The Welfare Effects of Vertical Integration in Multichannel Television Markets*

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[PRELIMINARY AND INCOMPLETE; PLEASE DO NOT CIRCULATE]

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Abstract

We investigate the welfare effects of vertical integration of regional sports networks (RSNs) in U.S. multichannel television markets. Vertical integration can enhance efficiency by reducing double marginalization and increasing carriage of these channels, but can also harm welfare due to foreclosure and raising rivals' costs incentives. We estimate a structural model of viewership, subscription, distributor pricing, and affiliate fee bargaining using a rich dataset on the U.S. cable and satellite television industry (2000-2010). We use these estimates to analyze the impact of simulated vertical mergers and de-mergers of RSNs by distributors on competition and welfare, and examine the efficacy of regulatory policy introduced in the 1992 Cable Act by the U.S. Federal Communications Commission.

1 Introduction

The welfare effects of vertical integration is an important, but controversial, issue. The theoretical literature on the pro- and anti-competitive impacts of vertical integration is vast (c.f. Perry, 1990; Whinston, 2006; Riordan, 2008), and typically contrasts potential efficiencies related to the elimination of double marginalization (Spengler, 1950) and the alignment of investment incentives (Willamson, 1985; Grossman and Hart, 1986) with the potential for losses arising from incentives to foreclose rivals and raise their costs (Salop and Scheffman, 1983; Krattenmaker and Salop, 1986; Hart and Tirole, 1990; Ordover et al., 1990). However, despite a growing literature, empirical evidence on the quantitative magnitudes of these potential effects (and the overall net welfare impact) is still limited.

This paper attempts to quantify the welfare effects of vertical integration in cable and satellite television in the context of high value regional sports programming in the U.S. Whether or not

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the ownership of content by distributors harms welfare is at the heart of several recently proposed (e.g., Comcast and Time Warner, AT&T and DirecTV) and consummated (e.g., Comcast and NBC, approved in 2011) mergers in the television industry. The attention these mergers attracted is due to the industry's overwhelming reach and size: nearly 90% of the 115 million television households in the U.S. subscribe to multichannel television, and the mean individual consumes about three hours of television per day. Regional sports programming is a large part of this industry, receiving $4.1 billion out of the over $30 billion per year in negotiated affiliate fees paid by distributors to all content providers, and an additional $700 million per year in advertising dollars.

Our focus on the multichannel television industry, and in particular sports programming, is also driven by several factors that create empirical leverage to address this question. First, there is significant variation across the industry in terms of ownership of content by multichannel video programming distributors (MVPDs). Second, although this variation is primarily at the national level for most channels, regional sports networks (RSNs) are present in smaller geographic areas, and thus provide useful variation in ownership patterns both across regions and over time. Third, the industry is the subject of significant regulatory and antitrust attention in addition to merger review, including the application of "program access rules" and exceptions to this rule, such as the "terrestrial loophole" which exempted certain distributors from supplying integrated content to rivals.

The heart of our paper is the specification and estimation of a structural model of the multichannel television industry that captures consumer viewership and subscription decisions, MVPD pricing and carriage decisions, and bargaining between MVPDs and content providers. Our paper builds off and significantly extends the model in Crawford and Yurukoglu (2012) into an empirical framework for the analysis of vertical integration and mergers, and importantly incorporates: (i) incentives to foreclose rivals' access to inputs, (ii) the potential for double marginalization, and (iii) the possibility of imperfect coordination and internalization within an integrated firm. We use data on both aggregate and individual level consumer viewership and subscription patterns along with price, quantity, and channel carriage for cable and satellite at the local market level over the years 2000 to 2010.

We leverage our structural model to highlight the mechanisms through which pro-competitive and anti-competitive effects of vertical integration might occur. In particular, we estimate: (i) the degree to which firms internalize the profits of integrated units when making pricing and channel carriage decisions; and (ii) the degree to which integrated channels act on incentives to deny access to rival distributors. Central to identifying both of these effects are our estimates of the changes in firm profits from the addition or removal of an RSN from its bundles, which in turn relies on using variation in distributor market shares as channel bundle offerings change to inform how much consumers value content when subscribing to an MVPD, and variation in observed viewership patterns and negotiated affiliate fees across channels to infer the relative values consumers place on different channels. Given these estimated profit effects, the pro-competitive effect of vertical integration is largely identified from the degree to which carriage is higher for

integrated distributors, while the anti-competitive foreclosure effect is identified by lower supply to downstream rivals of integrated channels.

Using these sources of identification, we find that integrated distributors do internalize the effects of their pricing and carriage decisions on their upstream channels' profits, although not to the full extent typically assumed in theoretical models of integration. We also find that integrated RSNs take into account to a substantial degree the benefits their downstream divisions reap when a rival distributor is denied access to the RSN's programming.

We use our estimated model to examine the effects of vertical integration, both when program access rules ensuring non-integrated rival distributed access to integrated content are effectively enforced, and when they are not. In the former case, foreclosure arising from vertical integration is prevented and our counterfactual captures the effects due to improved internalization of pricing and carriage decisions between the integrated units. In the latter case, the integrated firm (typically a cable distributor) may engage in foreclosure, denying non-integrated rival distributors (typically a satellite distributor) access to its RSN.

We find that vertical integration in the presence of effective program access rules leads to significant gains in both consumer and aggregate welfare. These benefits arise both due to lower retail prices and greater carriage of the RSN. Averaging across results for 27 RSNs that were active in 2007, we find that integration of a *single* RSN would reduce average cable prices by approximately \$0.50 per subscriber per month in that RSN's market, and increase carriage of the RSN by its integrated owner by approximately 8%. Combined, these effects would yield, on average, approximately a 1.2% increase per month per capita increase in consumer surplus.

However, when vertical integration occurs in the absence of effective program access rules, consumers are often harmed. This occurs in cases in which the integrated firm denies access to its RSN to rival distributors: for 8 of our RSNs, we predict that exclusion of satellite by integrated cable providers would be preferred, and in the majority of these cases, consumer welfare harmed. Such foreclosure tends to occur when the RSN is owned by a cable operator whose overall market share in the region served by the RSN is large: i.e., we do not find an integrated cable provider wishing to exclude satellite unless its percentage of households that it could serve exceeds 40%. Furthermore, when we do not predict foreclosure, we document that integration would encourage an RSN to increase the prices charged to rivals of its integrated distributor by over 30%.

Overall, we find the net effect of vertical integration—allowing for both efficiency and foreclosure incentives—to be heterogeneous. For those RSNs that are integrated in our setting, we predict that the impact on total and consumer welfare to be negative; for those RSNs that are not, the impact is slightly positive.[1]

The effects we document are only partial, as our analysis does not incorporate the potentially important effect of vertical integration on investments by RSNs and MVPDs, both those that integrate and their rivals. In principle, these investment effects on consumer and aggregate surplus

[1]Our analysis considers integration of each RSN individually, and therefore assumes that (national) satellite prices are unchanged. It may therefore understate consumer losses from widespread integration absent effective enforcement of program access rules.

could go either way, as emphasized in the literature on investment effects of vertical integration (Bolton and Whinston (1991), Hart (1995)). For example, in all cases, the impact on satellite distributors is negative, raising the possibility that widespread integration by cable distributors of RSNs might impact satellite distributors' effectiveness as a competitor to cable to a greater extent than admitted in our analysis.

Related Literature. Previous work in the cable industry, including Waterman and Weiss (1996), Chipty (2001), and Chen and Waterman (2007), have primarily relied on reduced form cross-sectional analyses for a limited subset of channels and found that integrated cable systems are more likely to carry their own as opposed to rival content. One exception that uses variation over time is Suzuki (2009), which studies the 1996 merger between Time Warner and Turner broadcasting and finds that integrated channels were more likely to be carried by Time Warner systems following the merger, and that non-integrated rival channels were less likely to be carried in Time Warner markets after the merger. In this regards, both this and our companion paper (Crawford et al., 2014) complement previous work in the cable industry with a richer panel dataset, and with a structural model we are able to both provide welfare measurements and shed light on the mechanisms through which vertical integration has an effect on welfare.

This paper also adds to the growing empirical literature on the effects of vertical integration and arrangements (e.g. Shepard, 1993; Asker, 2004; Hastings, 2004; Hastings and Gilbert, 2005; Hortacsu and Syverson, 2007; Villas-Boas, 2007; Mortimer, 2008; Houde, 2012; Lee, 2013). We build on existing approaches by estimating a model that explicitly incorporates avenues for vertical integration to both improve the efficiency of pricing and channel carriage decisions and to generate foreclosure of rival distributors, and by providing estimates of the degree to which integrated firms, in practice, act on each of these incentives. Using these estimates, we provide estimates of the welfare impacts of vertical integration that weigh these pro- and anti-competitive effects.[2]

2 Institutional Detail and Data

Our study analyzes the U.S. cable and satellite industry for the years 2000 to 2010 and focuses on the ownership of "Regional Sports Networks" (RSNs) by cable and satellite distributors. In this section, we describe the industry structure, RSNs, and regulatory policy during this period. We then discuss the data that we use to estimate the model. The tables referenced in this section are contained in Appendix B.

In the time period we study, the vast majority of households in the US were able to subscribe to a multichannel television bundle from one of three downstream multichannel video programming distributors (MVPDs): a local cable company (e.g., Comcast, Time Warner Cable, or Cablevision) or one of two nationwide satellite companies (DirecTV and Dish Network).[3] Cable companies

[2]See also Conlon and Mortimer (2013).

[3]In our analysis, we focus only on markets where there is a single cable provider. Telecommunications MVPD providers AT&T and Verizon did not enter a significant number of markets until 2007; by the end of 2010, AT&T

transmit their video signals through a physical wire whereas satellite companies distribute video wirelessly through a south-facing satellite dish attached to a household's dwelling. The majority of distributors' revenue comes from subscription to three different bundles of programming: a limited basic bundle which retransmits over-the-air broadcast stations, an expanded basic bundle containing 40-60 of the most popular channels available on cable (e.g., AMC, CNN, Comedy Central, ESPN, MTV, etc.), and a digital bundle containing between 10 to 50 more, smaller, niche channels.

