harms the welfare of the cable TV consumers who preferred one of the truncated packages. And the affected consumers in this situation would then respond by possibly seeking the second-best service package in the same delivery platform, or would otherwise ladder up to the upper-level choice of alternative platforms (such as CATV vs. DBS). On the other hand, from a strategic viewpoint, the merged firm would reduce the effective enjoyment of consumers only when they can expect from the underlying market structure that the revenue loss from the inter-platform transitions are not substantial compared to the expected cost saving. In other words, the success of any monopoly attempt (in pricing and other conducts) critically hinges on the existence of competitive constraints in the similar spirit to the well known SSNIP test of antitrust market definition (NERA 2001).

Specifically, we focus on the welfare impact of the monopolization of local cable TV operators with a possible competition against a national-coverage DBS operator in Korea. Because a detailed post-merger data is not available, we employ a unique choice-theoretic estimation method that is not only efficient in data requirement but also can successfully identify the utility loss of reduced choice set as mentioned above. Technically, we estimate the welfare effects through the "inclusive value" parameter in the hierarchical (or nested) logit model associated with the random utility theory of consumer choice (McFadden 1978). After constructing a hierarchical choice model of multi-channel video programming distribution (MVPD) services, which can be implemented by the ordinary market share data, we seek to answer to the main question if the "inclusive" (or maximum attainable) values of cable TV services are significantly lower in the regions with single cable system operator in comparison to the regions with multiple cable system operators. The choice-theoretic approach will not only enrich the nature of competition from consumers' perspectives but also give a

strategic implication for the effectiveness of DBS-CATV competition (Goolsbee and Petrin 2004) because significant shrinkage in the inclusive values of cable TV services in monopolized markets, if observed, may clue insufficient competitive constraints by the national DBS operator for some reasons.

The paper proceeds as follows: We begin by summarizing a brief overview of the Korean cable TV industry. Many of the characteristic features of the cable industry are the consequences of regulatory intervention. This review addresses relevant issues in this study. In particular, we introduce ever-intensifying competition concerns in the market that are triggered by the recent mergers of cable TV operators in many local markets and also by the emergence of national-coverage new delivery platforms, such as DBS and IPTV. We develop a theoretical foundation for our economic model and introduces the nested logit and a feasible GLS estimation technique. As mentioned, our key parameter of interest is the inclusive value of CATV services as a whole and its variation across the regions. Then, we describe the data and estimation results with a discussion on the inter-platform MVPD competition from a strategic viewpoint. Finally, we summarize the results of our study and discusses their policy implications.

Brief history of the cable TV industry in Korea

Overview

This section explores the growth of competition in the MVPD market in Korea. Generally, local cable TV markets have either monopoly or duopoly structures. In the case of United States, for example, the form of franchised monopoly prevails with only some exceptions. It is known that there exist only a few hundred examples of competitive franchises in a region among 33,000 franchise regions in the United States (FCC 2007). In contrast, the market structure of the Korean cable TV industry is somewhat different. First, Korea has a substantial share of duopoly structure. In 2005, for example, there were 42 duopoly regions among 77 franchise regions in Korea. Second, Korea has a unique market structure possibly in between of

monopoly and duopoly as it takes the form of duopoly on appearance but with no direct competition with each other. A historical review helps to understand this peculiar market structure of the Korean cable TV industry.

The first cable TV services in Korea date back to the period of installing community antenna televisions in the late 1960s. Community antenna television service operators, known as the relay operator (RO), provided terrestrial broadcasting channels and a few foreign satellite channels. When Korea's cable TV services started officially in 1995, there were 875 relay operators across the country (Schejter & Lee 2007). Franchising became common in the early days of the cable industry because of the belief that economic welfare can be maximized by exclusive franchise agreements. The Korean government also regarded the cable TV industry as a natural monopoly, where it is more efficient for a single company to provide services. On this ground, 53 cable system operators (SO) were licensed in the metropolitan cities in 1995, and 24 additional licenses were issued in 1997 for small and medium-sized cities and the rural areas. Legally, those 77 cable system operators were allowed an exclusive monopoly status in each of 77 local markets in the country.

However, the relay operators and the newly licensed cable system operators have competed with each other in the same market for the MVPD services. Since the relay services and cable TV services were not included in the same regulatory market, the relay operators and cable operators were under different regulatory frameworks. In fact, the existence of relay operators discouraged the early development of cable TV services in many respects. To cope with the competition with the cable operators, the relay operators provided illegal multi-channel services at lower prices, and also upgraded their own networks to the level of cable TV operators even without obtaining proper licenses from the government. Consequently, the penetration rate of cable TV services was only 11.2% of all households by 1996 and 17.4% by 1997. As

Figure 1 shows, the number of cable operators' subscribers was significantly low until the late 1990s, while the number of subscribers to relay operators was relatively high until 2000.

