

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

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Abstract

Because the marginal cost of providing direct broadcast satellite (DBS) transmission to an additional household is zero, efficient use of satellite spectrum would have a single firm transmitting each programming channel. That is, while having multiple DBS providers yields allocative efficiencies due to competition, it simultaneously leads to inefficient production. One of the services that would be provided if transmission were rationalized is delivery of local programming over DBS in additional markets. This paper empirically examines the value of having local programming on DBS in those markets in which it is available. We find that local programming appears to create value for consumers; both by increasing the value of DBS, and by inducing greater competition between DBS and cable television.

Keywords: Competition, Television, Satellite, Public Good

JEL Codes: D43, L82, H41

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## **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 have only been 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 a panel of households across the U.S. The use of panel data differs from previous research into MVPD competition, which has used cross-sectional data, typically at the level of the cable franchise (see, e.g., Emmons and Prager, 1997, Karikari et al., 2002, although Goolsbee and Petrin, 2004 use micro-level data).

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 45%. The increased competition from DBS suppliers appears to have induced a competitive response from cable companies. Specifically, the evidence suggests that cable prices are about 1.5% 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 subscribing households, slightly over 75% subscribe to traditional cable TV, and the two major DBS firms, DirecTV and

EchoStar, have a combined 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:

Satellite channels. 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.

Superstations. 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 seven that existed in May, 1991 due to the application of broadcast retransmission consent rules to new satellite delivery of independent broadcast stations after that date. 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 with ABC, CBS, FOX or NBC, and noncommercial PBS stations, but only to households in the FCC deems as “unserved” by local broadcast affiliates. Like superstations, these stations may be delivered by any MVPD or common carrier, so they are available to all

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<sup>1</sup> Annual Assessment of the Status of Competition, 17 F.C.C. Rcd.26901, Appendix B (2002) (Ninth Annual Report).

MVPDs on a nondiscriminatory basis. Compulsory licenses apply to the delivery of these channels.

Terrestrial channels. 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 non-overlapping “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 its programming.<sup>2</sup> Under “must carry,” MVPDs are compelled to deliver all “must-carry” local broadcast channels if they deliver any local broadcast channels.<sup>3</sup> In most cases, affiliates of the four major networks choose retransmission consent, and virtually all cable systems carry those affiliates. Noncommercial 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>4</sup>

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<sup>2</sup> 47 U.S.C. § 325.

<sup>3</sup> DBS providers became subject to must carry on January, 2002. 47 U.S.C. § 338 (a)(3).

<sup>4</sup> Annual Assessment of the Status of Competition, 17 F.C.C. Rcd. 26901, ¶ 80 (2002) (Ninth Annual Report).

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 regulations require. 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's technology is such that it transmits the same set of channels to subscribers in all 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 households 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>5</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>6</sup> This decision only limits the national programming that can be delivered on the same system. A decision by a DBS operator, 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

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<sup>5</sup> This distinction has been recognized in numerous FCC documents. See, e.g., Annual Assessment of the Status of Competition, 17 F.C.C. Rcd. 26901, ¶¶ 22-23 (Ninth Annual Report) (2002); Implementation of the Satellite Home Viewer Improvement Act of 1999, 16 F.C.C. Rcd. 1918, ¶ 6 n.12 (2000).

<sup>6</sup> This is a fairly typical allocation of capacity. See, e.g., [www.cablevision.com/lineups](http://www.cablevision.com/lineups).

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.<sup>7</sup>

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 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.<sup>8</sup>

### **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 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

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<sup>7</sup> Application of Echostar Communications Corporation, General Motors Corporation, and Hughes Electronic Corporation, 17 F.C.C. Rcd. 26901 ¶¶ 77-82 (2002) (Hearing Designation Order).

<sup>8</sup> Annual Assessment of the Status of Competition, 17 F.C.C. Rcd. 26901, ¶ 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).

local-into-local programming, national broadcasts, or unrelated telecommunications services such as broadband Internet.