Downstream distributors negotiate with content producers over the terms at which the distributors can offer the content producers' channels to consumers. These negotiations usually center on a monthly per-subscriber "affiliate" fee that the downstream distributor pays the channel for every subscriber who has access to the channel, whether the subscriber watches it or not. According to industry estimates, RSNs command the second-highest per-subscriber affiliate fees after ESPN. For example, NESN is reported to have per-subscriber monthly fees that averaged $2.72 per month in 2010 whereas highly-rated national channels such as Fox News, TNT, and USA hover around $1 per subscriber per month.

2.1 Vertical Affiliation of RSNs in Multichannel Television Markets

RSNs carry professional and college sports programming in a particular geographic region. For example, the New England Sports Network (NESN) carries televised games of the Boston Red Sox and the Boston Bruins that aren't concurrently being televised nationally. Metropolitan areas can have multiple RSNs: e.g., in the New York City metropolitan area, there are four different RSNs (Madison Square Garden (MSG), MSG Plus, SportsNet NY, and Yankees Entertainment and Sports (YES)). Some RSNs also serve multiple metropolitan areas: e.g., the Sun Sports network holds the rights to the Miami Heat and the Tampa Bay Rays, amongst others. Table 6 provides a variety of information about the largest RSNs in the US, including their availability, their average (across systems and years) affiliate fee, and average (across DMAs and years) viewership.

Figure 1 shows each RSN's years of operation between 2000 and 2010 and ownership affiliation with a downstream distributor. Many RSNs are owned, to some degree, by a downstream distributor. For example, in 2007, downstream distributors had ownership interests in 16 out of the 30 active RSNs. The cable MVPDs that owned RSNs are Comcast, Cablevision, Cox, and Time Warner; DirecTV, the largest satellite operator (and second-largest US MVPD), indirectly had stakes in numerous RSNs through its partial owners News Corporation and Liberty Media Corporation.[4]

Regulatory Policy. There are several key features of the regulatory environment for RSNs, and vertically integrated content more generally, that are relevant during our sample period. First, during our sample period, vertically integrated firms were subject to the "Program Access Rules"

and Verizon had a total of 3.0M and 3.5M subscribers each.

[4]News Corporation and Liberty Media both had a partial ownership stake in DirecTV from 2003 onwards; News Corporation sold its stake in 2006.

Figure 1: RSN Ownership

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Comcast	**Liberty/News**		**Liberty/Cablevision/News**		**Comcast**		**Comcast/Charter**		**Comcast/Cablevision**		**Comcast/News**		
Comcast SportsNet Bay Area	35/23/35	6/23/64	13/23/57	13/23/57	13/23/57	13/30/57	7/60/33	7/60/33	7/60/33	60/34	60/40	60/40	67/30
Comcast SportsNet California							100	100	100	100	100	100	100
Comcast SportsNet Chicago								30	30	30	30	30	30
Comcast SportsNet Mid-Atlantic	17/17	3/31	3/31	100	100	100	100	100	100	100	100	100	100
Comcast SportsNet New England	10/10/23	2/23/18	4/23/16	4/23/16	4/23/16	4/30/16	4/30/16	50/50	50/50	100	100	100	100
Comcast SportsNet Northwest										100	100	100	100
Comcast SportsNet Philadelphia	46	46	53	53	78	78	78	78	84	85	85	85	85
Comcast/Charter Sports Southeast		100	72	72	72	72	77/23	69/23	70/24	74/26	74/26	74/26	75/19
News Corp	**Liberty/News**		**Liberty/Cablevision/News**		**Liberty/Comcast/Cox/News**		**Liberty/Cox/News**		**News**				
Fox Sports Detroit	50/50	08/92	18/82	18/82	18/82	18/82	18/82	18/82	18/82	18/82	100	100	100
Fox Sports Florida	10/10/23	1/14/6	7/45/33	7/45/33	7/60/33	7/60/33	7/60/33	18/82	18/82	16/84	100	100	100
Fox Sports Midwest	50/50	08/92	18/82	18/82	18/82	18/82	18/82	18/82	18/82	16/84	100	100	100
Fox Sports North	-	-	-	18/82	18/82	18/82	18/82	18/82	18/82	16/84	100	100	100
Fox Sports Ohio	20/45/20	3/45/37	7/45/33	7/45/33	7/60/33	7/60/33	7/60/33	18/82	18/82	16/84	100	100	100
Fox Sports South	44/44	7/81	8/80	10/78	11/77	13/75	14/74	15/73	17/71	17/71	88	88	88
Fox Sports Southwest	50/50	08/92	18/82	18/82	18/82	18/82	18/82	18/82	18/82	16/84	100	100	100
Fox Sports West	50/50	08/92	18/82	18/82	18/82	18/82	18/82	18/82	18/82	16/84	100	100	100
Prime Ticket	50/50	08/92	18/82	18/82	18/82	18/82	18/82	18/82	18/82	16/84	100	100	100
Sun Sports	28/13/5/28	5/16/5/52	19/16/5/49	19/16/5/49	11/5/49	11/6/49	11/49	11/49	11/49	11/50	60	60	60
Liberty	**Liberty/News**		**Liberty**										
Root Sports Northwest	50/50	08/92	18/82	18/82	18/82	18/82	18/82	18/82	18/82	16/84	100	100	100
Root Sports Pittsburgh	50/50	08/92	18/82	18/82	18/82	18/82	18/82	18/82	18/82	16/84	100	100	100
Root Sports Rocky Mountain	50/50	08/92	18/82	18/82	18/82	18/82	18/82	18/82	18/82	16/84	100	100	100
Cablevision	**Cablevision**		**Liberty/Cablevision/News**										
Madison Square Garden Network (MSG)	20/45/40	3/45/37	7/45/33	7/45/33	7/45/33	7/60/33	7/60/33	100	100	100	100	100	100
MSG Plus	20/45/40	3/45/37	7/45/33	7/45/33	7/45/33	7/60/33	7/60/33	100	100	100	100	100	100
Cox	**Cox**												
Channel 4 San Diego	100	100	100	100	100	100	100	100	100	100	100	100	100
Cox Sports Television					100	100	100	100	100	100	100	100	100
Time Warner	**Comcast/TimeWarner**												
SportsNet New York									8/27	8/27	8/27	8/27	8/27
Independents / Other													
Altitude Sports & Entertainment							-	-	-	-	-	-	-
Mid-Atlantic Sports Network (MASN)								-	-	-	-	-	-
New England Sports Network (NESN)	-	-	-	-	-	-	-	-	-	-	-	-	-
Yankees Entertainment & Sports (YES)					-	-	-	-	-	-	-	-	-

Notes: Reported are the vertical ownership stakes held by major distributors of cable and satellite television service for the 30 Regional Sports Networks (RSNs) in our data that are active in 2007. Ownership data was collected by hand from company stock filings and industry sources. The ownership share for each distributor is reported and individual owners (or combinations of owners) are shaded according to the channel-specific legend located in the first line of each potential owner. Dark grey shading corresponds to a year in which the given RSN is not active (i.e., has not yet entered or has exited the market). Hyphens correspond to years of active operation for an RSN without a vertical ownership affiliation.

(PARs). These required that vertically integrated content be made available to rival distributors at non-discriminatory prices, subject to final-offer arbitration if necessary.

The PARs only applied, however, to content that was transmitted to the MVPD via satellite. This covered all national cable channels (who need satellite transmission to cost-effectively reach cable systems around the country) and most RSNs. A handful of RSNs, however, transmitted their signal terrestrially (usually via microwave), thereby avoiding the jurisdiction of the PARs. This was called the "terrestrial loophole" in the Program Access regulation. In 2007, only two cable-integrated RSNs were able to leverage the terrestrial loophole: Comcast SportsNet in Philadelphia and SD4 in San Diego (owned by Cox Cable); in both cases, the channel was not provided to satellite providers.[5] As a result, Major League Baseball (MLB), National Basketball Association (NBA), and National Hockey League (NHL) games in Philadelphia were only available through cable and not through DirecTV or Dish Network. Similarly in San Diego, MLB games were available only through cable. This accident of regulatory history will be an important source of identifying variation in our econometric estimation.

The PARs were introduced in 1992 and required renewal by the FCC every five years. They were allowed to lapse in 2012 and replaced by rules giving the Commission the right to review *any* programming agreement for anti-competitive effects on a case-by-case basis under the "unfair acts" rules the Commission established in 2010 (FCC (2012)). The new case-by-case rules explicitly include a (rebuttable) presumption that exclusive deals between RSNs and their affiliated distributors are unfair.[6]

During our sample period (2000-2010), most integrated RSNs outside of loophole markets had agreements to be carried by all MVPDs; however, even though the PARs were in effect, there were cases in which a cable-owned RSN was not carried by satellite providers: in 2007, these channels were Comcast Sports Northwest, Comcast/Charter Sports Southeast, and Cox Sports Television. Furthermore, independent channels were not necessarily always provided to all MVPDs. For example, this happened once in 2007: YES was not carried by Dish Network.

2.2 Data

We collect a wide variety of data to analyze the effects of vertical integration. We have three categories of data: (1) downstream prices, quantities, and characteristics of cable and satellite bundles, (2) channel viewership data, and (3) channel affiliate fees and advertising revenues. We briefly describe each in turn.

[5]Time Warner Cable also employed the terrestrial loophole from 2006 to 2008 for the (then relatively new) Charlotte Bobcats NBA franchise by placing some their games on News 14, a terrestrially delivered regional news channel.

[6]There are still cases on non-carriage of integrated RSNs on rival MVPDs; one high profile example is Time Warner Cable SportsNet LA, with rights to air Los Angeles Dodger Games, not being carried on DirecTV.

2.2.1 Downstream Prices, Quantities, and Characteristics

We combine data from multiple databases to construct downstream prices, quantities, and characteristics. Our foundational dataset is the Nielsen FOCUS database. It provides, for each cable system in the US, the set of channels offered, the number of homes passed, the total number of subscribers (i.e. to any bundle), the owner of the system, and the zip codes served. We use the years 2000 to 2010. We restrict our analysis to system-years in which the system faced no direct wire-based competition.[7] We construct market shares from the number of subscribers by dividing by the number of households in a market (obtained from 2000 and 2010 Census data). We combine these data with individual-level survey data from household survey firms Mediamark Research & Intelligence (MRI) and Simmons, using MRI data for 2000 to 2007, and Simmons for 2008-2010. Specifically, if a system-year had over 40 survey respondents, we use the average of the market share from the FOCUS data and the cable market share among the survey respondents; otherwise we use only the FOCUS data. We further eliminate any system-year for which the FOCUS subscriber data was not updated from the previous year, or we did not have at least 40 survey respondents in the MRI/Simmons data. We use the remaining system-years to construct our markets.

