Economics Bulletin

Volume 35, Issue 1

The Deterrent Effect of Cable System Clustering on Overbuilders: An Economic Analysis of Behrend v. Comcast

Philip J. Reny
University of Chicago

Michael A. Williams
Competition Economics LLC

Abstract

Empirical research on cable industry prices demonstrates that, all else equal, cable operators with highly clustered systems generally charge higher prices than unclustered cable companies. One factor that explains this outcome is the deterrent effect that clustering has on overbuilders. All else equal, the presence of overbuilders leads incumbent cable operators to lower their cable prices. We present a model of overbuilding that provides a theoretical basis for the empirical finding that clustered cable companies charge higher prices than unclustered cable companies. The model played an important role in the prominent antitrust case Behrend v. Comcast.

We thank Alibek Aldangarov and Simon Wilkie for helpful comments.
Citation: Philip J. Reny and Michael A. Williams, (2015) "The Deterrent Effect of Cable System Clustering on Overbuilders: An Economic Analysis of Behrend v. Comcast", *Economics Bulletin*, Volume 35, Issue 1, pages 519-527
Contact: Philip J. Reny - preny@uchicago.edu, Michael A. Williams - MWilliams@COMPETITIONECONOMICS.COM.
Submitted: December 08, 2014. **Published:** March 11, 2015.

1. Introduction

For the past twenty years, cable operators have pursued the strategy of "clustering" their cable systems. The Federal Communications Commission ("FCC") defines a cable "cluster" as "a group of co-owned and co-operated cable systems serving a contiguous geographic area or region" (FCC, 2009). The FCC defines a "cable system" as "a physical system integrated to a principal headend [i.e., the cable operator's central technical facility]" (FCC, 2013). Summarizing the effects of clustering by cable operators, the FCC in 2009 found that "clustering can provide a means of improving efficiency, reducing costs, and attracting increased advertising. On the other hand, . . . clustering can present a barrier to entry for the most likely potential overbuilder (i.e., an adjacent cable operator). . . . [W]hile clustering may help reduce programming costs and other expenses, the Commission's findings reflect that these lower costs are not being passed along to subscribers in the form of lower monthly rates" (FCC, 2009).

In a prominent antitrust case brought in 2003, ruled on by the U.S. Supreme Court in 2013, and ultimately settled in 2014, a class of cable subscribers brought a monopolization case under Section 2 of the Sherman Act against Comcast for clustering cable systems in the Philadelphia area (*Comcast v. Behrend*, 133 S. Ct. 1426).[1] Empirical research on cable industry prices demonstrates that large, highly clustered cable companies generally charge higher prices than small, unclustered cable companies. This result is surprising. The FCC (2001, p. 31), for example, in describing its null hypothesis regarding the expected effect of clustering on cable rates stated that it "expected the clustering variable to have a negative coefficient, i.e., an inverse relationship between clustering and average monthly rates. As a positive change is noted in the clustering variable, we would expect to find lower average monthly rates due to increasing economies of scale." However, upon performing its regression analysis, the FCC (2001) concluded: "When we estimated the equation, we found the opposite effect, the coefficient for the clustering variable was positive. This means that as clustering increased, average monthly rates also increased."

One mechanism through which cable system clustering results in higher cable prices is the deterrent effect of clustering on "overbuilders." The FCC (2009) defines an overbuilder as a cable system "that builds a second cable system 'over' the one that already exists." Overbuilders include multiple system operators ("MSOs"), single system cable operators, municipally owned cable systems, electric and gas utilities, and local exchange carriers (LECs), such as Verizon with its FiOS service.

In describing the possible anticompetitive effects of clustering, the FCC (1994) stated:

> There are, however, competitive risks associated with increased regional clustering of commonly-owned cable systems. The creation of large, contiguous clusters of commonly-owned systems may result in the removal of cable systems that are not affiliated with large MSOs from significant regions of the country. Those "independent" systems may serve presently as a competitive constraint, offering a credible threat of expansion into adjacent markets. If high capital

[1] The authors served as consulting and testifying experts, respectively, for Plaintiffs in *Behrend v. Comcast*, U.S. District Court, Eastern District of Pennsylvania, No. 03-6604.

expenditures discourage entry, then adjacent systems may be the most likely entrants, because such systems may be able to use parts of their existing cable plant to support expansion into adjacent areas. The elimination by acquisition of these potential competitors may increase the market power of clustered systems by decreasing the likelihood of entry.

