# DRAFT

# Duplication of Public Goods: Some Evidence on the Potential Efficiencies from the Proposed Echostar/DirecTV Merger

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March, 2004

The views expressed here are those of the authors only, and do not reflect those of the author's organizations. The authors were not involved in the Echostar/DirecTV proposed merger. We would like to thank participants in seminars at the FCC and UTA for their helpful discussions of this paper.

#### I. Introduction

In November 2002, the FCC formally rejected the proposed merger of Echostar and DIRECTV, two rival sellers of direct broadcast satellite (DBS) video programming. The FCC's primary reason for rejecting the application was that Echostar and DIRECTV were close substitutes for one another, and hence that the merger was likely to reduce competition.

At the same time, the FCC recognized that the merger would have led to efficiencies, in the form of improved use of transmission facilities. Specifically, because it is technologically feasible for customers to receive DBS signals without any degradation to any other customer's service, transmission is non-rivalrous. Hence, post-merger, effective DBS capacity could be increased by taking capacity that was previously used to transmit programming that was on both systems (e.g., CNN), and re-allocating it to some other use.

The potential that a merger might lead to both a reduction in competition and improvements in productivity is not unique to this transaction, of course. For virtually all mergers of competitors, antitrust and other regulatory authorities have to evaluate these two kinds of effects from mergers. What is unusual about the Echostar/ DIRECTV merger is that parties explicitly focused on the efficiencies from the proposed transaction. Moreover, the claimed efficiencies are potentially measurable in this case.

According to the Echostar and DIRECTV, a principal use of the capacity freed up by eliminating duplication was to have been transmitting local broadcast signals into additional local viewing areas. This is particularly relevant to evaluating the competitive effect of the merger, since the lack of availability of local stations has often been cited as the primary competitive weakness of DBS, relative to its chief rival technology, cable television.

The goal of this paper is to empirically evaluate the value of the availability of local

broadcast stations on a DBS system to consumers. To do this, we take advantage of time-series and cross-sectional variation in whether local stations are available on the system. Specifically, because local stations were only available on DBS systems since late 1999, and the DBS companies have still not placed local stations on their systems in all geographic markets, we can evaluate how prices and subscription rates differ between US geographic areas with and without local stations on the DBS systems.

To evaluate these questions, we analyzed the multichannel video programming distribution ("MVPD") purchasing decisions of households across the U.S. The use of household-level data differs from previous research into MVPD competition, which has tended to use data at the level of the cable franchise (see, e.g., Emmons and Praeger, 1997, Kerikeri et al., 2002)

We find that the availability of local stations has had an impact on the competition between DBS and cable television. We find that after about one year, the availability of local programming on DBS increases subscribership to DBS by as much as one-third. The increased competition from DBS suppliers appears to have induced a competitive response from cable companies. Specifically, the evidence also suggests that cable prices are about 2% lower in markets in which local programming is available on DBS system. We also find evidence that cable companies have increased their quality in response to the availability of local channels on DBS.

### **II. Background**

Over 85% of TV households subscribe to MVPD service. Of these households, traditional cable operators have a combined market share of slightly over 75%, and the two major DBS firms, DIRECTV and EchoStar, have a combined market share of about 20%. The remaining 5% is

divided among private cable operators, wireless cable operators, and local exchange carriers.<sup>1</sup>

MVPDs acquire programming from multiple sources. These sources can be divided into five distinct categories:

<u>Satellite channels.</u> These channels are dependent upon satellite for both their origination and distribution. Some of them, such as ESPN, MTV, USA and TNT, are supported by both advertisers and subscribers; others, such as HBO, Starz, and TCM, are supported solely by subscribers. With the exception of some regional sports networks, such as Madison Square Garden, satellite channels are programmed for a national audience.

<u>Superstations.</u> Commercial stations that are not affiliated with ABC, CBS, FOX or NBC and are delivered by satellite outside their local markets are "superstations." For all practical purposes, the number of superstations is fixed at the number that existing in May, 1991 due to the application of broadcast retransmission consent rules to new satellite delivery of new independent broadcast station after that date. The only broadcast stations eligible for distribution as superstations are WTBS (Atlanta), WGN (Chicago), WWOR (New York), WPIX (New York), WSBK (Boston), KTLA (Los Angeles) and KWGN (Denver). Because superstations may be uplinked by any MVPD or by any common carrier, they are available to all MVPDs on a nondiscriminatory basis. Nevertheless, copyright liability, calculated pursuant to a statutory compulsory license, varies by type of MVPD.