For our analysis, we define a market for each year to be a set of zip codes served by a single cable system and, by construction, both satellite providers. For cable systems, we aggregate over bundles within a system, focusing on total system subscribers. Our demand model is therefore a distributor choice model, rather than a bundle choice model.[8] We construct satellite shares within each of our markets for DirecTV and Dish Network from the MRI/Simmons survey data.[9] Furthermore, we gathered historical channel offerings and prices for DirecTV and Dish Network through the Internet Archive (archive.org).

We combine multiple sources of information on cable television prices. Systems regularly post prices for their tiers of service on their websites and these websites are often saved in the Internet Archive.[10] We use the price of Expanded Basic Service, the most popular bundle chosen by households and the bundle which typically contains all the channels in our analysis. Furthermore, newspapers often report when prices change at local cable systems. Some newspapers report this information every time cable prices change (typically yearly), providing valuable information about the history of price changes for a single (often large) system or geographic family of systems owned by the same provider. Finally, cable systems typically have "rate cards" describing their current

[7] We do so because when a system faces competition from another cable operator we do not know the number of subscribers in the areas where the system faced competition relative to the areas where it did not.

[8] While we would prefer a bundle demand model, our subscriber data was not rich enough to estimate bundle-specific quantities. This isn't overly limiting, as our focus is on the impact of vertical integration on inter-distributor demand.

[9] We use satellite state market shares unless we have at least 5 respondents in the individual-level data, in which case we take the average of the satellite state market shares and within-market market shares, placing greater weight on the market-level survey data the greater the number of observations. We dropped any constructed market whose total market share exceeded one or which had a zero market share for one of the satellite providers (which happens naturally due to sampling error).

[10] Following industry practice, we refer to the set of channels offered at a given (incremental) price as a tier of service and the combination of tiers chosen by households as the bundle that they buy. Thus the expanded basic bundle (service) consists of the limited basic tier and the expanded basic tier.

tiers, channels, and prices which they use for marketing or to inform customers of changes in these offerings; they were used when able to found online. We searched the Internet for all such information about cable prices and linked the information obtained to FOCUS systems by hand based on the provider, principal community served, and other communities served as reported in the newspaper or listed on the rate card. For system-years where we do not find a price from websites, rate sheets, or newspapers, we link to the TNS Bill Harvesting database. These data are individual-level bills for cable service which report the company providing the service, the household's expenditure, and their zip code. For a given system-year if we have at least 5 respondents, we use the mean expenditure for subscribers to that system.[11] These data also provide the level of a tax on satellite television service in states where it exists, which we use as an instrumental variable for price in demand estimation.

Table 7 reports the average price, market share, and number of RSN, cable, and total channels offered across markets and years in our estimation dataset. We use 11 years of data, comprising over 6,000 market-years, with an average coverage of 31.5 million (roughly 30% of) US households per year.[12] Average prices are quite similar across providers, whether on an unweighted basis or weighted by the number of households in the market. The satellite companies generally offer more channels on their Expanded Basic service than the local cable system, but a similar number of RSNs.

We derive MVPD margins for for DirecTV and Dish from their 2007 10K reports.[13]

2.2.2 Viewership

We estimate demand using both bundle purchase and viewing data. We have two types of viewing data: some at the level of individual households and others reporting aggregate viewing decisions at the level of the Designated Market Area (DMA "ratings").[14] Average viewership for various RSNs is reported in Table 6 and average viewership for other cable networks is reported in Tables 8-9.

The first group of data come from our MRI and Simmons datasets described in the previous sub-section. Our MRI data reports the number of hours watched for each of the sampled households

[11] We only use bills which clearly delineate video programming costs (i.e., that separate it out from other bundled services such as internet and phone), and use the average of a system's service tier revenue (i.e., excluding pay-per-view or one-time charges) to construct prices.

[12] While we observe the population of channel lineups, incomplete reporting of subscriber information in the FOCUS dataset and the inability to collect cable prices in some markets prevents us from constructing the information we need in every U.S. cable market.

[13] We compute Comcast margins using video, advertising, and franchise fee revenues; programming expenses; and sales, general, and administrative (SG&A) expenses multiplied by both the video revenue share of total revenues (to proportionately allocate expenses across Comcast's other businesses) and the share of SG&A expenses that are subscriber acquisition and retention related (computed from DirecTV's reports). We compute DirecTV margins using total revenues; and programming, subscriber acquisition, upgrade, and retention expenses. For Dish, we use total revenues; subscriber acquisition costs; and the share of subscriber related expenses multiplied by the share of non-SG&A costs (programming and service expenses) that are programming related (computed from DirecTV's reports). The computed values are $\{.539, .396, .413\}$.

[14] DMAs are mutually exclusive and exhaustive definitions of television markets created by Nielsen and used for the purchase of advertising time.

of 96 national channels from 2000 to 2007, while our Simmons data reports the same information for 99 national channels between 2008 and 2010. Our aggregate ratings data come from Nielsen. Reported is the average rating for each of between 63 and 100 channels, of which 18 to 29 are RSNs, depending on the year, in each of the 44 to 56 largest DMAs between 2000 and 2010.

Tables 6, 8, and 9 report summary statistics for our viewing data. Tables 8 and 9 report, for each of our sources of viewing data, the mean rating for each of the 87 non-RSNs in either dataset, as well as additional information from our household data. For example, the average rating for the ABC Family Channel in the Nielsen data across the 747 DMA-years for which the information was recorded is 0.418. This is measured in percentage points, so it suggests a household selected at random in one of these years and DMAs would be watching the ABC Family Channel with probability 0.418 percent. While small, this is above average for cable networks. Similarly, the average rating for the RSN, Yankees Entertainment & Sports (YES) from Table 6, is 0.27. For RSN viewership, we have additional information about the average RSN rating by platform chosen by households (i.e. cable or each satellite operator), which we report there.

Our household-level data provide further details about viewing which are summarized in the remaining columns of Tables 8 and 9. The last column reports the share of households on average across DMAs and years that report *any* viewing of that channel. As noted in Crawford and Yurukoglu (2012), this provides valuable information about whether a household has any interest in a channel that we will use to inform the estimated distribution of preferences for channels across households.[15]

2.2.3 Average Affiliate Fees and Advertising Rates

As described earlier, affiliate fees are the monthly per-subscriber charges paid by distributors to content providers for the ability to distribute the channel. SNL Kagan maintains a database with aggregate information about individual cable television networks, both nationally-distributed networks like CNN and ESPN as well as RSNs like the family of Comcast and Fox networks. For many networks, we use information about the average affiliate fee paid by cable systems to each such network. For cable channels, we have information about affiliate fees paid by between 120 and 210 channels per year between 2000 and 2010. For RSNs, we also have information about the total national subscribers served by each of 88 providers between 2000 and 2010. These are also reported in Tables 6, 8, and 9. The average affiliate fee in our data is \$0.16 per subscriber per month for a nationally distributed channel and \$1.45 for an RSN.

Per-subscriber advertising rates are determined for each channel by dividing total advertising revenues (provided by Kagan) by total subscribers.

[15]The MRI/Simmons data allows us to estimate the probability that a given channel is never watched for national channels; we regress this probability on viewership to impute this probability for RSNs.

3 Model

In this section, we present an industry model that predicts: (i) household viewership of channels; (ii) household demand for multichannel television services; (iii) prices and bundles that are offered by distributors; and (iv) negotiated distributor-channel specific affiliate fees. One key output from the specification and estimation of our model is the impact on viewership and demand of adding or removing channels from a bundle, which in turn informs the degree to which firms internalize the profits of integrated units when making strategic decisions, and the incentives of an RSN to provide or withold access to its content to distributors.

3.1 Overview

Index consumer households by i, markets by m, and time periods by t. There are a set of "downstream" multichannel video programming distributors (MVPDs) $\mathcal{F}_t$ and "upstream" channels $\mathcal{C}_t$ active in each period t. MVPDs create and maintain a distribution network and perform retail activities such as billing, packaging, and technical support. Examples include Comcast, Time Warner Cable, Cox, Cablevision, DirecTV, and municipal cable companies.

Let the set of MVPDs active in a given market-period be denoted $\mathcal{F}_{mt}$. We will assume that each distributor $f \in \mathcal{F}_{mt}$ in each period offers a single "bundle" in market m, where a household subscribing to this bundle pays a price p_{fmt} and has access to a set of channels $\mathcal{B}_{fmt} \subseteq \mathcal{C}_t$.[16] We will use f to denote both a firm as well as a bundle offered by that firm.

We assume the following timing: in **stage 1** channels and distributors bargain bilaterally to decide affiliate fees, and distributors also simultaneously set prices and make carriage decisions for each market in which they operate; in **stage 2** households choose which firm, if any, to subscribe to in their market; and in **stage 3** households view television channels. We now provide details of each stage and further assumptions, proceeding in reverse order of timing.

3.2 Stage 3: Household Viewing

Household i in market m and period t subscribing to firm $f \in \mathcal{F}_{mt}$ allocates its time between watching available channels ($\{c\} \subseteq \mathcal{B}_f$) and non-television activity (denoted by $c = 0$) to solve:

$$\begin{aligned} \max_{\boldsymbol{t}_{if}} v_{if}(\boldsymbol{t}_{if}) \quad &= \quad \sum_{c \in \mathcal{B}_f \cup \{0\}} \frac{\gamma_{ict}}{1-\nu_c} (t_{ifc})^{1-\nu_c} \\ s.t.: \quad & t_{ifc} \geq 0 \; \forall \; c \\ & t_{ifc} = 0 \; \forall \; c \notin \{\mathcal{B}_f \cup \{0\}\} \\ & \sum_{c \in \mathcal{B}_f \cup \{0\}} t_{ifc} \leq T \end{aligned} \tag{1}$$

[16] In the previous section we discussed how we deal with firms within a market offering multiple bundles.