<Figure 1>

To respond the conflict between RO and SO, Korean government finally gave relay operators legal privileges to overbuild and compete with the cable operators in the same local market. Therefore, the cable TV market structure changed to a dual franchise system (RO and SO) in many of 77 local markets in 2001. With the transformation of relay operators to cable operators, the number of relay operators has decreased significantly. While the RO-SO conflict was mostly resolved in this way, the direct broadcasting satellites (DBS) system was introduced in 2002 as a new and potentially more threatening alternative delivery platform to the cable TV services. Technically, DBS can offer more channels with digital video and CD-quality sound nationwide, and can appeal to the rich segment of the multi-channel video consumers. However, DBS was handicapped with certain limitations, such as high set-up costs[1] and long-term contracts to recoup the installation and equipment costs. Besides, DBS was prohibited from offering local terrestrial broadcast channels until the early 2006. Even after terrestrial broadcasters agreed to provide their contents to Skylife (the only DBS provider in Korea), the incumbent cable system operators are still exercising their monopoly of certain popular video channels by preventing them from distributing over the DBS platform. In the face of such obstacles, Skylife had to rely on less popular foreign channels. Nevertheless, DBS service has grown steadily to be one of the most important competitors to cable TV services. Table 1 shows the number of subscribers and the shares (in parenthesis) of MVPD services by RO, SO, and DBS respectively.

<Table 1>

As Table 1 shows, Korea's MVPD market experienced a spectacular growth. As of 2006, nearly 80 percent of 17 million Korean households subscribe to one of those MVPD services. One of the major reasons

[1] Although both cable TV and DBS charge installation fees, DBS charges more start-up costs.

of the rapid expansion is the relatively low subscription price of cable TV services which is on average about $5 per month. As we discussed before, this low subscription price is partly attributable to the competition between relay operators and cable operators.

Since relay operators do not play an important role in the MVPD market any more (see in Table 1), cable TV services and the DBS services potentially compete with each other in the MVPD market of Korea. However, it is not easy to examine whether or not the competition is strong enough because both cable and DBS services are still under the growth stage as is gleaned from Table 1.

Market structure and the cable prices

As described earlier, fierce competition between relay operators and cable operators has exerted significant downward pressure on the retail price of the cable TV services in Korea. Price competition has continued in the form of legal duopoly even after many relay operators were transformed to cable operators. There is though a striking difference in the cable subscription prices across the regional markets with different market structures. Table 2 shows a current situation of monopoly regions and competitive regions from 2004 to 2006 in the Korean cable television market. In 2004, there were 35 monopoly markets (denoted as M), 32 competitive markets (denoted as C) and 10 overbuilt markets (denoted as O) which have two different operators under the same corporate ownership.[2] Note that the number of effectively competitive regions (C) has decreased from 32 in 2004 to 20 in 2006 due to the recent conglomerate trends in the cable TV industry in Korea. This merger trend is in fact a major concern of the competition agency, the Korea Fair Trade Commission (KFTC). For example, KFTC recently challenged the merger of two system operators (HCN and Gumho) in the same regional market with an anti-trust perspective.

<Table 2>

[2] One of the reasons of the overbuilt operation by a single corporate can be found in the merger regulations in Korea. By regulation, it is

It is known that the KFTC's challenge against the merger was largely based on an econometric analysis of comparing the cable prices between monopoly regions and competitive regions. Using an aggregate cable prices and service characteristics, the KFTC found that the competition lowered the cable prices by about 15 percent while increasing the number of cable channels by about 8 percent. Furthermore, concerned with a series of mergers between cable operators, the KFTC announced that it would step in and make sure that a merger is not anti-competitive on the empirical ground. We will criticize in the next section the 'endogeneity' of the aggregate price measures in this reduced-form model of price comparison. On the other hand, Youn et al. (2007) analyzed the competition between cable TV and DBS using a survey data on households' decision on the adoption of DBS and cable TV services. They showed that a household in a monopolistic cable TV market is more likely to adopt DBS than that in a competitive cable TV market as is weakly supportive to the inter-platform competition of interest.

Potential challenge of IPTV

Over the last few years, there has been a rising interest in the IPTV services in Korea. The telecom-broadcasting convergence is shifting into a new phase as the telecom incumbents are actively preparing for the entry into the traditionally tabooed broadcasting sector. In 2006, Hanaro Telecom which is the second largest PSTN operator in Korea launched its IP-VOD services. However, IP multi-channel services are still prevented in Korea by regulation. Telecom and broadcasting industries are both defined as regulated industries with the latter having far more tight protection and political consideration. Given that the Ministry of Information & Communication (MIC) and the Korean Broadcasting Commission (KBC) maintain vastly different ideas about how IPTV multi-channel services ought to be regulated, it will not be easy for a commercial IPTV service to debut in the near future.

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currently prohibited that a single operator has more than 33% market shares nationwide or it operates in more than 15 regional markets.

Nevertheless, it is interesting to observe one of the key debates for IPTV entry requirements. KBC argues that potential IPTV service provider should be evaluated in accordance with the current broadcasting regulations simply because the market and business model of IPTV and cable TV services are virtually identical. One of the major problems in the broadcasting industry's legacy regulatory framework is the presence of 77 cable franchise regions as we mentioned by which no single company is allowed to operate in more than 15 regions. On this ground, KBC persists that IPTV should be subjected to the same guideline of the ownership restriction.

In summary, there still remains a great deal of regulatory uncertainty and complexities until a full fledged form of IPTV would finally debut into the MVPD market as a new player. In the mean time, the market will be contested by the incumbent cable system operators and the DBS operator. Therefore, we will focus hereafter on the competition between the two delivery platforms in the first round and among many individual service packages in the second.