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>9</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>10</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 caused a significant change in MVPD competition.<sup>11</sup> Prior to the passage of this Act, the 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 Prager, 1997; Beil et al., 1993). In fact, the addition of local broadcast channels has

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<sup>9</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>10</sup> Pub. L. 106-113, 113 Stat. 1501 (codified in scattered sections of 17 U.S.C. and 47 U.S.C.).

<sup>11</sup> See Hazlett (forthcoming) for a discussion of the nature of the competition between DBS and cable.

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>12</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>13</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 one 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?
- 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 quality difference when local-into-local is available?

#### **IV. Data Description**

The primary data source in our analysis comes from TNS Telecoms<sup>14</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 covering July, 1999 to December, 2001. ReQuest is a quarterly nationwide survey of approximately 30,000 households in the U.S. regarding the availability and consumption of

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<sup>12</sup> See, e.g., Annual Assessment of the Status of Competition, 17 F.C.C. Rcd. 26901, ¶ 61 (2002) (Ninth Annual Report); Annual Assessment of the Status of Competition, 17 F.C.C. Rcd. 1244, ¶ 59 (2002) (Eighth Annual Report); Annual Assessment of the Status of Competition, 16 F.C.C. Rcd. 6005, ¶ 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>13</sup> <<www.directv.com>> (visited 19 April 2003); <<www.dishnetwork.com>> (visited 19 April 2003).

<sup>14</sup> See <<[www.tnstelecoms.com](http://www.tnstelecoms.com)>>.

various telecommunications services. 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 multi-unit 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.

Households are also asked for, and compensated for, submitting one set each of their original bills for local telephone, 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>15</sup> It also identifies the month of each observation, while the ReQuest data only report the quarter of the observation. More accurate information on timing allows us to more accurately determine when each household in our sample had local channels available on DBS. 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 five weeks of 1999 or the first quarter of 2000 and another third occurred throughout the rest of 2000. For both DirecTV 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. This reflects the premise that 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 can induce neither increased substitution between cable TV and DBS nor a competitive response. Second, we focus our analyses on the top 100 DMAs rather than including smaller markets because no market outside

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<sup>15</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 of the MVPD provider in all years.

of the top 80 in terms of number of households had gained local-into-local program availability during our sample period. A household's subscription decision could be much different in smaller geographic markets.

## **V. Results**

Our analyses of the market outcomes share a common structure. In each case, we attempt to identify the effect of DBS local-into-local (*L-I-L*) programming availability on a market outcome 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 variable against a vector of DMA fixed effects as well as a dummy variable for *L-I-L* availability in order to isolate the *L-I-L* effects from other 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 had *L-I-L* programming available at any point in our sample. The simple trend is to account for the apparent growing popularity of DBS even without *L-I-L* programming available. However, the DMAs in which *L-I-L* programming first became available initially averaged 6 to 7% DBS market share compared to 10 to 13% initially in the other DMAs. This large difference in levels suggests that 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 gauge the confidence that should be placed on statistical inferences in light of “Moulton” effects (Moulton, 1986). Moulton effects are downward biases in the standard error estimates resulting from having multiple observations with identical values for the right-hand side variables. As shown below, the magnitude of this effect seems small for our sample.

We include demographic variables to control for other variables that have shown in the past to influence MVPD purchasing decisions. We anticipate these variables would be significant in the household-level regressions, but not the DMA-level regressions, since the later already control for the average level of each demographic variable through the DMA fixed effects. Hence, in the DMA-level regressions, the variation in the demographic variables, and thus the estimated coefficients for demographic variables, largely comes from period-to-period variation in the sampled group. In the DMA-level regressions, we weight each observation by the number of households sampled from the DMA in order to correct for heteroskedasticity, since the true proportion of households subscribing to each MVPD is measured with greater error in DMAs with fewer observations.

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

Table 2 reports results for consumer decisions to subscribe to CATV or DBS. The first two columns report probit results (marginal effects evaluated at means rather than coefficient values) based on household level data and the next two columns report OLS results at the DMA level. The interpretations of the coefficients are similar, regardless of whether we measure outcomes at the household or DMA level. At the household level, the coefficient on the number of months of *L-I-L* availability represents the change in the probability that a household subscribes to DBS resulting from one additional month of *L-I-L* availability. The coefficient in the DMA-level regression is the change in the percentage of the population that subscribes to DBS, resulting from one additional month of *L-I-L* availability.