Parameters γ_{ict} and $\nu_c \in [0,1)$ are taste parameters for channels, where γ_{ict} sets the level of marginal utility of household i from the first instant of watching channel c, and ν_c controls how fast this marginal utility decays in the amount of time watched. This viewership model is equivalent to the Cobb-Douglas model used in Crawford and Yurukoglu (2012) if $\nu_c \to 1$ for all c. We restrict ν_c to be equal for all non-sport channels and the outside-option, and equal for all sports channels (which include RSNs); i.e., $\nu_c = \nu^S$ if c is a sports channel, and $\nu_c = \nu^{NS}$ otherwise.[17]

We parameterize $\boldsymbol{\gamma}_{it} \equiv \{\gamma_{ict}\}_c$, a $\#C_t \times 1$ vector of household channel preferences, as $\boldsymbol{\gamma}_{it} \equiv \boldsymbol{\chi_{it}} \cdot \tilde{\boldsymbol{\gamma}}_{it}$, where $\boldsymbol{\chi_{it}}$ is a vector whose components χ_{ict} are Bernoulli random variables (i.e., 0 or 1) that equals 0 with probability ρ_{ct}, and $\tilde{\boldsymbol{\gamma}}_{it}$ is a vector where each random component $\tilde{\gamma}_{ict}$ is drawn from an exponential distribution with parameter σ_{ct}.

For RSNs, we scale $\tilde{\gamma}_{ict}$ by $\exp(-\gamma^b b_{ict} - \gamma^d d_{ic})$, where $b_{ict} \in [0,1]$ represents the fraction of teams carried on RSN c that are "blacked-out" (i.e., unable to have games televised in household i's market due to restrictions imposed by the team's league) and d_{ic} is the average distance from household i to the stadiums for the teams shown on RSN c (measured in thousands of miles).[18] These terms allow for households to value an RSN differentially if the household cannot watch some of the carried sport teams, or if the household lives further away from the carried teams' stadiums.

3.3 Stage 2: Household Bundle Choice

Household i considers characteristics of each bundle—including the utility obtained from watching channels in the bundle and its price—when determining which firm, if any, to subscribe to. We specify household i's indirect utility conditional on subscribing to f as:

$$u_{ift} = \beta^v v^*_{ift} + \boldsymbol{\beta}^x \boldsymbol{x}_{ft} + \beta^{sat}_{if} + \alpha p_{ft} + \xi_{ft} + \varepsilon_{ift} \tag{2}$$

where v^*_{if} is the indirect utility from the time allocation problem in (1), $\boldsymbol{x}_{ft}$ are firm dummy and year dummy variables, p_{ft} is the per-month subscription fee for bundle f, and ξ_{ft} is a scalar unobservable demand shock for bundle f. Each consumer has a random preference for each satellite provider, β^{sat}_{if}, which is drawn from an independent exponential distribution with parameter ρ^{sat}_f; we assume that $\beta^{sat}_{if} = 0$ if f is a cable provider. We assume that ε_{ift} is distributed Type I extreme value, that the outside option of no bundle is normalized to $u_{i0} = 0$, and that each household chooses the bundle with the highest value of u_{if}.

The probability that household i subscribes to bundle f in market m is obtained by integrating

[17] Allowing for this parameter to differ between sports and non-sports channels is motivated by the observation that sports channels receive higher affiliate fees than national channels for the same viewership ratings; we discuss this futher in Section 4.1.2.

[18] We focus only on blackout restrictions for MLB, NBA, and NHL teams. We ignore the NFL in our analysis since its games have only been aired by national channels since the 1960s (CBS, NBC, Fox, and ESPN currently own its television rights).

over $\{\varepsilon_{ift}\}$ for each household:

$$s_{ifmt} = \frac{\exp(\beta^v v^*_{ift} + \boldsymbol{\beta}^x \boldsymbol{x}_{ft} + \beta^{sat}_{if} + \alpha p_{ft} + \xi_{ft})}{1 + \sum_{k \in \mathcal{F}_{mt}} \exp(\beta^v v^*_{ikt} + \boldsymbol{\beta}^x \boldsymbol{x}_{kt} + \beta^{sat}_{ik} + \alpha p_{kt} + \xi_{kt})} \,. \tag{3}$$

The total market share of each bundle f (in market m at time t) is then $s_{fmt} \equiv \int_i s_{ifmt} dH_{mt}(i)$, where $H_{mt}(i)$ is the joint distribution of household random coefficients $(\boldsymbol{\gamma}, \boldsymbol{\beta})$ in the market, and the demand for the bundle is $D_{fmt} \equiv N_{mt} s_{fmt}$, where N_{mt} is the number of television households in m.

3.4 Stage 1: Affiliate Fee Bargaining, Distributor Pricing, and Bundling

In Stage 1, all distributors and channel conglomerates bargain over affiliate fees $\{\tau_{fct}\}_{\forall f,c}$, where τ_{fct} represents the affiliate fee that distributor f pays the owner of channel c for each of f's household subscribers that receives channel c. Simultaneously, all distributors choose the prices and composition of each of its bundles.[19] That is, we assume that bargaining occurs simultaneously with distributor pricing and bundling.[20,21] We assume that affiliate fees, bundle prices, and bundle compositions are optimal with respect to one another in equilibrium.[22]

3.4.1 Stage 1a. Distributor Pricing and Bundling

Every distributor $f \in \mathcal{F}_t$ chooses prices and bundles $\{p_{fmt}, \mathcal{B}_{fmt}\}_{\forall m: f \in \mathcal{F}_{mt}}$ to maximize its profits given anticipated negotiated affiliate fees $\boldsymbol{\tau}_t \equiv \{\tau_{fct}\}_{\forall f,c}$. Profits for f across all markets are:

$$\Pi^M_{ft}(\{\mathcal{B}_{mt}\}_m, \{\boldsymbol{p}_{mt}\}_m, \boldsymbol{\tau}_t; \mu) \quad = \quad \sum_{m: f \in \mathcal{F}_{mt}} \Pi^M_{fmt}(\mathcal{B}_{mt}, \boldsymbol{p}_{mt}, \boldsymbol{\tau}_t; \mu)$$

[19] A given cable distributor f often operates in many markets, and is choosing prices and bundle composition in each of these markets. Satellite firms choose a single national price and channel bundle, with the only potential variation across DMAs being the set of RSNs that are carried.

[20] See also Nocke and White (2007) and Draganska et al. (2010) who use a similar timing assumption. Formally, one can think of separate agents of the distributor bargaining and making the pricing and bundle composition decisions. This sort of timing is also implicit in the analysis described in Rogerson (2014).

[21] An alternative timing assumption would be to assume that affiliate fees are first negotiated, and then distributor prices and bundles are chosen. This would adjust firms perceptions of off-equilibrium actions: e.g., when bargaining, firms would anticipate different bundle prices to immediately be set if off-equilibrium affiliate fees or disagreement were realized. However, there may be reasons to believe that such a rapid response is unrealistic. Absent a fully specified dynamic model of firm bargaining and pricing, which is outside the scope of the current analysis, we believe the approach taken here to be a reasonable approximation. We leverage this assumption to simplify the computation and estimation of our model.

[22] Note that a distributor's optimal carriage decisions for an RSN are indeterminate when no deal is reached for that RSN (i.e., whether or not the distributor would carry the RSN on one of its systems in the event it were available is irrelevant when no deal is reached). In our estimation, we assume that satellite providers, who offer only a single national bundle, adopt the strategy of carrying any channel for which it has negotiated a deal (intuitively, since any deal that is reached should make carriage profitable).

where:

$$\Pi^M_{fmt}(\mathcal{B}_{mt}, \boldsymbol{p}_{mt}, \boldsymbol{\tau}_t; \mu) \;=\; D_{fmt}\Big(p_{fmt} - mc_{fmt}\Big) + \mu\Big(\sum_{c\in\mathcal{V}_{ft}} O_{fct} \sum_{g\in\mathcal{F}_{mt}: c\in\mathcal{B}_{gmt}} D_{gmt}(\tau_{gct} + a_{ct})\Big) \quad (4)$$

We denote by $\mathcal{B}_{mt} \equiv \{\mathcal{B}_{fmt}\}_{f\in\mathcal{F}_{mt}}$ and $\boldsymbol{p}_{mt} \equiv \{p_{fmt}\}_{f\in\mathcal{F}_{mt}}$ the set of bundles and associated prices offered in the market, and by a_{ct} the expected advertising revenue obtained by channel c per subscriber to a bundle containing c. The term $\mathcal{V}_{ft}$ represents the set of channels owned by MVPD f in period t, and the term O_{fct} represents MVPD f's ownership share of channel c at time t.[23]

The first component of an MVPD's profit function in a given market m, given by (4), is standard: each bundle has a price and a marginal cost (mc_{fmt}) that determine margins, and this is multipled by demand. We assume that each MVPDs' marginal cost in market m can be decomposed into the sum of the per-subscriber fees that f must pay to the various channels in its market-bundle, and a bundle-specific cost shock that is the sum of non-channel related marginal costs, denoted by ω_{fmt}: i.e., $mc_{fmt} \equiv \sum_{c\in\mathcal{B}_{fmt}} \tau_{fct} + \omega_{fmt}$.[24] The second component of the profit function is non-standard, and represents the degree to which a vertically integrated downstream unit values the profits that accrue to its upstream (i.e., channel) units. These terms include per-subscriber fees and advertising revenues that accrue to integrated upstream channels from its own viewers as well as from viewers of other distributors.[25] The parameter $\mu \in [0, 1]$ represents the extent to which a downstream MVPD f internalizes upstream affiliate fees and advertising revenues from its integrated channels $c \in \mathcal{V}_{ft}$.

In the absence of any frictions, μ would equal one, implying that the downstream firm perfectly internalizes integrated upstream unit profits, and its strategic decisions maximize total firm profit. Parameter μ could also be less than one, potentially representing divisionalization that could arise from ignorance, poor management, optimal compensation under informational frictions, or any other conflict between managers of different divisions within the same firm.

Optimal Pricing and Bundling. We will leverage necessary conditions on the optimality of MVPD pricing and bundling decisions in our estimation. Differentiating (4) with respect to p_{fmt} (and dividing by market size) yields the following pricing first-order condition:

$$\frac{\partial \Pi^M_{fmt}}{\partial p_{fmt}} = s_{fmt} + \Big(p_{fmt} - mc_{fmt}\Big)\frac{\partial s_{fmt}}{\partial p_{fmt}} + \mu\Big(\sum_{c\in\mathcal{B}_{gmt}\cap\mathcal{V}_{ft}} O_{fct} \sum_{g\in\mathcal{F}_{mt}} (\tau_{gct} + a_{ct})\frac{\partial s_{gmt}}{\partial p_{fmt}}\Big) \quad (5)$$

[23] For our analysis, we only include in $\mathcal{V}_{ft}$ the set of integrated RSNs. We will assume that $c \in \mathcal{V}_{ft}$ (and hence, c is integrated with f) if MVPD f owns any percentage of channel c in period t. In the case that a third party has an $x\%$ stake in MVPD f and $y\%$ stake in channel c at time t, we assume that $O_{fct} = x\% \times y\%$. This can be interpreted as the third party having an $x\%$ probability of making strategic decisions on behalf of the MVPD.