Empirical Model

Nested Choice Model

Let $r = 1,2,\Lambda\ ,R$, $i = 1,2$, and $j = 1,2,\Lambda\ ,J_i^{(r)}$ denote the index for the regional market r, the type of delivery platform, either cable ($i = 1$) or DBS ($i = 2$), and individual service package j for each platform in a market. Letting $U_{i,j}^{(r)}$ denote the random utility associated to the choice alternative (i, j) at market r, we have

$$U_{i,j}^{(r)} = f(X_i^{(r)}) + g(Z_{i,j}^{(r)}) + e_{i,j}^{(r)}, \tag{1}$$

in which $X_i^{(r)}$ represents the platform-specific attributes at market r, $Z_{i,j}^{(r)}$ the package-specific attributes such as the price and the number of channels included. If the error term $e_{i,j}^{(r)}$ follows a generalized extreme value (GEV) distribution with the correlation measure of $\sigma \in [0,1)$, the probability that a representative customer at market r choose the platform-package pair of (i, j) can be structured as a sequential probabilistic decision model such as

$$P_{i,j}^{(r)} = P_i^{(r)} \times P_{j|i}^{(r)} \tag{2}$$

where $P_i^{(r)}$ denotes the 1st stage marginal probability of choosing the i[th] platform, and $P_{j|i}^{(r)}$ denotes the 2nd stage conditional probability of selecting the j[th] service package once the i[th] platform is chosen beforehand. Applying the random utility theory of choice (McFadden, 1978), it is easy to derive

$$P_{j|i}^{(r)} = \frac{\exp((1-\sigma)^{-1} g(Z_{i,j}^{(r)}))}{\exp(IV_i^{(r)})} \tag{3}$$

where $IV_i^{(r)}$ denotes the "inclusive value" of the i[th] platform that represents the expected maximum utility of the service packages available in the i[th] platform at market r such that

$$IV_i^{(r)} = E\left(\max_j U_j\right) = \log \sum_{j=1}^{J_i^{(r)}} \exp\left((1-\sigma)^{-1} g(Z_{i,j}^{(r)})\right), \tag{4}$$

and

$$P_i^{(r)} = \frac{\exp(f(X_i^{(r)}) + (1-\sigma) IV_i^{(r)})}{\sum_{h=1}^{2} \exp(f(X_h^{(r)}) + (1-\sigma) IV_h^{(r)})} \tag{5}$$

This model is usually dubbed as the nested multinomial logit model (NMNL). Figure 2 illustrates the process of sequential decision of a representative customer for the choice of a specific MVPD service package.

<Figure 2>

Note that the inclusive value $IV_i^{(r)}$ in Equation (4) is the key parameter of interest in this paper. The intuition is rather clear: When choosing a platform in the first stage, the consumer would consider in advance the maximum attainable utility conditional on the choice of each platform, and then would more likely choose the platform with higher inclusive value if being equal in other platform-specific factors in $X_i^{(r)}$. From Equation (4), it is also clear that the inclusive value is determined by two key components: the number of choice alternatives ($J_i^{(r)}$) and the value of package-specific characteristics ($g(Z_{i,j}^{(r)})$). Therefore if we specify a linear utility function such that

$$g(Z_{i,j}^{(r)}) = Z_{i,j}^{(r)\prime}\beta, \quad f(X_i^{(r)}) = X_i^{(r)\prime}\alpha \tag{6}$$

the value of each platform can be decomposed into the vector of observable package characteristics (such as the number of channels and the price) and the consumers' evaluation of the marginal contribution of each characteristic (represented by the slope parameter β). Therefore, we can infer at this moment that a monopolization will change the inclusive values in two distinct ways, either through the reduction of the choice alternatives or the impairment of individual package values if the consumer response (β) is intact. From Equation (5), it is also noteworthy that the model reduces to the usual multinomial logit model (MNL) when the choice alternatives within a nest are mutually independent (i.e., $\sigma = 0$) such that

$$P_{i,j}^{(r)} = \frac{\exp(f(X_i^{(r)}) + g(Z_{i,j}^{(r)}))}{\sum_{(h,k)} \exp(f(X_h^{(r)}) + g(Z_{h,k}^{(r)}))}.$$

Estimation

In this subsection, we explain how to estimate the parameters in the nested logit model. Basically we follow the "share-ratio" estimation technique in Bechtel (1990) which utilizes the linearity in the log odd

ratios of the choice probability inherent in Equation (3), (5) and (6). The idea is quite simple. If we exactly observe the marginal and conditional probabilities, it is easy to derive

$$\log \frac{P_{j|i}^{(r)}}{P_{k|i}^{(r)}} = (1-\sigma)^{-1}(Z_{i,j}^{(r)} - Z_{i,k}^{(r)})'\beta \tag{7}$$

and

$$\log \frac{P_{i}^{(r)}}{P_{h}^{(r)}} = (X_{i}^{(r)} - X_{h}^{(r)})'\alpha + (1-\sigma)\times(IV_{i}^{(r)} - IV_{h}^{(r)}) \tag{8}$$

where α denote the contribution of platform-specific factors in the 1st stage decision, and $IV_i^{(r)}$ is substituted by Equation (4). Of course, we do not observe the exact probabilities in the model. In stead, we observe the market share of each platform and the conditional share of each service package at each regional market, denoted as $S_i^{(r)}$ and $S_{j|i}^{(r)}$ respectively. Because the market shares are consistent estimates of the underlying choice probabilities, we can construct a regression analogue to the above model such as

$$\log \frac{S_{j|i}^{(r)}}{S_{k|i}^{(r)}} = (1-\sigma)^{-1}(Z_{i,j}^{(r)} - Z_{i,k}^{(r)})'\beta + \varepsilon_{j,k|i}^{(r)} \tag{9}$$

and

$$\log \frac{S_{i}^{(r)}}{S_{h}^{(r)}} = (X_{i}^{(r)} - X_{h}^{(r)})'\alpha + (1-\sigma)\times(IV_{i} - IV_{h}) + \varepsilon_{i,h}^{(r)}. \tag{10}$$