For either measure of MVPD share, we model the effect of *L-I-L* in two ways. First, in columns (1) and (3), we report regressions in which we use a dummy variable equal to 1 if *L-I-L*

was available in the current month in that DMA. Our second approach is based on the idea that it may take time for consumers to change their MVPD decisions in response to the availability of *L-I-L* in their DMA, so that we might expect consumers to gradually switch over to DBS over time. To account for this gradual consumer reaction, the specification in columns (2) and (4) includes a variable measuring the number of months since *L-I-L* was first introduced into the DMA.

The coefficients on the time trend and the trend interacted with the *L-I-L* variable are essentially unchanged between the household-level and DMA-level regressions. This, along with the similarity in the estimated standard errors suggests that Moulton effects are not significant. The important difference in results is associated with whether we model the effect of *L-I-L* as increasing over time, or once-and-for-all. In the former case (columns (2) and (4)), we find that *L-I-L* has a positive and statistically significant effect on subscriptions. In contrast, if *L-I-L*'s effect is modeled as a dummy variable, it has a small positive effect in the household-level regression, and a small negative one in the DMA-level regression, with neither effect being statistically significant. Since the former assumption seems more consistent with consumer theory and is similar across specifications, we view those estimates as a more accurate description of the effect of *L-I-L*.

In all specifications, the monthly trend variable indicates that DBS subscription is rising. This itself is consistent with the premise that consumers only learn of DBS's attributes (and switch from CATV) gradually over time. The trend interacted with *L-I-L* DMAs is positive and significant only in the dummy variable specifications where it might be capturing faster than average growth in DMAs that eventually had *L-I-L*.

These results suggest that the availability of local programs on their systems made DBS service a more attractive product to 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 (29 months at 0.084% per month) and by about 6.4% due to *L-I-L* introduction (24 months at 0.258% per month) in the DMAs with the earliest *L-I-L* availability. Since DBS share initially averaged about 6 to 7% in DMAs where *L-I-L* would become available, this indicates that *L-I-L* availability on DBS had a large impact on subscription decisions.

While Table 2 does not report the individual coefficients for the demographic variables that were included in the household-level regressions, our findings are largely consistent with expectations (complete results available from authors). We find that the likelihood of DBS subscription is increasing in income, falling in the age of the respondent, the number of units in their dwelling and their education level, while household size and racial characteristics had little relationship to their choice of MVPD. Goolsbee and Petrin (2004) also find that DBS use is increasing in income (as do Karikari et al., 2003), and less likely for households in multi-family dwellings.<sup>16</sup>

#### *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 product space. If so, we might expect to see consumers switch between the two more often. We try to measure this rate of customer “churn” with ReQuest survey responses to questions about

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<sup>16</sup> Emmons and Praeger, 1997, study a period prior to DBS’s emergence, and found similar relationships between cable subscribership and these demographic variables.

whether 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 to 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 switched MVPD providers in the past year.<sup>17</sup> 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, on average, only about 5% of households indicate a switch, this represents a 20% or more increase. The estimated effect is quite similar, regardless of whether the analysis is at the household or DMA level, or whether demographic variables are excluded or included. As in Table 2, the standard errors are similar in the household and DMA versions.

Our estimates indicate that the trend in switching is negative, although not generally of statistical significance. One specific issue that arises with respect to switching is that, since a household bears lower incremental switching costs when it changes locations, it is more likely to act on changes in the perceived differences between 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 nearly 12% more likely to have a different MVPD provider than they did one year earlier

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

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<sup>17</sup> Tables 3 and 5 are based on the ReQuest data, which only reports the quarter in which the observations is made. We treat each quarterly observation as occurring in the middle of the relevant quarter.