Singer (2003) provides empirical evidence that clustering by cable companies reduces the probability of entry by overbuilders. Empirical research on cable industry prices demonstrates that the presence of overbuilders leads incumbent cable operators to lower their prices. In the *Comcast* antitrust case, the U.S. District Court (2012) ruled that "the Class has met its summary judgment burden of presenting evidence sufficient to create a genuine fact issue on the antitrust impact theory that clustering deters overbuilding." Here we present the economic theory accepted by the court.

2. Structural Characteristics of the Cable Television Industry

For the past twenty years, MSOs have pursued a nationwide strategy of engaging in swaps and acquisitions in order to create clusters of cable systems. Over time, the geographic size of clusters has increased. Characterizing the process that has resulted in increased clustering, the FCC (2005) stated:

> Many of the largest MSOs have concentrated their operations by acquiring cable systems in regions where the MSO already has a significant presence, while giving up other holdings scattered across the country. This strategy is accomplished through purchases and sales of cable systems, or by system "swapping" among MSOs.

Although the focus of our theory is on the geographic size of clusters, the FCC defines clusters based on whether a group of "cable systems" owned by an MSO are contiguous. Over the past twenty years, MSOs have combined cable systems to create clusters, but cable systems themselves have become larger.[2] The increasing geographic size of cable systems causes, all else equal, a reduction in the FCC's defined number of clusters, even though the geographic size of the clusters has increased.

Table 1 shows (1) the number of clusters as defined by the FCC; (2) the number of cable subscribers in those clusters; (3) the total number of cable subscribers in the U.S.; and (4) the percentage of U.S. cable subscribers in a cluster. The number of clusters increased from 97 in 1994 to 139 in 1996, but then fell to approximately 110 during the period 1997-2005. However, the number of cable subscribers in a cluster increased from 20.1 million in 1994 to a maximum

[2] MSOs have a powerful economic incentive to increase the size of their cable systems so as to reduce the number of headends. As described by Charter Communications in its 2010 10-K: "In most systems, we deliver our signals via fiber optic cable from the headend to a group of nodes, and use coaxial cable to deliver the signal from individual nodes to the homes passed served by that node. . . . Through system upgrades and divestitures of non-strategic systems, we have reduced the number of headends that serve our customers from 1,138 at January 1, 2001 to 204 at December 31, 2010. Headends are the control centers of a cable system. Reducing the number of headends reduces related equipment, service personnel, and maintenance expenditures."

of 54.4 million in 2000, before declining to 50.8 million in 2005. The fact that the number of cable subscribers in a cluster increased when the FCC's defined number of clusters decreased is caused by the increasing size of cable systems. Thus, the decrease in the FCC's defined number of clusters should not be interpreted as a decline in the geographic size of clusters created by swaps and acquisitions of cable systems by MSOs. As summarized recently by the FCC (2012): "Moreover, we note that data submitted in the record by cable operators indicate that clustering has increased since 2007."

TABLE 1
NUMBER AND SUBSCRIBER SIZE OF MAJOR CABLE SYSTEM CLUSTERS

Year	Total Clusters	Cluster Subscribers (millions)	Total Basic Subscribers (millions)	Share of Total Basic Subscribers in a Cluster
1994	97	20.1	59.5	0.338
1995	137	31.2	62.1	0.502
1996	139	33.6	63.5	0.529
1997	117	34.3	64.8	0.529
1998	106	40.4	65.1	0.621
1999	114	43.9	65.9	0.666
2000	108	54.4	66.6	0.817
2001	107	52.3	66.9	0.782
2002	109	51.3	66.1	0.776
2003	108	53.6	66.0	0.812
2004	118	51.5	65.4	0.787
2005	113	50.8	65.2	0.779

Sources: FCC, 6th – 13th Annual Reports, MB Docket Nos. 99-418 (C-2), 01-1 (B-1, C-2), 02-338 (B-2, Table 1), 05-4 (B-2, Table 1), 05-13 (B-2, Table 1), 06-11 (B-2, Table 1), 07-206 (B-2, Table 1), and authors' calculations.