Distant network affiliates. MVPDs may deliver distant commercial stations that are affiliated

<sup>&</sup>lt;sup>1</sup> Annual Assessment of the Status of Competition, \_\_\_\_\_ F.C.C. Rcd. \_\_\_\_\_, Appendix B (2002) (Ninth Annual Report).

with ABC, CBS, FOX or NBC, and noncommercial PBS stations, but only to households in areas deemed by the FCC to be "unserved" by local broadcast affiliates. Like superstations, these stations may be delivered by any MVPD or any common carrier, so they are available to all MVPDs on a nondiscriminatory basis. Compulsory licenses apply to the delivery of these channels.

<u>Terrestrial channels.</u> These channels may originate with either a MVPD or an independent programmer, and are delivered by microwave or coaxial cable. These channels include some very popular regional sports and news channels, such as Comcast Sports Net Philadelphia and New England Cable News, as well as public, educational, and governmental access channels that appear on cable and DBS systems primarily due to government mandate. The distribution of these channels is not subject to any restriction on exclusivity.

Local broadcast channels. For broadcast purposes, the United States is divided into 210 nonoverlapping "Designated Market Areas" or *DMAs*. Virtually all of these DMAs include a single affiliate of ABC, CBS, FOX, and NBC, plus a PBS affiliate. In addition, most DMAs include several commercial independent stations that may affiliate with minor networks such as WB or UPN. MVPDs face numerous complex regulations concerning the delivery of these channels into their own local DMA. Commercial stations may elect "retransmission consent" or "must carry" status with respect to MVPDs in their DMA. Under this "retransmission consent," MVPDs must negotiate compensation with the individual station to obtain permission to deliver it.<sup>2</sup> Under "must carry," MVPDs are compelled to deliver all "must-carry" local broadcast channels if they deliver any local broadcast channels. In most cases, affiliates of the four major networks choose retransmission consent, and virtually all cable systems carry those affiliates. Noncommercial

<sup>&</sup>lt;sup>2</sup> 47 U.S.C. § 325.

stations may only elect "must carry" status. Although the combined viewing share of local broadcast channels has declined since the advent of MVPD service in the early 1960s, local broadcasters still account for nearly 60% of all television viewing.<sup>3</sup>

An important difference between the provision of cable and DBS in the U.S. is the geographic extent of a single system. By the nature of cable TV delivery, signals are delivered throughout the US by a series of local systems. Each system uses its scarce channel capacity to carry channels that the operator deems to be of sufficient local interest or that the government requires. A local cable operator does not use space on its cable system to deliver channels that are not of local interest (e.g., a Los Angeles cable company does not waste capacity by carrying San Francisco channels). In contrast, a DBS operator must transmit the same set of channels to subscribers in a large number of DMAs, even though the DBS provider is prohibited by law from allowing a household to view certain programming (i.e., the DBS company must use software that prevents a household in DMA A from viewing local programming that originated in DMA B).

Because both cable and DBS operators face practical and technological constraints on channel capacity, the distinction between a technology that is local from one that is national is crucial.<sup>4</sup> To illustrate, suppose a cable operator allocates one-third of its channel capacity to local and regional terrestrial channels and local broadcast channels.<sup>5</sup> This decision only limits the national programming that can be delivered on the same system. A decision by a DBS operator,

<sup>&</sup>lt;sup>3</sup> Annual Assessment of the Status of Competition, \_\_\_\_ F.C.C. Rcd. \_\_\_\_, ¶ 80 (2002) (Ninth Annual Report).

<sup>&</sup>lt;sup>4</sup> This distinction has been recognized in numerous FCC documents. See, e.g., Annual Assessment of the Status of Competition, \_\_\_\_\_ F.C.C. Rcd. \_\_\_\_, ¶¶ 22-23 ; Implementation of the Satellite Home Viewer Improvement Act of 1999, \_\_\_\_\_ F.C.C. Rcd. \_\_\_\_, ¶ 6 n.12 (2000).

<sup>&</sup>lt;sup>5</sup> This is a fairly typical allocation of capacity. See, e.g., <u>www.cablevision.com/lineups</u>.

however, to deliver the same channels to a specific market serves to limit the national programming that the DBS operator can offer in other DMAs as well as the local programming that can be offered in other DMAs. Although new "spot-beam" technology, which allows limited re-use of channels, can reduce the effect of local programming for one DMA restricting the capacity available to serve other DMAs, adding additional spot beams will require additional investments in satellite technology. According to the FCC, the additional costs associated with additional beams means that the DBS suppliers will not find it economic to make investments sufficient to enable them to supply local programming throughout the country. [cite to the FCC decision doc.]