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>18</sup>

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

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<sup>18</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 firm to reduce price. It also increases the high-quality firm’s optimal quality level (see Reiffen et al., 2000).

households should not directly affect cable TV rates. To the extent demographic variables are significant, they might imply that either demand or cost varies with the demographics or that they proxy for unmeasured quality or service level differences across systems or households (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 monthly prices by \$0.57-\$0.75, or about 1.5% (p-values of 11.3% and 5.8% respectively). This effect is much smaller than the 15% reduction in cable prices due to the presence of DBS estimated by Goolsbee and Petrin (2004), or the 20% reduction in prices due to competition between cable systems found by Emmons and Prager (1997). That these studies find a larger effect is not surprising, since they are comparing cable pricing with and without a close substitute, whereas we are considering the effect of making the substitute somewhat closer in product space.

The trend variable indicates that prices rose about \$0.17 per month for non-*L-I-L* DMAs and an additional \$0.05 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 the increased service demanded by these consumers.

#### *D. Effect of Local-into-Local on the “Perceived Quality” of Cable*

This evidence suggests 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 (separately) for DBS and CATV customers. Given this ordinal scale, a natural way to estimate the relationship between rankings 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 five intercepts associated with the six-outcome choice. The left-hand side variable in columns (1) and (3) is consumer satisfaction with DBS service (at the household and DMA level, respectively), while the left-hand side variable in columns (2) and (4) is satisfaction with cable service. We would expect the direct effect of *L-I-L* on DBS ratings would be larger than its indirect effect on CATV ratings. In addition, we would expect the change in perceived DBS quality due to *L-I-L* to closely follow the initiation of *L-I-L*, since 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).<sup>19</sup> The timing of the resulting change in CATV ratings is less clear; Table 5 reports the effect of *L-I-L* on cable ratings assuming the effect is immediate. However, the results are robust to alternative assumptions regarding timing.<sup>20</sup>

As expected, consumer satisfaction with their DBS services is higher when local-into-local is available. In addition, as hypothesized, consumer satisfaction with CATV also increases, although by a smaller amount, when local-into-local is available. This suggests a competitive response by CATV providers to the improved DBS quality represented by *L-I-L* availability. Using a different mode of analysis, Goolsbee and Petrin (2004) also find that cable companies improved the quality of their service in the face of increased DBS competition. While it is somewhat problematic to interpret the magnitude of the coefficients in Table 5, one rough scale for the size of the effects is relative to DMA-level standard deviations. Since the raw DMA-level standard deviation for CATV rating is 0.198 and for DBS is 0.240, the estimates in columns (3) and (4) 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 *L-I-L* representing 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.

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<sup>19</sup> This fact is not inconsistent with our earlier contention that customers who are not yet DBS subscribers come to learn about DBS characteristics only slowly over time. Existing DBS subscribers are more readily targeted with information about the availability of *L-I-L* by DBS providers than are non-subscribers.

<sup>20</sup> In unreported regressions, we replaced the local-into-local dummy with a dummy for whether local-into-local was available in the previous month. The results are qualitative similar.

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 households that subscribe to DBS increases substantially 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 is more common when a DBS system features local stations. Third, cable prices appear to fall after a DBS provider begins including 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 value consumers place on local-into-local programming.

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 significant consumer benefits.

In regard to the DirecTV/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, as the parties claimed, freed up satellite capacity for other uses, including local-into-local for more markets, that would have yielded consumer benefits. 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.

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Table 1  
DBS Subscription in Top 100 DMAs

Year:Quarter	Percentage of Households Subscribing to DBS	Number of Observations
1999:3	9.3%	3,596
1999:4	7.9%	3,323
2000:1	9.9%	3,758
2000:2	11.3%	3,756
2000:3	12.7%	4,532
2000:4	14.6%	3,206
2001:1	17.4%	3,559
2001:2	15.3%	3,669
2001:3	16.0%	3,842
2001:4	16.5%	3,994
Average	13.1%	37,236

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

	Household Level Probit	Household Level Probit	DMA Level OLS	DMA Level OLS
Monthly Trend	0.060* (0.026)	0.060* (0.026)	0.084** (0.034)	0.084** (0.034)
Trend for L-I-L DMAs	0.142** (0.037)	-0.179* (0.081)	0.137** (0.050)	-0.101 (1.178)
L-I-L dummy	0.103 (0.623)		-0.312 (0.807)	
Months Since L-I-L Introduced		0.370** (0.086)		0.258* (0.124)
DMA Dummies	Jointly Sign.	Jointly Sign.	Jointly Sign.	Jointly Sign.
Demographic Variables	Jointly Sign.	Jointly Sign.	Jointly Sign.	Jointly Sign.
Log Likelihood	-10,366	-10,356		
Adjusted R2			0.20	0.20
Observations	35,642	35,642	2,908	2,908