Two related trends have affected the structure of the cable industry. First, cable companies have merged to form large MSOs and, second, MSOs have swapped and acquired cable systems to become more highly clustered. The first trend has the effect of increasing the total number of subscribers served by an MSO, while the second trend has the effect of clustering together an MSO's cable systems for a given number of subscribers. In some of the econometric models discussed in Section 3, these two effects are distinguished so that one can examine separately (1) the effect of increasing the total number of subscribers served by an MSO on cable prices, holding constant the degree to which its cable systems are clustered and (2) the effect of clustering an MSO's cable systems on cable prices, holding constant the total number of subscribers served by the MSO. For econometric models that do not distinguish these two effects, the MSO-size variables pick up both effects since large MSOs tend to be highly clustered and vice versa.

3. A Review of the Econometric Results

This section summarizes two different sets of econometric results from the literature on the cable industry. The first set of results shows that large and highly clustered cable companies generally charge higher prices than small and unclustered cable companies (Appendix Table 1). The second set of results shows that the presence of overbuilders leads incumbent cable companies to lower their prices (Appendix Table 2). The econometric studies were performed by academic researchers, the FCC, and the U.S. Government Accountability Office (GAO). The publication dates of the studies range from 1986-2009, and the databases used range from 1983-2008.

With respect to the first set of econometric results, the eighteen econometric studies summarized in Appendix Table 1 generally exhibit high levels of statistical significance showing that large cable companies charge higher prices than small cable companies. Some of the studies report more than one regression or more than one relevant parameter in a given regression. Appendix Table 1 reports a total of 31 relevant regression coefficients from the studies. Of these 31 regression coefficients, 17 are significant at the 1% level; five are significant at the 5% level; two are significant at the 10% level; three are significant at the 20% level; and four are insignificant. In terms of economic significance, the studies generally find sizable price effects. Depending on the definition of the variable measuring MSO size, the predicted price effects range from approximately 1% to approximately 23%.

With respect to the second set of econometric results, the twenty econometric studies summarized in Appendix Table 2 generally exhibit high levels of statistical significance showing that the presence of overbuilders leads incumbent cable companies to lower their prices. As before, some of the studies report more than one regression or more than one relevant parameter in a given regression. Appendix Table 2 reports a total of 49 relevant regression coefficients from the studies. Of these 49 regression coefficients, 38 are significant at the 1% level; four are significant at the 5% level; one is significant at the 10% level; and six are insignificant. In terms of economic significance, the studies generally find sizable price effects. Depending on the definition of the overbuilder, the predicted price effects range from approximately 4% to approximately 38%.

4. Cable System Overbuilders

In this section we provide a very simple economic theory of overbuilding that specifically applies to an overbuilder that initially has no existing facilities in or adjacent to a given incumbent cable system whose territory the overbuilder intends to serve. The model corresponds closely to the facts in *Comcast* in which an overbuilder (RCN Corporation) that did not have a cable system adjacent to Comcast selectively entered areas near Philadelphia in which RCN expected to be able to operate profitably. Because the overbuilder initially has no existing infrastructure in the area it intends to enter, it will optimally choose a location from which to begin overbuilding, and it will build outward, in a contiguous fashion, from that point. *Comcast* offers an example of such a build out by an overbuilder. RCN Corp. received certification from the FCC in June 1998 to serve five contiguous counties (Bucks, Chester, Delaware, Montgomery, and Philadelphia) in Pennsylvania that were served by Comcast.[3] Such a contiguous build out is efficient from the perspective of the overbuilder because it minimizes the need to build additional, costly headends. This "build-out" effect gives an incumbent cable operator an incentive to cluster, as we now demonstrate.

Consider first an operator who is a monopolist within each of two geographically separated cable systems within a Designated Market Area, which is a television market area as defined by

[3] FCC, Memorandum Opinion and Order, Released June 15, 1998, *In the Matter of RCN Telecom Services of Philadelphia, Inc., Certification to Operate an Open Video System*, DA 98-1153.

Nielsen Media Research. Suppose the two cable systems are identical and that the monopolist's profits in each area equal to π_m. Because the two cable systems are geographically separated within the DMA, an overbuilder that begins in one area will not reach the other area for some time, if at all, by the build-out effect. For simplicity, suppose that the overbuilder would not reach the second area at all. Consequently, the monopolist would be willing to pay up to $\pi_m - \pi_c$ to keep the overbuilder out of the one cable system that it is threatening to enter, where π_c is the (lower) profits the monopolist would earn if the overbuilder successfully enters and they compete, e.g., according to Cournot competition.