Note that the error terms in the regression model in Equation (9) and (10) are correlated with heteroscedastic variances because they belong to the same type of platforms and are also divided by the common terms (assume the denominators be the market shares of the last choice alternatives without loss of generality). Applying the "delta" method (Rao 1973; Greene 2003), Bechtel (1990, p.234) kindly described how to construct the variance-covariance matrix (Σ) of the error terms in the 1st and the 2nd stage regressions, and their consistent estimate ($\hat{\Sigma}$) so that a feasible generalized least square (FGLS) method is applicable. That is,

the regression coefficients $\frac{\beta}{1-\sigma}$, α, $(1-\sigma)$ are estimated in sequence by the least square method after pre-multiplying the LHS and RHS variables in (9) and (10) with the cholesky root of the inverse of estimated variance-covariance matrix, i.e., $\hat{\Sigma}^{-1/2}$ (See Greene (2003) for a detail of the FGLS method). Finally, it should be noted that the parameters $1-\sigma$ should be in the unit interval to make the model consistent with the random utility theory (Borsch-Supan 1990), and the hypothesis of the nested model structure can be tested by the null hypothesis of $H_0 : 1-\sigma = 1$. In the following empirical section, we implement the FGLS regression using R, an open-source statistical language[3].

Data and Results

Data

The data is based on the two-year official statistics published by the Korean Broadcasting Commission (2005, 2006), which is co-responsible for broadcasting regulation and policy with the Ministry of Information and Communications. As described, Korea has 77 cable TV franchise regions (R=77) in which either one or two system operators provide cable TV services. In addition, consumers in each regional market can alternatively choose the monopoly DBS operator (branded as 'Skylife') which employs with a national coverage satellite system. The unit of analysis in this paper is the choice of CATV vs. DBS in the 1st stage (i.e., the upper-level choice in Figure 2), and then the conditional choice of individual service package in the 2nd stage (i.e., the lower-level choice in Figure 2) which consists of different channel composition and prices.

Usually the cable TV operators in most franchise regions offer one or more additional packages of channels in addition to the basic package (or tier). Cable services vary widely in terms of quality and price from community to community. That is, the number of packages varies across the regional market segments

[3] The codes can be obtained from the author upon request.

mostly due to different market structures ranging from just one package by a monopoly cable operator to as many as 10 packages by two competing cable operators. Figure 3 shows the empirical distribution of the number of cable TV service packages in a regional market for the pooled sample period of 2005 and 2006.

<Figure 3>

On the other hand, the DBS operator offers three differentiated packages of channels nationwide.

In order to identify the effect of competition on consumer welfare, we classify cable TV markets into three groups of monopoly ($C_r = 1$), overbuild ($C_r = 2$), and effective competition ($C_r = 3$). Monopoly represents the region with only a single SO, overbuild represents the region with two cable operators under control of the same corporate ownership, and effective competition means the region with two independent cable operators.

Results

As a preliminary analysis, we compare the price per channel of cable TV operators by the corresponding market structure (C_r). This is in a similar spirit to Emmons and Prager (1997), and also to as conducted by KFTC in the recent merger case as we addressed earlier. To construct the measure of interest, we calculate the ratios of weighted average of prices and the number of channels provided by each operator as follows: Let $s_{k,j}$ be the number of subscribers to the service package j of operator k, $P_{k,j}$ be the monthly subscription price (in KRW[4]) of the package j, and $N_{k,j}$ the number of channels included in the package. Then, the weighted price per channel of every regional SO in the sample can be constructed as

$$Q_k = \frac{\sum_j s_{k,j} P_{k,j}}{\sum_j s_{k,j} N_{k,j}}. \qquad (11)$$

Figure 4 depicts the empirical distribution of the price measures by the regions of different market structures. The group averages are 126.5 KRW for monopoly markets, 100.9 KRW for overbuild markets and 100.2 KRW for competition markets. And the difference of price per channel between competition and monopoly was found statistically reliable at 1% significance level.[5]

<Figure 4>

From this finding alone, one may contend that the horizontal merger of cable TV system operators harms consumer welfare by increasing the price per channel about 25% around. However, this reasoning can be shaky on the following grounds. First, the price measure is obviously endogenous because it is weighted by the number of subscribers which is in fact a result of pricing. Second, the measure is narrow sighted by assuming that consumer values only the adjusted price of the services. In fact, the number of channels by itself may increase the consumer welfare by allowing more choices to viewers, and also increasing the chance of including popular contents in the package. Therefore, we provide the above findings only as subsidiary evidence to the main results in the sequel.

To implement the nested choice model, we begin with the lower-level conditional choice of individual packages in Figure 2. As is in the choice probability in Equation (3) and its FGLS implementation in Equation (9), a typical consumer in each market r will choose the service package that gives her the maximum utility. For the package specific attribute $Z_{i,j}^{(r)}$, we included the log number of channels and the log monthly subscription prices (in KRW) for every CATV and DBS service package in each regional market. From Equation (9), note that any demographic attribute such as the level of income and education is dropped out of equation by differencing from a base package in the model.