[24] Cost shocks include changes in variable costs such as technical service labor, gasoline, and equipment costs that are incurred on a per-subscriber basis.

[25] We omit portions of integrated channels' profits which are not affected by f's pricing and carriage decisions, as they do not affect the analysis. We also assume that channel c's per-subscriber advertising revenues in market m do not vary across MVPDs, and that channel c's marginal costs per-subscriber are zero.

In addition, we assume that the set of channels actually offered by each MVPD f in each market m satisfies:

$$\mathcal{B}_{fmt} = \arg\max_{\mathcal{B}_f \subseteq \mathcal{A}_f} \Pi^M_{fmt}(\{\mathcal{B}_f, \{\mathcal{B}_{gmt}\}_{g\neq f}\}, \boldsymbol{p}_{mt}, \boldsymbol{\tau}_t; \mu) \tag{6}$$

where $\mathcal{A}_{ft} \subseteq \mathcal{C}_t$ is the set of channels available to MVPD f: i.e., the set of channels for which f has reached an agreement.[26]

Satellite Pricing and Bundling. If distributor f is a satellite MVPD (DirecTV or Dish), we assume that the distributor sets a single national price and bundle. We assume that the bundle offered by a satellite MVPD in any given market may differ from the national bundle only in the set of RSN channels that are offered.

3.4.2 Stage 1b: Bargaining over affiliate fees

Before describing how affiliate fees are determined, we specify the profits each channel c contemplates when bargaining with MVPD f in market m as:

$$\begin{aligned}\Pi^C_{cmt}(\mathcal{B}_{mt}, \boldsymbol{p}_{mt}, \boldsymbol{\tau}_t; \mu, \lambda_R) = \sum_{g\in\mathcal{F}_{mt}: c\in\mathcal{B}_{gmt}} D_{gmt}\Bigg(\tau_{gct} + a_{ct} \ \ldots \\ + \mu \times \lambda_{R:fct}\Big(O_{gct}(p_{gmt} - mc_{gmt}) + \sum_{d\in\mathcal{B}_{gmt}\setminus c} O^C_{cdt}(\tau_{gdt} + a_{gdt})\Big)\Bigg)\end{aligned} \tag{7}$$

The first line reflects affiliate fees and advertising revenues obtained from each bundle the channel is available on; the second line incorporates potential profits of an integrated downstream MVPD, as well as profits from other channels also owned by the same owner of channel c. We denote by O^C_{cdt} the common ownership percentage of two channels c and d by a third-party.[27]

Both terms on the second line are multiplied by μ and $\lambda_{R:fct}$, where:

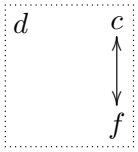
$$\lambda_{R:fct} = \begin{cases} 1 & \text{if } f \text{ and } c \text{ are integrated (i.e., } O_{fct} > 0)\ , \\ \lambda_R & \text{if } f \text{ and } c \text{ are not integrated .} \end{cases}$$

We assume that $\lambda_{R:fct} = 1$ if c is owned by f and is bargaining with f; this implies that a channel and distributor that are integrated with each other place equal weight (given by μ) on each other's profits when bargaining with each other. However, if c is integrated but bargaining with a rival distributor (i.e., the MVPD that c is bargaining with, f, is not an owner of c), then $\lambda_{R:fct} = \lambda_R \geq 0$; thus λ_R governs the extent to which an integrated upstream unit recognizes and internalizes the effects of foreclosing the rival MVPD on the profits of its other integrated units.

In Figure 2, we provide an illustration of how channel c's perceived profits when bargaining with MVPD f may change depending on whether or not it is integrated with f. In Figure 2a, c is

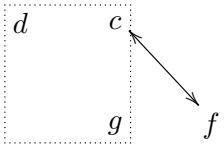
[26] See footnote 22 regarding our treatment of channels not contained in $\mathcal{A}_{ft}$.

[27] Specifically, if each owner $j \in \mathcal{J}$ of channel c owns shares x_j of c and y_j of channel d, then $O^C_{cdt} \equiv \sum_{j\in\mathcal{J}} x_j y_j$.



$$\Pi^C_{cmt} = \pi_{cmt} + \mu(\pi_{fmt} + \pi_{dmt})$$

(a) Internal Bargaining.



$$\Pi^C_{cmt} = \pi_{cmt} + \mu \times \lambda_R(\pi_{gmt} + \pi_{dmt})$$

(b) Bargaining with Rival MVPD.

Figure 2: Examples of Π^C_{cmt} when c bargains with MVPD f.

integrated with MVPD f and another channel d (represented by the dashed square); in this case, c will consider when bargaining with f its own profits (denoted by π_{cmt}), consisting of affiliate fees and advertising revenues, as well as profits of its integrated distributor f and channel d (denoted by π_f and π_d) weighted by μ. We assume that π_{fmt} includes f's subscription revenues net its costs; profits π_{dmt} include d's affiliate fees and advertising revenues. In Figure 2b, c is integrated with another MVPD g and d; in this case, c will consider when bargaining with f (a rival MVPD) its own profits π_{cmt}, and those of its integrated units π_{fmt} and π_{dmt} weighted by $\mu \times \lambda_R$.

The parameter λ_R captures the extent to which an upstream unit has incentives to foreclose access to the RSN to a rival distributor and lower the rivals' bundle quality (thereby shifting demand to the integrated distributor), an effect analogous to the "raising-rivals'-cost" effect discussed in Salop and Scheffman (1983) and Krattenmaker and Salop (1986). We thus refer to λ_R as our "rival-foreclosure" or "raising-rivals'-costs" (RRC) parameter.

We assume that, given channel c is carried on some of MVPD f's systems, the affiliate fee τ_{fct} between distributor f and channel c maximizes their respective bilateral Nash products *given the expected negotiated affiliate fees of all other pairs and the expected prices and bundles for all distributors*:

$$\hat{\tau}_{fct}(\boldsymbol{\tau}_{-fc,t}, \mathcal{B}_t, \boldsymbol{p}_t) = \arg\max_{\tau_{fct}} \Bigg[\underbrace{\sum_m [\Delta_{fc} \Pi^M_{fmt}(\mathcal{B}_{mt}, \boldsymbol{p}_{mt}, \{\tau_{fct}, \boldsymbol{\tau}_{-fc,t}\}; \mu)]}_{GFT^M_{fct}} \Bigg]^{\zeta_{fct}} \times \Bigg[\underbrace{\sum_m [\Delta_{fc} \Pi^C_{cmt}(\mathcal{B}_{mt}, \boldsymbol{p}_{mt}, \{\tau_{fct}, \boldsymbol{\tau}_{-fc,t}\}; \mu, \lambda_R)]}_{GFT^C_{fct}} \Bigg]^{1-\zeta_{fct}} \tag{8}$$

where:

$$[\Delta_{fc} \Pi^M_{fmt}(\mathcal{B}_{mt}, \cdot)] \equiv \Big(\Pi^M_{fmt}(\mathcal{B}_{mt}, \cdot) - \Pi^M_{fmt}(\mathcal{B}_{mt} \setminus fc, \cdot) \Big)$$

$$[\Delta_{fc} \Pi^C_{cmt}(\mathcal{B}_{mt}, \cdot)] \equiv \Big(\Pi^C_{cmt}(\mathcal{B}_{mt}, \cdot) - \Pi^C_{cmt}(\mathcal{B}_{mt} \setminus fc, \cdot) \Big)$$

and $\zeta_{fct} \in [0, 1]$ represents a firm-channel-time specific Nash bargaining parameter.

We denote by $\mathcal{B}_{mt} \setminus fc$ the set of all bundles $\mathcal{B}_{mt}$ in which we remove channel c from bundle f. Thus, these terms represent the difference in either MVPD or channel profits in market m if f no longer carries channel c. We will refer to GFT^M_{fct} and GFT^C_{fct}, which is the sum of these terms across all markets, as the *gains from trade* (or *bilateral surplus*) for MVPD f and channel c coming to an agreement.

This bargaining solution in which each pair of distributors and channels agree upon a set of affiliate fees that maximize the Nash product of their gains from trade is motivated by the model put forth in Horn and Wolinsky (1988), and used by Crawford and Yurukoglu (2012) to model negotiations between MVPDs and channel conglomerates.[28] Each MVPD and conglomerate negotiate a single affiliate fee per channel that applies to all markets.

We can write the first-order condition of (8) for each channel c bargaining with MVPD f as:

$$\zeta_{fct} GFT^C_{fct}\left(\frac{\partial GFT^M_{fct}}{\partial \tau_{fct}}\right) + (1-\zeta_{fct}) GFT^M_{fct}\left(\frac{\partial GFT^C_{fct}}{\partial \tau_{fct}}\right) = 0 \tag{9}$$

where the derivative terms in (9) are:

$$\frac{\partial GFT^M_{fct}}{\partial \tau_{fct}} = \sum_m \frac{\partial \Pi^M_{fmt}}{\partial \tau_{fct}} = (-1 + (\mu \times O_{fct})) \sum_{m \in \mathcal{M}_{fct}} D_{fmt}$$

$$\frac{\partial GFT^C_{fct}}{\partial \tau_{fct}} = \sum_m \frac{\partial \Pi^C_{cmt}}{\partial \tau_{fct}} = (1 - (\mu \times \lambda_{R:fct} \times O_{fct})) \sum_{m \in \mathcal{M}_{fct}} D_{fmt}$$

and $\mathcal{M}_{fct} \equiv \{m : c \in \mathcal{B}_{fmt}\}$ denotes the set of markets where c is on f's bundle. As we have assumed that $\lambda_{R:fct} = 1$ whenever $O_{fct} > 0$ (i.e., f and c are integrated and bargaining with one another), it follows that $\partial GFT^M_{fct}/\partial \tau_{fct} = -\partial GFT^C_{fct}/\partial \tau_{fct}$. We can thus re-write (9) as:

$$(\zeta_{fct}) GFT^C_{fct} = (1-\zeta_{fct}) GFT^M_{fct} \qquad \forall f, c \; s.t. \; \exists m : c \in \mathcal{B}_{fmt}. \tag{10}$$

This bargaining solution is not defined if $\mu \times O_{fct} = 1$; under this case, f and c would perfectly internalize each other's profits when bargaining with one another, and the negotiated τ_{fct} would be indeterminate. Also, in deriving (10), we are leveraging the assumption that distributor bundle prices are set simultaneously with affiliate fees, and there is no anticipated change in p_{fmt} if τ_{fct} changes. Nonetheless, in equilibrium, both prices and affiliate fees will satisfy the pricing first-order conditions given by (5) and the bargaining first-order conditions in (10).