The national/local distinction between cable and DBS applies not only to programming, but also to price. Each cable system chooses its own prices and offerings given and local demand conditions and its costs, which, in turn, reflect the system's capacity and signal quality. In contrast, DBS offers virtually the same programming nationally over a delivery system that has the same capacity and signal quality across the entire nation. Generally, DBS firms have priced their product on a national basis.<sup>6</sup> In sum, DBS prices have typically been uniform nationally, but with sufficient exceptions to indicate that DBS operators have some ability to vary price by region to respond to competitive pressures.

#### **III.** Local Broadcast Stations and DBS

As the discussion above indicates, providing local programming to a DMA (*local-into-local*) throughout the US requires a significant commitment of capacity for the DBS companies. For this

<sup>&</sup>lt;sup>6</sup> Annual Assessment of the Status of Competition, \_\_\_\_\_ F.C.C. Rcd. \_\_\_\_, ¶ 178 (2002) (Ninth Annual Report). In some instance, however, DBS operators have varied price by region for installation, and have also discounted programming for residents of specific areas in response to competition from cable operators (see ¶ 181).

reason, a merger between Echostar and DIRECTV could result in a significant increase in the number of DMAs receiving local broadcasts. Specifically, because satellite transmission to customers is non-rivalrous, a merged firm could eliminate redundant transmission of local stations (e.g., one channel on each system devoted to the New York City NBC affiliate) and national feeds (e.g., a CNN on each system). The freed-up capacity could be used for additional local-into-local, or other national broadcasts.

This paper attempts to estimate the value to consumers of the effective increase in capacity that would result from eliminating redundant transmissions. Specifically, we estimate a model of household choice of MVPD. This allows us to estimate the effect of local-into-local on the competition between DBS and cable, controlling for other characteristics.<sup>7</sup> The variation in local-into-local availability comes from two sources; cross-sectional variation in the local areas that receive local-into-local signals, and time-series variation in local-into-local within localities.

The time-series variation results from a 1999 change in the regulations governing DBS. In November 1999, the Satellite Home Viewer Improvement Act of 1999 became law.<sup>8</sup> Under this Act, DBS operators were authorized to begin distribution of local broadcast stations immediately. The two DBS providers began providing this local into local service into the more populous DMAs almost immediately.

The Act was a significant change in MVPD competition. Prior to the passage of this Act, the

<sup>&</sup>lt;sup>7</sup> As noted above, we do not attempt to measure the potential harm to consumers from the elimination of competition between the two satellite providers. Given the closeness in product space between the two firms, it seems reasonable that each represents the other's closest substitute, and consequently that the merger may have some off-setting harm to consumers.

 $<sup>^{8}\,</sup>$  Pub. L. 106-113, 113 Stat. 1501 (codified in scattered sections of 17 U.S.C. and 47 U.S.C.).

absence of local broadcast stations was frequently identified as DBS's primary competitive weakness. The passage of this Act would seem to make DBS a closer substitute for cable in the DMAs in which local-into-local is available. The addition of a close substitute for an existing cable system is likely to lead the cable operator to increase quality and reduce prices, as was the experience when cable TV operators faced other forms of direct competition (see Emmons and Praeger, 1997; Beil et al., 1993). In fact, the addition of local broadcast channels has been repeatedly cited as an important factor in spurring the growth of DBS subscribership, in making DBS a closer competitor to cable, and in potentially constraining cable prices.<sup>9</sup>

The cross-sectional variation comes from differences in local-into-local availability among the DMAs. As of April, 2003, DirecTV offers local broadcast channels in 53 markets; EchoStar offers them in 61 markets.<sup>10</sup> Because the DBS operators' choices of which local markets to serve vary somewhat, a total of 68 markets enjoyed local broadcast channels from at least DBS operator at that time.

By taking advantage of these sources of variation, we can examine four questions related to the competitive effects of local-into-local availability:

- A. Is the DBS market share higher when local-into-local is available?
- B. Are households more likely to switch providers when local-into-local is available?

<sup>&</sup>lt;sup>9</sup> See, e.g., Annual Assessment of the Status of Competition, \_\_\_\_ F.C.C. Rcd. \_\_\_, ¶ 61 (2002) (Ninth Annual Report); Annual Assessment of the Status of Competition, \_\_\_\_ F.C.C. Rcd. \_\_\_\_, ¶ 59 (2002) (Eighth Annual Report); Annual Assessment of the Status of Competition, \_\_\_\_ F.C.C. Rcd. \_\_\_\_, ¶ 68-70 (2001) (Seventh Annual Report). See also Steve Donohue, Austin: DirecTV's Still "Best of Breed," Multichannel News 3 (10 March 2003) ("I'll tell you the things we have to have to compete with cable. Local markets are clearly critically important.").

<sup>&</sup>lt;sup>10</sup> <<www.directv.com>> (visited \_\_\_ April 2003); <<www.dishnetwork.com>> (visited \_\_\_\_ April 2003).