Consider, on the other hand, the same scenario, but where the monopolist's two cable systems are contiguous, i.e., clustered together, within the DMA. In this case, the monopolist would be willing to pay up to $2(\pi_m - \pi_c)$, i.e., up to twice as much, to keep the entrant out. This is because a successful entrant who builds outward may well overbuild the incumbent's two contiguous cable systems, reducing profits from π_m in each area to π_c in each area. For simplicity, suppose that a successful entrant will in fact do so. (The qualitative conclusions would not be altered if this were only more likely to occur when the monopolist's cable systems are clustered than when they are not.) Finally, let k denote any sunk costs the entrant must pay to attempt to enter a single cable system. Examples of such sunk costs includes infrastructure costs for headends and content delivery networks such as "fiber to the home" or "fiber to the node." Other sunk costs include legal and regulatory fees, as well as advertising expenses.

Consider the following strategic game. The entrant must decide to enter, E, or not, N. If the entrant enters, the monopolist must decide whether to permit entry, P, and compete with the entrant, or to fight entry, F. If the monopolist chooses to fight entry, it must then also choose an expenditure, x, that it wishes to devote to keeping the entrant from successfully entering. *Comcast* offers examples of such expenditures by an incumbent cable company designed to deter entry by an overbuilder. The U.S. District Court (2012) ruled that Plaintiffs offered evidence showing that Comcast had offered predatory, eighteen-month contracts targeted only to potential subscribers of the overbuilder (RCN Corporation). The Court ruled: "Because [Comcast] possessed market power, its decision to target promotional discounts to deter a new entrant may be deemed predatory and an exercise of market power to maintain its monopoly." Comcast also engaged in extensive lobbying efforts to deter RCN. The U.S. District Court (2012) ruled these lobbying efforts were legal because of the Noerr-Pennington doctrine, but for our purposes the point is that Comcast's lobbying efforts were costly.

Let $q(x)$ denote the probability that the overbuilder's entry attempt is unsuccessful given the monopolist's expenditure x. We assume that $q(x)$ is strictly increasing and strictly concave in x. That is, higher expenditures increase the probability that the entrant's attempt to enter is deterred, but at a decreasing rate.

Consider first the situation in which the monopolist is not clustered. Then the payoffs to the monopolist and the entrant are given by Table 2, where in each entry the monopolist's payoff is the first value and the entrant's payoff is the second, and where $\underline{x}$ is the profit-maximizing, entry-deterring expenditure by the monopolist.

Table 2: Monopolist and Entrant's Profits
Monopolist's Cable Systems are Not Clustered

$Monopolist \backslash Entrant$	E	N
P	$(\pi_c,\ \pi_c - \ k)$	$(\pi_m, 0)$
F	$\left(q(\underline{x})\pi_m + (1 - q(\underline{x})\ )\pi_c - \underline{x}, (1 - q(\underline{x}))\pi_c - k\right)$	$(\pi_m, 0)$

The monopolist maximizes $q(x)\pi_m + \left(1 - q(x)\right)\pi_c - x$ and so must satisfy the first-order condition,

$$q'(\underline{x}) = \frac{1}{\pi_m - \pi_c}. \quad (1)$$

We assume that

Assumption 1. $q(\underline{x})\pi_m + \left(1 - q(\underline{x})\right)\pi_c - \underline{x} > \pi_{c,}$

so that it is optimal for the monopolist to fight the entrant upon entry, even if just one cable system is threatened. This assumption will hold as long as the monopolist's expenditures directed toward keeping the entrant out are successful with high enough probability, i.e., so long as,

$$q(\underline{x}) > \frac{x}{\pi_m - \pi_c}.$$

Under this condition, the monopolist will choose to fight, F, when the entrant enters. Knowing this, the entrant will enter only when its resultant profits, $\left(1 - q(\underline{x})\right)\pi_c - k$, are not negative. Consequently, when the monopolist's cable systems are not clustered, the entrant will attempt to enter when $(1 - q(\underline{x}))\pi_c > k$ and will stay out otherwise. When it does enter, it will be successful with probability $1 - q(\underline{x})$.