[4] KRW (Korean Won) is the Korean currency unit. As of January 2007, 1 USD amounts to about 900 KRW.
[5] To save the space, we omitted the ANOVA result.

Using 980 market share ratio observations, we implemented the FGLS estimation in Equation (9) with the results summarized in Table 3.

<Table 3>

The adjusted R^2 was 0.60, and the overall significance of the model was strong with the p-value of the F-test very close to 0. In addition, the estimated parameters look quite natural because it was found that consumers derive significant utility gains from more channels and lower prices.

We now proceed to the upper-level choice of delivery platforms, either CATV or DBS. As is in Equation (4) and (10) respectively, the overall utility of each platform comes from two distinct parts, one from the impact of platform-specific factors ($X_i^{(r)}$) and the other from the effect of the inclusive values (IV) which are derived by the lower-level choice parameters by the definition of IV in Equation (4) and the estimated parameter $\hat{\gamma} \equiv (1-\sigma)^{-1}\beta$ in Equation (9). That is, we substitute the IV's in Equation (10) with

$$IV_i^{(r)} = \log \sum_{j=1}^{J_i^{(r)}} \exp\left(Z_{i,j}^{(r)\prime}\hat{\gamma}\right), \tag{12}$$

and then apply the FGLS method to Equation (10) in order to consistently estimate the parameters of α and $(1-\sigma)$. On the other hand, we specified the platform specific factors ($X_i^{(r)}$) simply as the dummy variable for the cable TV platform ($i=1$) so that

$$X_1^{(r)} = 1, \quad X_2^{(r)} = 0 \quad for\ r = 1,2,\Lambda\ , R. \tag{13}$$

In this case, the parameter α captures the overall value advantage of cable TV platform over DBS in terms of anything other than the effect of inclusive values. For example, it may indicate the higher installation charges of DBS, cost saving of the popular CATV-Internet bundles and etc. In this way, the estimate of α would inform us the magnitude of economic and/or psychological switching cost in the choice

of delivery platforms from consumers' perspectives. Using the log ratio of CATV-DBS market shares in 153 regional franchise regions[6], we find the estimation results in Table 4.

<Table 4>

It turned out that this upper-level choice model has particularly high level of goodness of fit (R^2=0.91) and the estimated signs of parameters are reasonable. First, the positive α indicates that the average Korean consumer has a favorable attitude to cable TV platform over DBS in addition to the number of channels and prices measured in the inclusive values. Second, the estimate of $1-\sigma = 0.13$ (so $\sigma = 0.87$) indicates that consumers reasonably favor the package with higher inclusive values, and this corresponds to the random utility theory (McFadden 1978).

Discussion

In this subsection, we discuss about the welfare consequence of cable TV monopolization using the previous estimation results. First, as we contended in introduction, monopolization may hurt consumer welfare by reducing the number of available service packages or deteriorating the merit of individual service packages (in channel composition and prices). Obviously, this effect can be gleaned from the estimated inclusive values. It is possible to calculate IV's of cable TV and DBS platforms for each of 153 sample franchise regions. Because the DBS operator has identical service packages across the region, the IV for DBS was estimated equal at -21.70 at every region. In contrast, the IV's for cable TV platform significantly vary across regions ranging from -20.68 to -12.05 depending on the number of packages, and the number of channels and price for each package. Figure 5 illustrates the distribution of cable IV's.

<Figure 5>

[6] The sample for one regional market in 2006 was discarded because it has only one CATV service package. Because our FGLS estimation method works with differencing from a base alternative as in (9) and (10), this sample is incompatible.

The group average of cable IVs was -19.33 for the monopoly markets, -18.13 for the overbuild markets, and -17.94 for the competitive markets. In the utility domain, this certainly implies that the consumers in the competitive regional market enjoy the higher values of the cable TV platform than the DBS. To make this prediction more robust, we run a regression of the difference of IVs (Cable vs. DBS) on the dummy of monopoly market structure as follows:

$$\log(IV_{CATV}^{(r)}) - \log(IV_{DBS}^{(r)}) = \delta_1 + \delta_2 \times [C_r = 1] + e^{(r)} \quad (14)$$

Table 5 reports the results with a satisfactory explanatory power (R^2=0.83).

<Table 5>

Two findings are striking. First, $\hat{\delta}_1 = 3.68$ shows that the cable TV platform is on average perceived better than DBS in terms of the inclusive values. Second, $\hat{\delta}_2 = -1.318$ indicates that the IV advantage of cable TV platform is significantly lower in the monopoly markets. In particular, the latter finding draws an important implication to the nature of inter-platform competition between cable TV and DBS. If the monopolized cable TV operator considers DBS as a fatal competitor, it is hardly to observe this deterioration of cable TV values in the monopolized markets. Therefore, the above results substantiate in a way insufficient competition between cable TV and DBS platforms in the upper-level choice of consumers. Recall that we found the cable TV platform has significant advantage over DBS ($\hat{\alpha} = 1.545$ in Table 4).