Standard Errors in Parentheses  
\* - indicates significance at 5%  
\*\* - indicates significance at 1%

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

Source: Bill Harvesting Data

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

	Household Level Probit	Household Level Probit	DMA Level OLS	DMA Level OLS
Monthly Trend	-0.015 (0.009)	-0.013 (0.008)	-0.011 (0.010)	-0.001 (0.011)
Trend for L-I-L DMAs	-0.002 (0.012)	-0.002 (0.011)	-0.007 (0.014)	-0.009 (0.014)
L-I-L dummy	1.101** (0.188)	1.207** (0.081)	1.110** (0.227)	1.035** (0.242)
Moved once in past year		11.855** (0.411)		7.848 (4.292)
Moved two or more times in past year		10.152** (0.389)		4.952 (3.769)
DMA Dummies	Jointly Sign.	Jointly Sign.	Jointly Sign.	Jointly Sign.
Demographic Variables	omitted	Jointly Sign.	omitted	Jointly Sign.
Log Likelihood	-57,718	-50,620		
Adjusted R2			0.27	0.29
Observations	275,510	275,510	1,000	1,000

Standard Errors in Parentheses  
 \* - indicates significance at 5%  
 \*\* - indicates significance at 1%

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

Source: ReQuest Data

Table 4  
The Effect of Local-into-Local Availability on CATV Monthly Bills

	Household Level CATV OLS	DMA Level CATV OLS
Monthly Trend	0.176** (0.017)	0.166** (0.018)
Trend for L-I-L DMAs	0.046* (0.023)	0.051* (0.024)
L-I-L dummy	-0.567 (0.358)	-0.745 (0.392)
Number of Tier 1 Cable Levels	8.039** (0.220)	6.886** (0.660)
Number of Tier 2 Cable Levels	6.262** (0.252)	2.964** (0.729)
Number of Tier 3 Cable Levels	7.866** (0.638)	4.956** (2.135)
Number of Tier 4 Cable Levels	4.758 (2.608)	7.778 (7.386)
Number of Pay-per-view	10.600** (0.192)	11.105** (0.720)
Number of Digital Tiers	19.957** (0.322)	17.535** (1.005)
Number of Satellite Tiers	11.263** (0.442)	7.694** (1.197)
No Service Level Breakdown	11.468** (0.272)	8.721** (0.789)
DMA Dummies	Jointly Sign.	Jointly Sign.
Demographic Variables	Jointly Sign.	Not Jointly Sign.
Adjusted R2	0.34	0.5169
Observations	31,407	2,801

Standard Errors in Parentheses  
 \* - indicates significance at 5%  
 \*\* - indicates significance at 1%  
 Source: Bill Harvesting Data

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

	Household Level DBS Ordered Probit	Household Level CATV Ordered Probit	DMA Level DBS OLS	DMA Level CATV OLS
Monthly Trend (x 10)	0.021* (0.011)	0.068 (0.050)	0.023 (0.016)	0.085** (0.009)
Trend for L-I-L DMAs (x 10)	-0.040* (0.015)	-0.010* (0.007)	-0.053** (0.020)	-0.019** (0.006)
L-I-L dummy	0.133** (0.027)	0.025* (0.011)	0.209** (0.035)	0.051** (0.019)
DMA Dummies	Jointly Sign.	Jointly Sign.	Jointly Sign.	Not Jointly Sign.
Demographic Variables	Jointly Sign.	Jointly Sign.	Not Jointly Sign.	Not Jointly Sign.
Log Likelihood	-50,874	-289,520		
Adjusted R2			0.58	0.08
Observations	34,826	176,280	1,000	1,000

Standard Errors in Parentheses  
\* - indicates significance at 5%  
\*\* - indicates significance at 1%

Source: ReQuest Data