- C. How do cable TV companies react to the presence of local-into-local (e.g., do they lower prices)?
- D. Do customers perceive a provider quality difference when local-into-local is available?

### **IV. Data Description**

Our empirical work seeks to explain the MVPD decisions of households. The primary data source in our analysis comes from TNS Telecoms.<sup>11</sup> We make use of the household survey data in ReQuest Market Monitor<sup>®</sup>, as well as the related Bill Harvesting<sup>®</sup> data. ReQuest is a quarterly nationwide survey of the availability and consumption of various telecommunications services of approximately 30,000 households in the U.S. The households are distributed across the country, and the location of each responding households is reflected in the data set. The share of sampled households coming from each DMA is roughly proportional to the DMA's share of the U.S. population.

Participants are also asked about various demographic characteristics of their households, including number of individuals, income, race, respondent's age, whether they live in a multiunit dwelling, and education level. Answers are provided in terms of a range of outcomes (e.g., income between \$50,000 and \$100,000). As such, our empirical analysis includes several dummy variables in each demographic category, e.g., income within some range, rather than a continuous variable measuring income. Because this results in our estimating a large number of parameters only indirectly related to the focus of this study, we merely summarize the estimated effects of the demographic dummy variables, rather than present them all in our results.

<sup>&</sup>lt;sup>11</sup>See <www.tnstelecoms.com>.

Households are also asked for, and compensated for, submitting one set each of their original bills for local, long distance, cable TV, cellular and Internet services. About 15% of the surveyed households submit their bills each quarter. The data from these households constitutes the Bill Harvesting data set. While the ReQuest data are more or less representative of US households, the voluntary nature of participation in the Bill Harvesting sample suggests that it may be subject to selection bias. In the results presented below, we assume that any selection bias is unrelated with the availability of local-into-local program availability by DBS providers.

The Bill Harvesting data are both more accurate and more detailed than the ReQuest data. For our purposes, the key addition associated with the Bill Harvesting is that it contains more complete information on MVPD purchasing, especially for years prior to 2001.<sup>12</sup> Table 1 lists the sample size and the percentage of households subscribing to DBS for each quarter for the top 100 DMAs in our sample. The trend in DBS subscription is clearly positive over this period. Since local-into-local was introduced in the larger U.S. DMAs in December 1999 and January 2000, it appears that to the extent local-into-local affects this trend, some of the effect would seem to occur with a lag.

To these data, we merged information regarding the introductions of local-to-local programming by DirecTV and Echostar. The timing of these introductions was obtained from various issues of Sky Report, an on-line newsletter for the Satellite broadcasting industry. About half of all introductions in our sample occurred in the last month and a half of 1999 or the first quarter of 2000 and another third occurred throughout the rest of 2000. For both DirecTV

<sup>&</sup>lt;sup>12</sup> Specifically, the survey asks if the household subscribes to any of a list of providers of MVPD, or "other." Prior to 2001, Echostar was not on the list, so Echostar subscribers are grouped with a large number of MVPD providers, including small cable system operators, in the "other" categories for those years. In contrast, the Bill Harvesting data contains the actual name

and Echostar, larger markets tended to receive local-to-local programming earlier.

Our analyses focus on those households for which cable TV was available (roughly 92% of our sample) in the top 100 DMAs in our sample. First, a household's DBS subscription decision is fundamentally different where cable TV is not an option. In particular, in these cases local-into-local programming availability cannot induce cable TV subscribers to switch to DBS by definition. Second, we focus our analyses on the top 100 DMAs rather than including smaller markets because no market outside of the top 80 in terms of number of households had gained local-into-local program availability during our time period. A household's subscription decision could be much different in smaller geographic markets.

### V. Results

Our analyses of each market outcome share a number of features. We attempt to identify the effect of DBS local-into-local (*L-I-L*) programming availability on market outcomes using difference-in-difference estimators. Our sample is essentially a panel in which *L-I-L* was available in only some DMAs and only for some time periods. Typically, we regress the market outcome variables against a vector of DMA dummy variables as well as a dummy variable for *L-I-L* availability in order to isolate the *L-I-L* effects from differences across DMAs.

In addition, we include two time trend variables – one a simple trend and one a trend interacted with a dummy variable for whether the DMA will ever have L-I-L programming available. The simple trend is to account for the apparent growing popularity of DBS even without L-I-Lprogramming available. However, the market in which L-I-L programming first became available initially averaged 6-7% DBS subscription market share compared to 10-13% initially in the other

of the MVPD provider in all years.

DMAs. This large different in levels suggests that the growth rates might also differ. The interacted trend attempts to distinguish the change in popularity across these groups.