What factors may be then responsible for this significant choice advantage in favor of cable TV in Korea? Though not explicitly modeled in the paper because of data limitation, we conjecture several possible factors: First, initial set up is more expensive and cumbersome for DBS because it must install a dish antenna in a proper way outside the residence. Second, as we addressed in the market review section, the incumbent cable TV operators prevent the DBS operator from distributing popular video contents by an exclusive agreement with the program providers. This should further harm the merit of DBS for many entertainment-

oriented consumer segments. Third, it is not until the beginning of 2006 when DBS finally began to provide the terrestrial broadcast channels after many conflicts with the broadcasters and regulators. Fourth, cable TV operators usually provide bundling services of broadband Internet services and CATV services at low prices. In fact, many cable TV operators are now planning to provide so called 'the triple play' services including video, telephony and high-speed Internet services around the end of 2007. Because those bundled packages give consumers some discounts and convenience, the DBS operator must feel handicapped in acquiring customers[7]. In all, these factors must function as a substantial switching cost (Klemperer, 1995) to the interests of consumers that in fact 'lock-in' the cable TV consumers even with the diminishing inclusive values after the recent conglomeration of the cable TV markets.

Finally, one may question that the CATV advantage (α) in the upper-level choice of platforms can vary across the regions with different market structures. In fact, if monopolized cable operators deteriorate other characteristics than the number of channels and prices, consumer reaction to this change should appear in the shrinkage of α in the monopolized markets. To address this possibility, we rerun the upper-level choice model in Equation (10) by allowing α interact with the monopoly dummy variable such as $\alpha = \alpha_0 + \alpha_1 \times (C_r = 1)$.[8](See Table 6)

<Table 6.>

Comparing with Table 5, we find the advantage of cable TV platform over DBS drops only insignificantly in the monopolized cable markets. Therefore, we can conclude that the increased monopoly power in the conglomerated cable TV market is more likely exercised to downgrade the inclusive values of

[7] In fact, the DBS operator also provides some bundled packages with alliance to other telecommunication operators. However, the size of discount is far smaller than those by the CATV operators.
[8] Note that the other parts of the model (including inclusive values) are invariant to this modification.

cable TV services in the lower-level choices than to deteriorate the value of other characteristics in the upper-level choices.

Conclusion

In this study, we have shown that the recent monopolization of CATV operators in Korea negatively affected consumer welfare utilizing a hierarchical consumer choice model (McFadden, 1986). In particular, we found that the inclusive value of the CATV platform has decreased significantly in the monopolized regional markets compared to the competitive markets. On a strategic sense, this highlights insufficient inter-platform (CATV vs. DBS) competition in the MVPD industry in Korea because the observed deterioration of consumer welfare could not be otherwise exercised against the competitive constraints by the alternative DBS platform.

Several policy implications stand out. First, a new regulatory framework should be established to promote competition in the MVPD market as a whole. Recently, a potentially competitive pressure from the supply side is being intensified by the emergence of alternative distribution technologies, such as DBS and IPTV. Local exchange carriers and Internet service providers are ready to offer IP based multi-channel video programming services in the very near future, but they cannot yet provide full-fledged services because of regulatory hurdles we discussed earlier. The concern of Korean regulators regarding the entry of telecom operators to MVPD markets is mostly based on antitrust considerations on the spill-over of monopoly powers in telecom market to the MVPD market. However, this stance itself can be anticompetitive. In order to justify the spill-over argument, the MVPD market should be sufficiently competitive. To the contrary, we found in the paper that the CATV markets are recently being conglomerated with a negative impact to consumer welfare, and the competition with the existing DBS platform is insufficient due to many functional and

perceptual disadvantages of DBS. There are two options in securing competition in the MVPD market. The first option is to prevent the mergers of cable operators in the same franchise region to maintain at least the duopoly market structure. This is consistent with the recent decision of KFTC. The second option is not only to allow mergers between cable operators, but also to promote more effective inter-platform competition in a more broadly defined MVPD market. Clearly it is the second option which is in accord with the global regulatory trends. DBS and IPTV may have effective competitive constraints on the conducts of monopolized cable TV operators for the interest of public. As we showed in this study, such a pro-competitive policy will help unsatisfied cable TV customers switch to the other platforms in the first stage choice of delivery platforms. Second, program access policy also should be considered. In fact, exclusive dealing of popular contents by the vertically integrated incumbent cable operators has served as the most powerful entry barrier to the MVPD market in Korea, and it is one of the main reasons for the weakness of DBS which we observed in this paper. Without properly correcting for this anticompetitive practice, it will be very difficult to make the proposed inter-platform competition really effective. Therefore, a new regulatory policy, such as nondiscriminatory program access rule, should be introduced to create a comprehensive framework for the level-ground and technology-neutral competition in the MVPD market in Korea.