The Role of λ_R. In our model, $\mu \times \lambda_R$ captures the internalization of an integrated downstream MVPD's profits when an integrated channel bargains with another distributor. Consider channel c owned by MVPD f bargaining with rival distributor g (e.g., a satellite distributor). When $\lambda_R > 0$,

[28] Other empirical papers that use use this bargaining solution include Grennan (2013), Gowrisankaran et al. (forthcoming), and Ho and Lee (2013); Collard-Wexler et al. (2014) provide a non-cooperative foundation for this bargaining solution.

c's desire to the increase downstream profits of f lowers c's gains from trade when bargaining with the non-integrated rival distributor g compared to when $\lambda_R = 0$. This may lead to the elimination of overall gains from trade, and can result in non-supply of c to g. However, even if there are still positive gains from trade, since these gains will be lower for c when $\lambda_R > 0$, the bargaining process will lead to an increased affiliate fee (τ_{gct}) for the rival distributor. Thus, even if g is still supplied with channel c, its costs are raised; in equilibrium, this can lead the rival to increase the price of its bundles to consumers.

Example. Consider the case in which MVPD f and channel c are both non-integrated entities that bargain with one another in period t. The negotiated affiliate fee τ_{fct} that satisfies the Nash bargaining solution given by (10) solves:

$$\begin{aligned}\sum_{m\in\mathcal{M}_{fct}} D_{fmt}\tau_{fct} = (1-\zeta_{fct}) \sum_{m\in\mathcal{M}_{fct}} \Big([\Delta_{fc}D_{fmt}](p_{fmt} - mc_{fmt} + \tau_{fct})\Big) \\ - (\zeta_{fct}) \sum_{m\in\mathcal{M}_{fct}} \Big(D_{fmt}a_{ct} + \sum_{g\neq f: c\in\mathcal{B}_{gmt}} [\Delta_{fc}D_{gmt}]\big(\tau_{gct} + a_{ct}\big)\Big)\end{aligned} \tag{11}$$

where $[\Delta_{fc}D_{gmt}] \equiv D_{gmt}(\mathcal{B}_{mt}, \cdot) - D_{gmt}(\mathcal{B}_{mt} \setminus fc, \cdot)$ denotes the change in firm g's demand in market m and time t if channel c was removed from firm f's bundle.

The left hand side of (11) is the total payment made by f to c. The right hand side is a fraction of the gains from trade due to agreement, where the first term represents f's increased profits (net of payments to c) due to more subscribers induced by the carriage of channel c, and the remaining terms on the second-line represent (the negative of) c's gains from being carried on f. Intuitively, the more f gains from the relationship, the higher the total payment that is made; the more c gains from the relationship, the lower the total payment. If f and c's Nash bargaining parameters were equal, then $\zeta_{fct} = 1/2$ and these gains from trade would be split in half.

4 Estimation and Identification

In this section, we discuss the estimation of our model's parameters and how they are identified (given our modeling assumptions) from patterns in the data. We proceed in two stages:

1. In the first stage, we estimate $\boldsymbol{\theta} \equiv \{\boldsymbol{\theta}_1, \boldsymbol{\theta}_2, \boldsymbol{\theta}_3\}$, where:

   (a) $\boldsymbol{\theta}_1 \equiv \{\boldsymbol{\Sigma}, \boldsymbol{\nu}, \boldsymbol{\rho}, \gamma^d, \gamma^b\}$, where $\boldsymbol{\Sigma} \equiv \{\sigma_{ct}\}_{\forall c}$, $\boldsymbol{\nu} \equiv \{\nu^S, \nu^{NS}\}$, and $\boldsymbol{\rho} \equiv \{\rho_{ct}\}_{\forall c,t}$, determines household viewership decisions by governing the distribution of $\boldsymbol{\gamma}$ and how fast marginal utilities from viewership decay.

   (b) $\boldsymbol{\theta}_2 \equiv \{\beta^v, \boldsymbol{\beta}^x, \boldsymbol{\rho}^{sat}, \alpha\}$, where $\boldsymbol{\rho}^{sat} \equiv \{\rho^{sat}_{DirecTV}, \rho^{sat}_{Dish}\}$, determines household bundle choice.

   (c) $\boldsymbol{\theta}_3 \equiv \{\mu\}$ represents the extent to which integrated conglomerates and distributors internalize profits across upstream and downstream units when pricing, bargaining, and

choosing other strategic variables.

Initially, we assume that $\zeta_{fct} = 1/2 \; \forall f, c, t$, and that distributors and channels have the same Nash bargaining parameters.

2. In the second stage, we estimate our RRC parameter, λ_R.

To capture the impact of program access rules, we will assume that $\lambda_R = 0$ in non-loophole markets and estimate our first stage parameters using only these markets. That is, we assume that the program access rules effectively require integrated firms to ignore any foreclosure incentives in dealing with non-integrated rivals. We then estimate λ_R using only the markets in our data in which the terrestrial loophole was used by RSNs (i.e., Philadelphia and San Diego).

4.1 First Stage Estimation

4.1.1 Moments used in Estimation

We estimate the model parameters via GMM, using the following moments derived from the model described in the previous section.

Household Viewership. For every RSN and 38 national channels in each year, we use the difference between the following viewership moments observed in the data and predicted by the model:

1. Summing across markets, the mean viewership for each channel-year;
2. Summing across markets, the number of households with zero viewership for each (non-RSN) channel-year.

To avoid re-solving the viewership problem for every household for every evaluation of a candidate parameter vector, we follow the importance sampling approach of Ackerberg (2009).

Household Bundle Choice. For every year and bundle, we assume that each bundle's unobservable characteristic is orthogonal to a vector of instruments: i.e., $E[\xi_{fmt}(\boldsymbol{\theta})\boldsymbol{Z}^{\xi}_{mt}] = 0$, where the expectation is taken across all markets, firms, and years. For $\boldsymbol{Z}_{mt}$, we include bundle observable characteristics $\boldsymbol{x}_{fmt}$ and predicted indirect utility of channel viewing v^*_{fmt} for the mean consumer; we also include the satellite tax within the market to instrument for p^o_{fmt}. We recover $\xi_{fmt}(\boldsymbol{\theta})$ using the standard Berry et al. (1995) inversion.

Distributor Bargaining, Pricing, and Carriage. First, for any $\boldsymbol{\theta}$, the vector of affiliate fees $\{\tau_{fct}\}$ and bundle-specific marginal costs $\{mc_{fmt}\}$ can be directly computed using the optimal pricing and bargaining conditions given by (5) and (10) (see Appendix for further details). We use these predicted values of $\{mc_{fmt}(\boldsymbol{\theta})\}$ and $\{\tau_{fct}(\boldsymbol{\theta})\}$ in constructing the next set of moments which we form only using 2007 data and values:

1. **Average affiliate fees**: For each RSN active in 2007 and four national channels (ABC Family, ESPN, TNT, and USA), we minimize the difference between the model's predicted average affiliate fees across MVPDs and observed average affiliate fees (τ^o_{ct}):

$$E_f[\tau_{fct}(\boldsymbol{\theta})] - \tau^o_{ct} = \omega^C_{ct}$$

where deviations, denoted by ω^C_{ct}, reflect measurement error in τ_c. We weight estimated affiliate fees by national MVPD market shares conditional on carriage of the channel to approximate expectations across MVPDs.

2. **Implied markups**: The model's predicted MVPD price-cost markups should match those observed in the data:

$$E_m[(p^o_{fmt} - mc_{fmt}(\boldsymbol{\theta}))/p^o_{fmt}] = markup^o_{ft} \qquad \forall f \in \{Comcast, DirecTV, Dish\} \; .$$

3. **Bundle Optimality and Carriage**: Equation (6) implies that every distributor f chooses the optimal set of channels to include in each bundle in each market m. We will assume that distributor f's true per-household profits (not per-subscriber) in market m are given by $\tilde{\pi}^M_{fmt}(\cdot)$, where:

$$\tilde{\pi}^M_{fmt}(\mathcal{B}_{mt}, \cdot) \equiv [\pi^M_{fmt}(\mathcal{B}_{mt}, \cdot) - \nu^1_{fmt}(\mathcal{B}_{fmt})] + \sum_{c \in \mathcal{B}_{fmt}} \nu^2_{ct} \; . \tag{12}$$

and $\pi^M_{fmt}(\mathcal{B}_{mt}, \cdot)$ represents our (the econometrician's) estimate of a firm's per-household profits. We introduce two types of disturbances in this definition: the first, $\nu^1_{fmt}(\cdot)$, represents a mean-zero i.i.d. bundle-distributor-market-time specific disturbance which captures potential measurement or specification error between our estimate of a firm's profits and that used by the firm; the second, ν^2_{ct}, is a mean zero channel-time specific disturbance that is known to the distributor when making its carriage decision (but not known during the bargaining stage), unobserved to the econometrician, and may include non-measured per-household fixed incentives or costs of carrying a channel.