We estimate regressions at both the household level and at the aggregated DMA level so as to avoid Moulton Effects (Moulton, 1986). We include demographic variables in the household level regressions but do not in the DMA level regressions because any change in a DMA's average demographic variables over time is likely due to sampling differences. DMA level regressions are weighted by the number of households sampled for the DMA in order to correct for heteroskedasticity.

### A. Effect of Local-into-Local on DBS Subscription

Table 2 reports results for consumer decisions to subscribe to CATV or DBS. The sample includes only households in the top 100 DMAs that subscribe to either CATV or DBS in which CATV was available. The first two columns report probit results based on household level data and the next two columns report results at the DMA level. Because consumers may be slow to react to the availability of *L-I-L* in their DMA, we might expect consumers gradually switch over to DBS over time. To account for this more gradual consumer reaction, we include a variable measuring the number of quarters since *L-I-L* was first introduced into the DMA instead of the simple dummy variable in columns two and four. The estimated *L-I-L* dummy variable coefficients are negative but not significant while the coefficients on the time since *L-I-L* introduction yield positive and significant only in the dummy variable specifications where it might be capturing faster than average growth in DMAs with *L-I-L* introduction. For the demographic variables, we find that the likelihood

of DBS subscription is increasing in income, falling in the age of the respondent, and their education level, while household size, number of units in their dwelling and racial characteristics had little relationship to their choice of MVPD.<sup>13</sup>

These results suggest that the availability of local programs on their systems made DBS service a more attractive product for most consumers. The last column indicates that, over our sample, DBS share rose about 2% in all DMAs due to factors unrelated to *L-I-L* introduction (9 quarters x 0.231% per quarter) and by about 8% due to *L-I-L* introduction (8 quarters x 01.025% per quarter) in markets with early *L-I-L* availability. Since DBS share initially averaged about 6-7% in DMAs where *L-I-L* would become available and 10-13% where it did not become available, this is indicative of the importance of *L-I-L* availability in DBS subscription decisions.

# B. Effect of Local-into-Local on CATV and DBS "Churn"

In addition to making DBS service a relatively more attractive alternative to CATV, the availability of local programs may have increased the substitutability between the two. The availability of *L-I-L* on DBS can be thought of as moving the two services closer together in products space. If so, we might expect to see more consumers switch between the two more often. We try to measure this rate of customer "churn" with ReQuest survey questions asking if the household has switched their current MVPD provider in the last year. If *L-I-L* availability made the two closer substitutes, we would expect the number of individuals switching between CATV and DBS would be higher in markets with local-into-local availability.

Table 3 presents estimates of the effect of L-I-L availability on whether a household has

<sup>13</sup> Emmons and Praeger, 1997, found similar relationships between cable subscribership and these demographic variables.

switched MVPD providers in the past year. No significant estimated trends can be found in any specification. Consistent with our expectations, the presence of local-into-local has a large and statistically significant effect on the extent of switching. In markets where local programming is available on a DBS system, households are 1.2 to 1.5 percentage points more likely to have switched MVPD provider in the past year. Since only about 5% of households indicate a switch, this represents a 25% increase.

One specific issue that arises with respect to this measure is that a household may change MVPD providers because it changed locations, rather than for any reason relating to the attributes of the competing MVPD providers. Because the ReQuest data asks households how many times they relocated in the past year, the regressions in table 3 control for this effect. In fact, we find that households that moved once during the previous year are about 12% more likely to have a different MVPD provider than they did one year earlier

#### C. Effect of Local-into-Local on Cable Prices

The evidence on the effect of local-into-local on subscribership suggests that its availability made DBS a closer substitute for cable television. One might expect this increase in substitutability would induce a competitive response by cable TV operators. In the short-run, we would anticipate that cable companies would lower their prices when faced with increased DBS competition. In the longer-run, we would expect cable companies to respond on dimensions that would increase the quality of their product.<sup>14</sup>

The Bill Harvesting data includes information on the actual dollar amount paid by the

<sup>14</sup> Specifically, in the context of vertically-differentiated products, an increase in the quality of the low-quality product (i.e., an exogenous decrease in the low-quality firm's cost of providing quality) will lead the high-quality

household in their most recent bill. The overall mean cable bill was about \$41, with a slight upward trend (the mean bill was \$38.78 in 1999:3, and \$43.97 in 2001:4). The main explanatory variable of interest is again the effect of local-into-local program availability. While some consumers may change their subscriptions gradually, we expect any reaction in cable prices to occur quickly because producers are better informed about changes in the DBS offerings and because price is a variable that can readily and quickly be changed. Therefore, our specifications assume that cable prices primarily respond to the presence of local channels on DBS, rather than how long they have been available. As above, we include a time trend, and allow that trend to differ between DMAs that eventually receive local-into-local, and those that do not.