Consider next the case in which the monopolist's two cable systems are clustered. In this case, the payoffs are given by Table 3, and the profit maximizing entry-deterring expenditure, $\overline{x}$, by the monopolist maximizes $q(x)2\pi_m + \left(1 - q(x)\right)2\pi_c - x$ in x and so must satisfy the first-order condition,

$$q'(\overline{x}) = \frac{1}{2(\pi_m - \pi_c)}. \quad (2)$$

Equations (1) and (2) together with the strict concavity of $q(.)$ imply that $\overline{x} > \underline{x}$, so that $q(\overline{x}) > q(\underline{x})$.

Table 3: Monopolist and Entrant's Profits
Monopolist's Cable Systems are Clustered

$Monopolist \backslash Entrant$	E	N
P	$(2\pi_c,\ 2\pi_c - 2k)$	$(2\pi_m, 0)$
F	$(q(\bar{x})2\pi_m + (1 - q(\bar{x})\ )2\pi_c - \bar{x}, (1 - q(\bar{x}))2\pi_c - 2k)$	$(2\pi_m, 0)$

Because Assumption 1 implies that it is optimal for the monopolist to fight entry when just one of its cable systems is threatened, it is optimal for the monopolist to fight entry when both cable systems are threatened. This can be seen as follows.

$$\begin{aligned} q(\bar{x})2\pi_m + (1 - q(\bar{x}))2\pi_c - \bar{x} &\geq q(\underline{x})2\pi_m + \left(1 - q(\underline{x})\right)2\pi_c - \underline{x} \\ &\geq q(\underline{x})2\pi_m + \left(1 - q(\underline{x})\right)2\pi_c - 2\underline{x} \\ &= 2[q(\underline{x})\pi_m + \left(1 - q(\underline{x})\right)\pi_c - \underline{x}\ ] \\ &> 2\pi_c\ , \end{aligned}$$

where the first inequality follows because $\bar{x}$ maximizes the expression in the left-hand side, and the last inequality follows by Assumption 1.

Knowing that the monopolist will fight entry, the entrant will enter only when its resultant expected profits, $\left(1 - q(\bar{x})\right)2\pi_c - 2k$, are not negative. Consequently, when the monopolist's cable systems are clustered, the entrant will attempt to enter when $\left(1 - q(\bar{x})\right)\pi_c > k$ and will stay out otherwise. When it does enter, it will be successful with probability $1 - q(\bar{x}) < 1 - q(\underline{x})$.

Finally, suppose that the entrant's sunk costs, k, are unknown to the monopolist, and that the monopolist believes that the probability that the entrant's sunk costs from attempting to enter a single cable system are less than or equal to k with probability $G(k)$. We can now compute the monopolist's total expected profits in both the unclustered and clustered scenarios.

The monopolist's total expected profits in the unclustered scenario equal the sum of its profits, π_m, in the geographically separated cable system, and its expected profits, π_e, in the cable system where the entrant may enter.

Let us now compute π_e. The probability that the entrant enters is $G((1 - q(\underline{x}))\pi_c)$ because the entrant enters if and only if its cost k is less than $(1 - q(\underline{x}))\pi_c$. When the entrant enters the monopolist will fight, F, obtaining a payoff of $q(\underline{x})\pi_m + (1 - q(\underline{x}))\pi_c - \underline{x}$. On the other hand, the entrant stays out with probability $1 - G((1 - q(\underline{x}))\pi_c)$ and in this event the monopolist earns π_m in the threatened area. Hence,

$$\pi_e = \left[q(\underline{x})\pi_m + \left(1 - q(\underline{x})\right)\pi_c - \underline{x} \right] G\left(\left(1 - q(\underline{x})\right)\pi_c\right) + \pi_m \left(1 - G\left(\left(1 - q(\underline{x})\right)\pi_c\right)\right).$$

Altogether therefore, the monopolist's total expected profits in the unclustered scenario are,

$$\Pi(\text{unclustered}) = \pi_m + \pi_e$$

$$= \pi_m + \left[q(\underline{x})\pi_m + \left(1 - q(\underline{x})\right)\pi_c - \underline{x}\right] G\left(\left(1 - q(\underline{x})\right)\pi_c\right)$$

$$+ \pi_m \left(1 - G\left(\left(1 - q(\underline{x})\right)\pi_c\right)\right).$$