Now consider a channel c that has negotiated an agreement with some firm f: i.e., f carries c on its bundles in some non-empty set of markets. A firm's optimal bundling decision given by (6) implies that:

$$\begin{aligned} [\Delta_{fc}\pi^M_{fmt}(\mathcal{B}_{mt}, \cdot)] - [\Delta_{fc}\nu^1_{fmt}(\mathcal{B}_{fmt})] + \nu^2_{ct} \geq 0 \qquad & \forall m : c \in \mathcal{B}_{fmt} \\ -\Big([\Delta_{fc}\pi^M_{fmt}(\mathcal{B}_{m't} \cup fc, \cdot)] - [\Delta_{fc}\nu^1_{fm't}(\mathcal{B}_{fm't} \cup fc, \cdot)] + \nu^2_{ct}\Big) \geq 0 \qquad & \forall m' : c \notin \mathcal{B}_{fm't} \end{aligned}$$

where $[\Delta_{fc}\pi^M_{fmt}(\mathcal{B}_{mt}, \cdot)] \equiv \pi^M_{fmt}(\mathcal{B}_{mt}, \cdot) - \pi^M_{fmt}(\mathcal{B}_{mt} \setminus fc, \cdot)$, $[\Delta_{fc}\nu^1_{fmt}(\mathcal{B}_{fmt})] \equiv \nu^1_{fmt}(\mathcal{B}_{fmt}) - \nu^1_{fmt}(\mathcal{B}_{fmt} \setminus fc)$, and $\mathcal{B}_{m't} \cup fc$ denotes the set of all bundles $\mathcal{B}_{m't}$ where c is added to bundle f. That is, these inequalities imply that in any market in which c is carried by f, f obtains

higher profits from carrying than by dropping c (holding fixed prices and carriage decisions of other firms); similarly, in any market where c is not carried, f obtains higher profits from not carrying than by carrying c.

This implies for any fm and $f'm'$ pair such that $c \in \mathcal{B}_{fmt}$ and $c \notin \mathcal{B}_{f'm't}$ and both MVPDs f and f' have an agreement with c, the two inequalities above can be added together to yield:

$$[\Delta_{fc}\pi_{fmt}(\mathcal{B}_{mt},\cdot)]-[\Delta_{f'c}\pi_{fmt}(\mathcal{B}_{m't}\cup f'c,\cdot)]-([\Delta_{fc}\nu^1_{fmt}(\mathcal{B}_{fmt})]-[\Delta_{f'c}\nu^1_{f'm't}(\mathcal{B}_{f'm't}\cup f'c,\cdot)]) \geq 0 \ .$$

where the ν^2_{ct} disturbances cancel out. Thus, given our assumptions on the distribution of $\{\nu^1_{fct}(\cdot)\}$, for each firm f and RSN c with agreement,

$$E_{m\in\mathcal{M}^+_{fct}}\Big[[\Delta_{fc}\pi_{fmt}(\mathcal{B}_{fmt},\cdot)] - [\Delta_{f'c}\pi_{f'm'(fm),t}(\mathcal{B}_{f'm'(fm),t}\cup fc)]\Big] \geq 0$$
$$E_{m\in\mathcal{M}^-_{fct}}\Big[- [\Delta_{fc}\pi_{fmt}(\mathcal{B}_{fmt}\cup fc,\cdot)] + [\Delta_{f'c}\pi_{f'm'(fm),t}(\mathcal{B}_{f'm'(fm),t})]\Big] \geq 0$$

where $\mathcal{M}^+_{fct}$ denotes the set of markets in which f is active and carries channel c, $\mathcal{M}^-_{fct}$ denotes those markets in which f is active but does not carry c, and $f'm'(fm)$ denotes a firm-market pair where f' has an agreement with c but has the opposite carriage decision as firm f in market m for c (i.e., if $c \in \mathcal{B}_{fmt}$, then $c \notin \mathcal{B}_{f'm'(fm),t}$, and vice versa). These inequalities imply that the summed change in f's per-household profits in market m and f''s profits in market m' (where either f carries c in m or f' carries c in m'), when reversing the observed carriage decisions in both markets and averaging across all markets m in which f either carries or doesn't carry c, is positive. If these inequalities did not hold, it would imply that either f or f' would have a profitable deviation by changing its carriage decisions for c in certain markets.

These inequalities motivate maximizing the following moments in estimation:

$$\sum_{f\in\mathcal{F}_t}\frac{1}{\#(\mathcal{M}^+_{fct})}\left[\sum_{m\in\mathcal{M}^+_{fct}}[\Delta_{fc}\pi_{fmt}(\mathcal{B}_{fmt},\cdot)] - [\Delta_{f'c}\pi_{f'm'(fm),t}(\mathcal{B}_{f'm'(fm),t}\cup fc,\cdot)]\right]_- \quad \forall c \tag{13}$$

$$\sum_{f\in\mathcal{F}_t}\frac{1}{\#(\mathcal{M}^-_{fct})}\left[\sum_{m\in\mathcal{M}^-_{fct}} -[\Delta_{fc}\pi_{fmt}(\mathcal{B}_{fmt}\cup fc,\cdot)] + [\Delta_{f'c}\pi_{f'm'(fm),t}(\mathcal{B}_{f'm'(fm),t},\cdot)]\right]_- \quad \forall c \tag{14}$$

where $[\cdot]_- \equiv \min\{\cdot, 0\}$. We choose $f'm'(fm)$ to be a firm-market pair such that: $f' \neq f$, $f'm'$ has the opposite carriage decision for c as firm-market pair fm, and m' is the closest market (in Euclidean distance) to market m in terms of (weighted) distance to the teams carried on

RSN c and fraction of teams on c that are blacked out.[29,30] We construct these moments for each RSN active in 2007. These sets of moments are similar to those used in Crawford and Yurukoglu (2012) and utilizes insights from Pakes et al. (forthcoming).

4.1.2 Identification

We now provide an informal discussion of how the parameters of the model are identified from these moments.

The main parameters governing the distribution of γ_{ict} (i.e., $\boldsymbol{\Sigma}, \boldsymbol{\rho}$) are primarily identified from viewing behavior: e.g., channels watched more often have higher values of γ_{ict} and lower values of ρ_{ct}. However, since we do not possess ratings for channels at the system level, we identify the black-out and distance parameters γ^b, γ^d primarily from the Bundle Optimality and Carriage moments; we defer discussion of these parameters until the end of this subsection when discussing identification of μ.

Parameters governing household bundle choice, $\boldsymbol{\beta}^x$ and $\boldsymbol{\beta}^v$, are identified from variation in bundle market shares as observed bundle characteristics and channel utility changes: i.e., across firms and years, and as channels are added and dropped from bundles. The satellite tax is an instrument for price, and is used to identify the price sensitivity coefficient α. Information contained in cable and satellite pricing margins helps identify the heterogeneity in preferences for satellite. In particular, the relationship between satellite and cable market shares has strict implications for predicted price elasticities (and hence implied markups) under a standard logit demand system without preference heterogeneity; inclusion of a random preference for satellite (parameterized by $\boldsymbol{\rho}^{sat}$) assists with rationalizing observed markups for a given satellite market share.

In addition to observing how bundle market shares vary based on channel composition (which has limited variation for some channels across markets), matching observed average affiliate fees negotiated for each channel $\{\tau^o_{ct}\}$ to those predicted by the model $\{\tau_{fct}(\boldsymbol{\theta})\}$ is crucial. First, our model relates $\tau_{fct}(\boldsymbol{\theta})$ to the gains from trade created when channel c contracts with firm f: i.e., differences in f and c's profits (primarily realized from subscription and advertising revenues) when f drops c. Thus, our model attempts to rationalize a channel with higher observed affiliate fees τ^o_{ct} by predicting that this channel creates greater surplus from carriage: this is partly through the term $\beta^v v^*_{ift}$ in a household's bundle utility equation given by (2), which in turn is also a function of parameters governing the distribution of γ_{ict}, and how γ_{ict} is scaled to enter into utility by ν_c—i.e., a channel with a higher γ_{ic} and lower decay parameter ν_c than another will contribute more to a viewer's utility from the same amount of time the channel is watched.

To anchor this in an example, consider a single market and bundle with two channels c and

[29]The rationale for this matching procedure is to match markets with comparable magnitudes of profitability changes, and to be robust to the possibility that ν^2_{ct} might vary across dissimilar markets.

[30]In practice, we also double the set of inequalities in (13) and (14) by segmenting the set of markets for channel into those within and outside of 100mi to the stadiums of the teams carried by the RSN, and only matching any firm-market to other firm-markets within the same segment. The reason for this is to ensure that the magnitudes of profit violations are comparable: e.g., profit violations in markets far away from an RSN's teams' stadiums might be offset by larger profit violations in markets close to the stadiums.

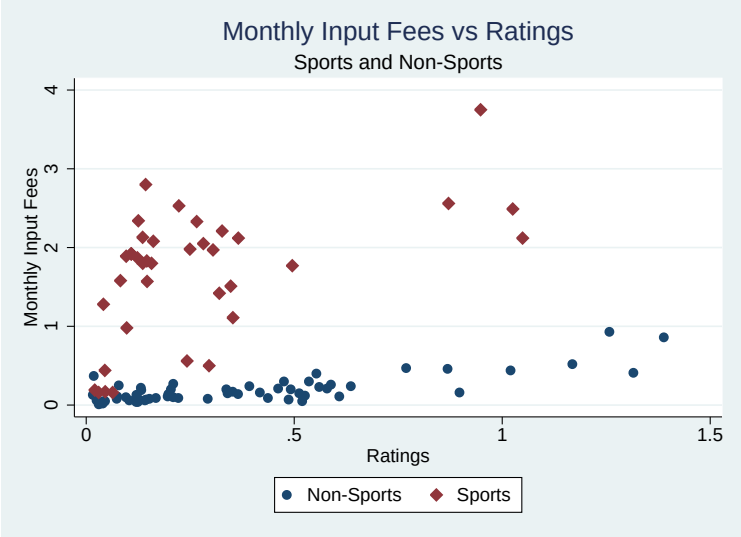


Figure 3: Negotiated monthly affiliate fees and viewership ratings.