Cable TV charges will depend on the specific bundle of services a customer orders. The Bill Harvesting data includes information on the levels of service included in the bill such as the number of pay-per-view programs ordered by the home, whether the service is digital or analog, and the "tier" of service (e.g., the number of premium offerings) chosen by the household. Since a cable system's price menu is available to all customers, demographic differences across households should not directly affect cable TV rates. To the extent demographic variables are significant, they might implies that either demand or cost varies with the demographics or that they proxy for unmeasured quality or service levels differences across systems (e.g. household income is a proxy for average income in the cable service area, and demand is higher in wealthier cable service areas).

The evidence presented in Table 4 suggests that the availability of a better substitute induces cable operators to lower their prices by \$0.76-\$0.79 per month or about 2%. This effect is much smaller than the 20% reduction in price due to competition between cable systems found by Emmons and Praeger (1997). That they find a larger effect is not surprising, since they are

firm to reduce price. It also increases the high-quality firm's optimal quality level (see Reiffen et al., 2000).

comparing cable pricing with and without a close substitute, whereas we are considering the effect of making the substitute somewhat closer in product space. Prices rose about 0.50 per quarter for non-*L*-*I*-*L* DMAs and an additional 0.18 in *L*-*I*-*L* DMAs. Service characteristics have the expected effects. For example, digital service adds about 15-20 to the average cable bill. Of the demographic variables, household income has a large positive and statistically significant effect on cable bills; bills are about 4.50 higher for the highest income category household than the lowest income one. Again, this could reflect either larger margins to presumably less elastic consumers or higher costs of increased service demanded by these consumers.

# D. Effect of Local-into-Local on the "Perceived Quality" of Cable

This evidence indicates that cable companies respond to the availability of local stations on DBS by lowering price. We hypothesize that cable companies may also respond to improved DBS quality by improving their own service. Our measure of MVPD quality is the subjective ordinal ranking households place on their MVPD service. Households are asked to rank their MVPD service on a scale of 1 (extremely poor) to 6 (excellent).

At the DMA level, we calculate the average rating for each of DBS and CATV customers. Given this ordinal scale, a natural way to estimate the relationship between the ranking and *L-I-L* availability at the household level is to estimate an ordered probit. In these regressions, the coefficient on *L-I-L* has the interpretation of being the effect that the availability of local programming has on the likelihood that a household describes their service quality as being in category q+1, rather than category q. A positive coefficient on the *L-I-L* variable would mean that the subjective rating of MVPD service is higher when local-into-local is available on DBS.

Table 5 presents the evidence on the relationship between *L-I-L* availability and perceived

CATV and DBS quality. The right-hand side variables include whether the *L-I-L* is available, the trend variables, and the 5 intercepts associated with the 6-outcome choice. Our hypothesis that satisfaction depends on current local-into-local status (rather than lagged status) reflects the fact that in the typical DMA, more than 50% of existing DBS subscribers opt for local-into-local within one month of its introduction (see, e.g., Star Report, 2/10/00). Hence, we would expect the increase in subscriber satisfaction should be almost immediate.<sup>15</sup> As expected, consumer satisfaction with their DBS services is higher when local-into-local is available. In addition, consumer satisfaction with CATV also increases when local-into-local is available suggesting a competitive response to the improved quality represented by *L-I-L* availability. While problematic to interpret, one can judge the magnitude of these effects with a comparison to DMA level standard deviations. Since the raw DMA level standard deviation for CATV is 0.198 and for DBS is 0.240, the estimates in columns three and four indicate that *L-I-L* availability improved DBS quality ratings by about two-thirds of a standard deviation and that CATV improved quality by about one-fifth of a standard deviation. This is consistent with a sizeable improvement in DBS quality and a non-trivial response by cable TV operators.

#### **VI.** Conclusion

This paper presents four different kinds of evidence regarding the effect that the inclusion of local programming among DBS offerings has on the competition between DBS and cable TV. All of the evidence points to the importance of local-into-local in making DBS a closer substitute for cable TV. First, we find that the percentage of household that subscribe to DBS increases substantially

<sup>15</sup> In unreported regressions, we replaced the local-into-local dummy with a dummy for whether local-into-local was available in the previous quarter. The results are qualitative similar.

when local stations are available on the system. Second, consistent with the premise that the availability of local programming makes DBS a closer substitute for cable, we find that switching between MVPD providers in more common when a DBS system features local stations. Third, cable prices appear to be lower in the DMAs in which DBS includes local programming. Fourth, consumer rankings of their satisfaction with their MVPD provider, whether DBS or cable, were higher where local-into-local was available. The evidence that cable companies respond to local-into-local on DBS by lowering prices and improving quality implies that our estimated effect of local-into-local on subscribership actually underestimates the true effect.