In the clustered scenario, both of the monopolist's contiguous cable systems are simultaneously threatened by entry. The entrant enters with probability $G((1 - q(\bar{x}))\pi_c)$. When the entrant enters the monopolist will take the action *F* and obtain the payoff $q(\bar{x})2\pi_m + (1 - q(\bar{x}))2\pi_c - \bar{x}$. On the other hand, the entrant stays out with probability $1 - G((1 - q(\underline{x}))\pi_c)$ and in this event the monopolist earns $2\pi_m$ in total in the two cable systems. Hence, the monopolist's total expected profits in the clustered scenario are,

$$\Pi\ (\text{clustered}) = [q(\bar{x})2\pi_m + \left(1 - q(\bar{x})\right)2\pi_c - \bar{x}]G\left(\left(1 - q(\bar{x})\right)\pi_c\right)$$

$$+2\pi_m \left(1 - G\left(\left(1 - q(\bar{x})\right)\pi_c\right)\right).$$

Hence, for example, when $q(\bar{x})$ is sufficiently close to one relative to $q(\underline{x})$, the monopolist will strictly prefer to cluster. Therefore, the monopolist may strictly prefer to cluster its cable systems. When this occurs, there are several effects. First, clustering its cable systems reduces the likelihood that an entrant attempts to enter. Second, given that an entrant does attempt to enter, clustering its cable systems reduces the likelihood that the entrant's attempt is successful. Third, clustering its cable systems increases the monopolist's expected profits without any increase in efficiency. Fourth, under the assumption that successful entry reduces prices, clustering its cable systems increases the price the monopolist charges its customers on average.

5. Conclusions

MSOs have clustered their cable systems throughout the U.S. through mergers and swaps. Although the FCC expected such clustering to yield efficiencies resulting in lower prices, the econometric literature shows the opposite—as MSOs have become more clustered, all else equal, their prices have increased. In *Comcast*, a class of Plaintiffs alleged that by clustering cable systems in the Philadelphia DMA, Comcast acquired monopoly power. We have presented the model accepted by the U.S. District Court in *Comcast* that explains how clustering can deter overbuilders. The public policy implications of our model have continued empirical relevance given the on-going efforts by MSOs to establish larger systems, such as that envisioned by the proposed merger of Comcast and Time Warner Cable—the two largest MSOs in the U.S.

References

Charter Communications, Form 10-K, for the fiscal year ended December 31, 2010.

FCC, "First Annual Report," CS Docket No. 94-48, Released September 28, 1994.

FCC, "Sixth Annual Report," CS Docket No. 97-141, Released January 14, 2000.

FCC, "Seventh Annual Report," CS Docket No. 01-129, Released January 8, 2001.

FCC, "Eighth Annual Report," CS Docket No. 01-129, Released January 14, 2002.

FCC, "Ninth Annual Report," MB Docket No. 02-145, Released December 31, 2002.

FCC, "Tenth Annual Report," MB Docket No. 03-172, Released January 28, 2004.

FCC, "Eleventh Annual Report," MB Docket No. 04-227, Released February 4, 2005.

FCC, "Twelfth Annual Report," MB Docket No. 05-255, Released March 3, 2006.

FCC, "Thirteenth Annual Report," MB Docket No. 06-189, Released January 16, 2009.

FCC, "Fifteenth Annual Report," MB Docket No. 12-203, Released July 22, 2013.

FCC (2012), "Revision of the Commission's Program Access Rules, MB Docket Nos. 12-68, 07-18, 05-192, 07-29, Report and Order in MB Docket Nos. 12-68, 07-18, 05-192, Further Notice of Proposed Rulemaking in MB Docket No. 12-68, Order on Reconsideration in MB Docket No. 07-29, 27 FCC Rcd 12605, 12817, ¶¶ 18-19.

Singer, H. (2003), "Does Clustering by Incumbent Cable MSOs Better Entry by Overbuilders?" Working Paper, Criterion Economics.

U.S. District Court, Eastern District of Pennsylvania (April 12, 2012), Behrend, et al. v. Comcast Corp., et al., No. 03-6604.