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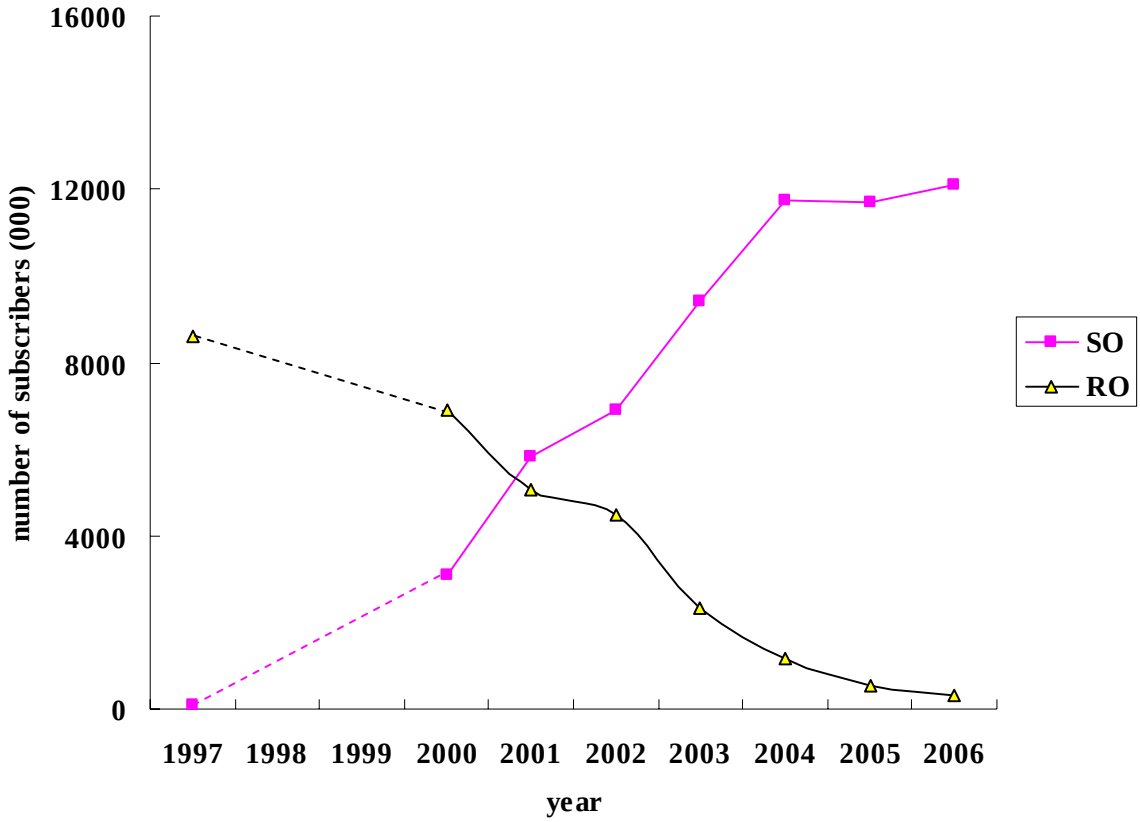
Figure 1. Number of Subscribers of RO and SO (1997-2006)



Sources: Korean Broadcasting Commission.

Figure 2. Hierarchical Choice of MVPD Services

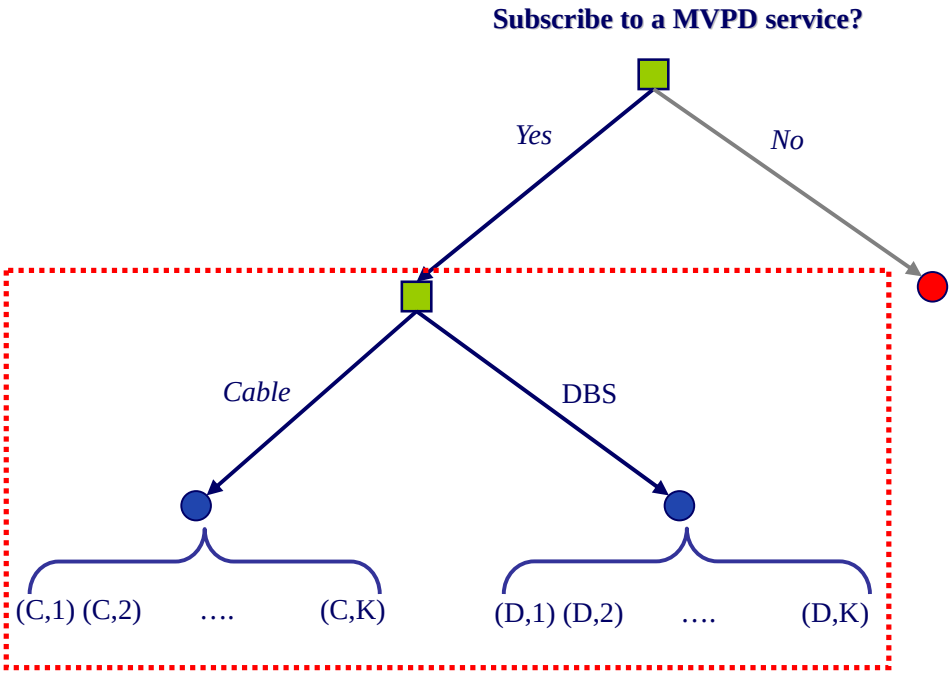
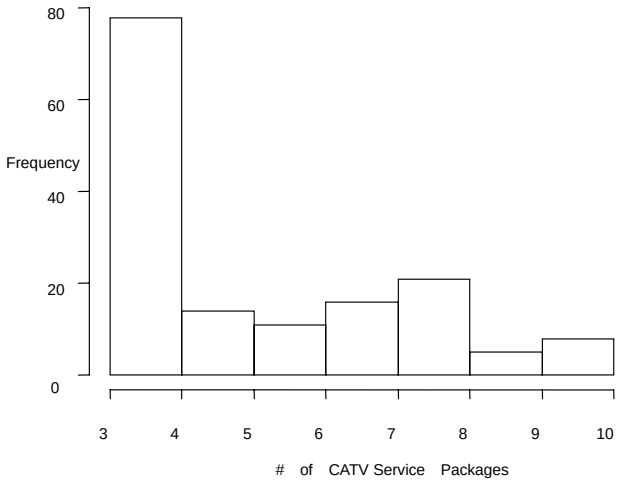


Figure 3. Distribution of the Number of CATV Service Packages in a Region (2005-2006)



Sources: Korean Broadcasting Commission.