That these disparate measures yield similar conclusions suggests that our findings in regard to any one of these measures are robust. Hence, it seems that a reasonable conclusion that can be drawn from our findings is that the 1999 Act allowing local-into-local did yield consumer benefits.

In regard the to Direct TV/Echostar merger, our results have less to say about appropriate policy. Economic theory implies that production by two firms of a good that is non-rivalrous in consumption is inefficient. It seems plausible that the merger of Echostar and DirecTV would have reduced this duplication, and freed up satellite capacity for other uses, such as increased local-into-local, as the parties claimed. That is, our results suggest that real efficiencies would have resulted from the merger. Of course, this does not imply that these potential efficiencies outweighed the potential harm from allowing the merger of two close competitors.

### References

Beil, R.O. P.T. Dazzio, Robert Ekelund and J. D. Jackson (1993) "Competition and the Price of Municipal Cable Television Services: An Empirical Study," <u>Journal of Regulatory</u>

Economics, 401-15.

- Emmons, William M. and Robin Praeger (1997) "The Effects of Market Structure and Ownership on Prices and Service Offerings in the U.S. Cable Television Industry "<u>Rand</u> Journal of Economics, 732-50.
- Kerikeri, John A, Stephen M. Brown and Amy D. Abramowitz (2003) "Subscriptions for Direct Broadcast Satellite and Cable Television in the US: An Empirical Analysis" <u>Information</u> <u>Economics and Policy</u>, 1-15.
- Moulton, B. (1986) "Random Group Effects and the Precision of Regression Estimates," *Journal of Econometrics*, 32, 385-97.
- Reiffen, David, Laurence Schumann and Michael R. Ward (2000) "Discriminatory Dealing with Downstream Competitors: Evidence From the Cellular Industry " <u>Journal of Industrial</u> <u>Economics</u>, 253-88.

| Year:Quarter | Percentage of Households | Number of    |
|--------------|--------------------------|--------------|
|              | Subscribing to DBS       | Observations |
| 1999:3       | 9.3%                     | 3,596        |
| 1999:4       | 7.9%                     | 3,323        |
| 2000:1       | 9.9%                     | 3,758        |
| 2000:2       | 11.1%                    | 3,756        |
| 2000:3       | 12.5%                    | 4,532        |
| 2000:4       | 14.7%                    | 3,206        |
| 2001:1       | 17.7%                    | 3,559        |
| 2001:2       | 15.1%                    | 3,669        |
| 2001:3       | 15.8%                    | 3,842        |
| 2001:4       | 16.2%                    | 3,994        |
| Average      | 13.0%                    | 37,236       |

Table 1 DBS Subscription in Top 100 DMAs

|                                    | Household<br>Level Probit | Household<br>Level Probit | DMA Level<br>OLS   | DMA Level<br>OLS   |
|------------------------------------|---------------------------|---------------------------|--------------------|--------------------|
| Quarterly Trend                    | 0.200**<br>(0.073)        | 0.200**<br>(0.073)        | 0.231*<br>(0.100)  | 0.231*<br>(0.100)  |
| Trend for L-I-L<br>DMAs            | 0.432**<br>(0.111)        | -0.507<br>(0.288)         | 0.494**<br>(0.148) | -0.521<br>(0.393)  |
| L-I-L dummy                        | -0.654<br>(0.630)         |                           | -0.966<br>(0.777)  |                    |
| Quarters Since<br>L-I-L Introduced |                           | 0.981**<br>(0.304)        |                    | 1.025**<br>(0.413) |
| DMA Dummies                        | Jointly Sign.             | Jointly Sign.             | Jointly Sign.      | Not Jointly Sign.  |
| Demographic<br>Variables           | Jointly Sign.             | Jointly Sign.             |                    |                    |
| Log Likelihood                     | -10,266                   | -10,261                   |                    |                    |
| Adjusted R2                        |                           |                           | 0.39               | 0.39               |
| Observations                       | 35,650                    | 35,650                    | 1,000              | 1,000              |

| Table 2   |
|---|
| The Effect of Local-into-Local Availability on Customers' |
| Percentage Probability of Choosing DBS over CATV          |
|   |

Probit regressions report the estimated marginal effect for each variable calculated at the sample mean rather than the estimated coefficient values.