Figure 4. Comparison of Per-channel Subscription Prices by Market Structure

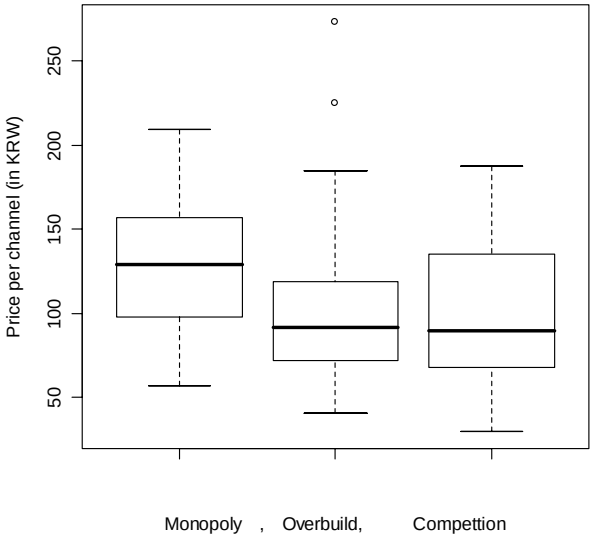


Figure 5. Estimated Inclusive Values of CATV Services by Market Structure

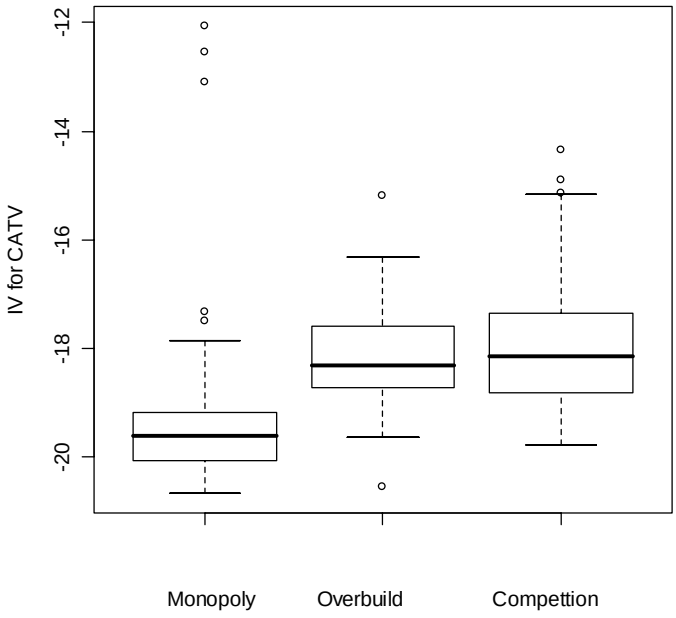


Table 1. Number of Subscribers and Market Shares of RO, SO, and DBS (2001-2006).

Unit: thousands.

	2001	2002	2003	2004	2005	2006
SO	5,844 (52.7%)	6,912 (60.0%)	9,402 (75.2%)	11,724 (82.6%)	11,694 (83.3%)	12,083 (84.6%)
RO	5,062 (45.7%)	4,502 (38.4%)	2,323 (18.6%)	1,179 (8.3%)	519 (3.7%)	297 (2.1%)
DBS	176 (1.6%)	302 (2.6%)	779 (6.2%)	1,297 (9.1%)	1,826 (13.0%)	1,903 (13.3%)
Total	11,082	11,716	12,504	14,200	14,039	14,283

Sources: Korean Broadcasting Commission.

Table 2. Comparison of Monopoly and Competitive Cable TV Markets (2004-2006)

	2004				2005				**2006**			
	M[1)]	O[2)]	C[3)]	Total	M	O	C	Total	M	O	C	**Total**
No. of Regions	35	10	32	77	35	17	25	77	46	12	19	**77**
No. of Cable Operators	**35**	**20**	**64**	**119**	**35**	**34**	**50**	**119**	**46**	**24**	**38**	**108**

1) M: Monopoly; 2) O: Overbuild; 3) C: Duopoly with direct competition.

Sources: Korean Broadcasting Commission.

Table 3. Estimation for the Effect of Number of Channels and Prices

(lower-level choice model)

	Estimates	t-values	**Significance**
Log # of channels	1.937	10.52	***
Log subscription price	**-3.265**	**-30.50**	***

*** Statistically significant at 1% significance level.

Table 4. Estimation for the Effect of CATV Dummy and Inclusive Values

(upper-level choice model)

	Estimates	t-values	**Significance**
CATV dummy (α)	1.545	14.55	***
Inclusive values ($1-\sigma$)	**0.134**	**3.85**	***

*** Statistically significant at 1% significance level.

Table 5. Estimation for the Effect of Monopoly on the Difference of Inclusive Values.

	Estimates	t-values	**Significance**
Intercept (α_0)	3.680	22.61	***
Monopoly dummy (α_1)	**-1.318**	**-5.83**	***

*** Statistically significant at 1% significance level.

Table 6. Estimation for the Effect of Monopoly on the CATV Dummy

(upper-level choice model).

	Estimates	t-values	**Significance**
Baseline CATV dummy (α_0)	1.746	10.92	***
Monopoly effect to CATV dummy (α_1)	-0.189	-1.68	
Inclusive values ($1-\sigma$)	**0.104**	**2.64**	**

*** Statistically significant at 1% significance level, ** at 5% significance level.