|                          | Household<br>Level Probit | Household<br>Level Probit | DMA Level<br>OLS   | DMA Level<br>OLS   |
|--------------------------|---------------------------|---------------------------|--------------------|--------------------|
| Quarterly Trend          | -0.038<br>(0.025)         | -0.032<br>(0.024)         | -0.034<br>(0.029)  | -0.005<br>(0.033)  |
| Trend for L-I-L<br>DMAs  | -0.044<br>(0.036)         | -0.063*<br>(0.034)        | -0.049<br>(0.043)  | -0.068<br>(0.044)  |
| L-I-L dummy              | 1.232**<br>(0.187)        | 1.509**<br>(0.181)        | 1.200**<br>(0.220) | 1.333**<br>(0.243) |
| DMA Dummies              | Jointly Sign.             | Jointly Sign.             | Jointly Sign.      | Jointly Sign.      |
| Demographic<br>Variables |                           | Jointly Sign.             |                    | Jointly Sign.      |
| Log Likelihood           | -57,718                   | -50,620                   |                    |                    |
| Adjusted R2              |                           |                           | 0.28               | 0.30               |
| Observations             | 275,510                   | 275,510                   | 1,000              | 1,000              |

| Table 3   |
|---|
| The Effect of Local-into-Local Availability on the Percentage Probability |
| that a MVPD Customer Changed Providers in Past 12 Months.                 |
| that a MVPD Customer Changed Providers in Past 12 Months.                 |

Probit regressions report the estimated marginal effect for each variable calculated at the sample mean rather than the estimated coefficient values.

|                           | Household Level<br>CATV OLS | DMA Level CATV<br>OLS |
|---------------------------|-----------------------------|-----------------------|
| Quarterly Trend           | 0.506**                     | 0.482**               |
|                           | (0.046)                     | (0.053)               |
| Trend for L-I-L DMAs      | 0.185**                     | 0.185*                |
|                           | (0.067)                     | (0.072)               |
| L-I-L dummy               | -0.789*                     | -0.761*               |
|                           | (0.347)                     | (0.374)               |
| Number of Tier 1 Cable    | 7.983**                     | 6.078**               |
| Levels                    | (0.214)                     | (0.978)               |
| Number of Tier 2 Cable    | 6.227**                     | 1.074                 |
| Levels                    | (0.245)                     | (1.014)               |
| Number of Tier 3 Cable    | 7.699**                     | 6.171*                |
| Levels                    | (0.628)                     | (3.612)               |
| Number of Tier 4 Cable    | 2.935                       | 2.427                 |
| Levels                    | (2.487)                     | (14.406)              |
| Number of Pay-per-view    | 10.876**                    | 11.984**              |
|                           | (0.198)                     | (1.342)               |
| Number of Digital Tiers   | 19.897**                    | 14.265**              |
| -                         | (0.323)                     | (1.789)               |
| Number of Satellite Tiers | 10.833**                    | 4.821**               |
|                           | (0.435)                     | (1.607)               |
| No Service Level          | 11.344**                    | 7.004**               |
| Breakdown                 | (0.265)                     | (1.110)               |
| DMA Dummies               | Jointly Sign.               | Jointly Sign.         |
| Demographic Variables     | Jointly Sign.               |                       |
| Adjusted R2               | 0.35                        | 0.69                  |
| Observations              | 32,317                      | 1,000                 |

 Table 4

 The Effect of Local-into-Local Availability on CATV Monthly Bills

|                          | Household<br>Level CATV<br>Ordered Probit | Household<br>Level DBS<br>Ordered Probit | DMA Level<br>CATV OLS | DMA Level<br>DBS OLS |
|--------------------------|---|--|-----------------------|----------------------|
| Quarterly Trend          | 0.021**<br>(0.001)                        | 0.006*<br>(0.003)                        | 0.026**<br>(0.002)    | 0.009*<br>(0.004)    |
| Trend for L-I-L<br>DMAs  | 0.004*<br>(0.002)                         | -0.011*<br>(0.005)                       | -0.004<br>(0.003)     | -0.016*<br>(0.006)   |
| L-I-L dummy              | 0.027**<br>(0.011)                        | 0.103**<br>0.028                         | 0.040*<br>(0.017)     | 0.150**<br>(0.032)   |
| DMA Dummies              | Jointly Sign.                             | Jointly Sign.                            | Jointly Sign.         | Not Jointly Sign.    |
| Demographic<br>Variables | Jointly Sign.                             | Jointly Sign.                            |                       |                      |
| Log Likelihood           | -285,608                                  | -50,620                                  |                       |                      |
| Adjusted R2              |   |  | 0.57                  | 0.03                 |
| Observations             | 176,280                                   | 34,826                                   | 1,000                 | 1,000                |

| Table 5  |
|--|
| The Effect of Local-into-Local Availability on Customers' Quality Rating |
| of CATV or DBS Provider  |