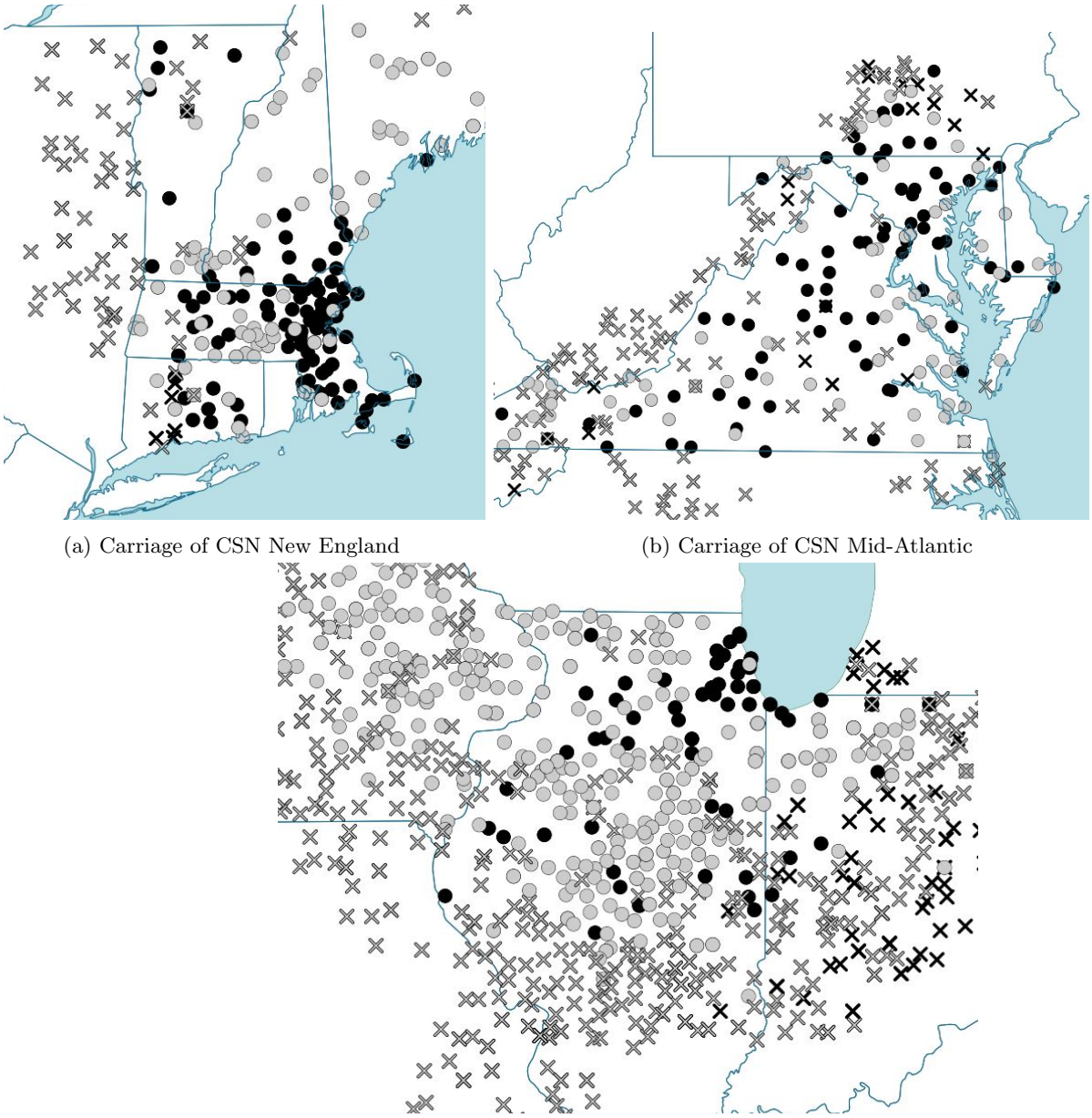
d, and a single household i. Assume that the household watches d more than c. This could be induced by many potential combinations of $(\gamma_{ic}, \nu_c, \gamma_{id}, \nu_d)$; e.g., γ_{id} could be higher than γ_{ic} and $\nu_c = \nu_d$. If this were true, however, then d should obtain higher negotiated affiliate fees as it would be predicted to generate a higher surplus for a viewer, and hence there would be higher gains from trade from carriage of d than c. However, if affiliate fees are observed to be the same for the two channels despite the difference in viewership, then the model would predict that the rate of "decay" for channel c, ν_c, was in fact higher than ν_d (thereby allowing c to generate the same utility for consumers—and hence the same negotiated affiliate fees—for a shorter amount of time watched).

Now add to this example two additional markets: one market only has channel c available, and another only has channel d. If viewership patterns for these channels in the new markets were similar to those in the first market, then variation in market shares for the bundle across these markets as the channel composition of the bundles changed would inform the value of β^v.

In a sense, the parameters governing the distributions of γ_{ic} and ν_c can be seen as helping the model rationalize variation in both negotiated affiliate fees and the market share of bundles as (both the mean and variance of observed) *viewership* of channels varies across markets, controlling for channel carriage; and β_v can be seen as helping the model rationalize variation in market shares of bundles as *channel carriage* changes across markets, holding fixed patterns of viewership for these channels.

The reason that we allow for consumers to possess two different "decay" parameters $\{\nu^S, \nu^{NS}\}$ for sports and non-sports channels is motivated by the data, illustrated in Figure 3. Sports channels have consistently higher negotiated affiliate fees than non-sports channels with similar viewership patterns (ratings), in cases receiving payments an order of a magnitude higher. Our model rationalizes this by assigning a higher decay rate to sports channels, which predicts higher utility delivered to consumers for a given amount of time the channel is watched; thus, sports channels

are able to negotiate higher affiliate fees as they create greater gains-from-trade upon agreement with an MVPD.



(a) Carriage of CSN New England

(b) Carriage of CSN Mid-Atlantic

(c) Carriage of CSN Chicago

Figure 4: Carriage by Comcast and non-integrated cable MVPDs of three Comcast-integrated RSNs across cable systems in 2007. Circles represent carriage by a system, X's represent no carriage. Black markers represent Comcast systems, grey markers represent non-Comcast cable systems.

Although the internalization parameter μ enters into the computation of several moments (including any moment based off of recovered values of $\tau_{fct}(\boldsymbol{\theta})$ and $mc_{fmt}(\boldsymbol{\theta})$), it will primarily be identified off of the Bundle Optimality and Carriage moments. In particular, as μ increases, distributors have a greater incentive to carry an integrated channel for a fixed value $\tau_{fct}(\cdot)$; hence, the

Table 1: Regression of RSN Carriage on Integration Status, Distance, and Blackout Percentage

	Coeff.	SE	t
Integrated with RSN	0.166	0.065	2.56
Avg Distance to RSN's Stadiums (mi)	-0.001	0.000	-5.23
% Teams not Blacked Out	0.512	0.094	5.45
Fixed effects:	RSN, MSO, DMA		
R-squared	0.713		
N	1593		

Notes: Linear probability regression where the dependent variable is whether a system carries an RSN in 2007. SE's are clustered by RSN. Inclusion of system demographic controls (race, population density, average income, household ownership) did not change point estimates.

model will help to rationalize higher carriage rates between integrated distributors and channels (which is observed in the data). We identify our black-out and distance parameters, γ^b, γ^d, in a similar fashion. An example of the variation in the data that we leverage is illustrated in Figure 4, which presents the integrated and non-integrated carriage of a Comcast integrated RSN in three different regions of the U.S. In these three settings, moving further away from the RSN's teams' stadiums yields more likely carriage by a Comcast system of the channel (denoted by a black circle) than carriage by a non-Comcast system (denoted by a grey circle). For example, in Figure 4a, all Comcast systems in northern Vermont carry CSN NE whereas most non-Comcast systems do not (denoted by grey X's); and in Figure 4b and in Figure 4c, non-carriage by non-Comcast systems occurs much closer to the RSN's teams' stadiums than for Comcast systems (as there are more grey X's near Washington DC and Chicago than black X's, which denote non-carriage by Comcast systems). These maps also indicate that non-carriage is much more likely in areas where the teams on the RSN are blacked out (as in New York for CSN NE, Pennsylvania for CSN Mid-Atlantic, and Michigan for CSN Chicago).

Table 1 summarizes this relationship across all RSN's and distributors in our sample: carriage of an RSN by a cable system is strongly increasing with the RSN and distributor being integrated, and strongly decreasing in the distance between the system and the RSN's teams' stadiums and in the fraction of teams that are blacked out.

4.2 Second Stage Estimation

4.2.1 Recovery of λ_R

To recover our RRC parameter λ_R, we will use information provided by markets in which distributors are able to exclude competitors from carrying an integrated RSN channel—i.e., terrestrial loophole markets. The markets we focus on will be Philadelphia and San Diego, the channels in question CSN Philadelphia (owned by Comcast) and 4SD (owned by Cox), and the competitors excluded from carriage are satellite providers DirecTV and Dish.

To describe our approach, consider a channel c that is integrated with cable distributor f and

that is "relevant" (i.e., offered and plausibly available to some set of distributors) in markets $\mathcal{M}_c$.[31] If we observe that channel c does not contract with satellite distributor $g \neq f$, we will assume that λ_R must have been sufficiently large for c and g to not contract with one another to be an equilibrium outcome. A *necessary* condition for this is that there is no affiliate fee $\tilde{\tau}_{gct}$ such that c and g would both find it profitable to contract with one another:

$$\sum_{m \in \mathcal{M}_c} \left[\underbrace{[\Delta_{gc} \Pi^M_{gmt}(\{\mathcal{B}^o_{mt} \cup gc\}, \boldsymbol{p}^o_{mt}, \tilde{\boldsymbol{\tau}}; \hat{\mu})]}_{GFT^M_{gcmt}} + \underbrace{[\Delta_{gc} \Pi^C_{cmt}(\{\mathcal{B}^o_{mt} \cup gc\}, \boldsymbol{p}^o_{mt}, \tilde{\boldsymbol{\tau}}; \hat{\mu}, \lambda_R)]}_{GFT^C_{gcmt}} \right] \leq 0 \; \forall \; \tilde{\tau}_{gct} \quad (15)$$

where the o superscript denotes variables that are observed, $\{\mathcal{B}^o_{mt} \cup gc\}$ denotes the set of observed bundles with the modification that g carries c in all (relevant) markets,[32] $\hat{\cdot}$ are estimated values from the first-stage estimation, $\tilde{\boldsymbol{\tau}} \equiv \{\tilde{\tau}_{gct}, \hat{\boldsymbol{\tau}}_{-gct}\}$, $\hat{\boldsymbol{\tau}}_{-gct}$ represents all affiliate fees except those between g and c, and GFT^M_{gcmt} and GFT^C_{gcmt} represent g and c's respective gains-from-trade from agreement in market m.[33,34] If (15) holds for all values of $\tilde{\tau}_{gct}$, the Nash bargaining solution between g and c given by (8) is not defined.

Since we are evaluating a deviation in a model in which bundle composition, bundle prices, and affiliate fees are simultaneously determined, when computing "counterfactual" profits from agreement between channel c and distributor g (the terms with underbraces in (15)), we will hold fixed bundle prices and carriage decisions for all other channels and all other distributors when evaluating counterfactual profits upon carriage of c by g.[35] In that case, condition (15) holds at all $\tilde{\tau}_{gct}$ if and only if the joint profits of the two parties is larger with non-supply. We thus can test whether (15) holds for $\tilde{\tau}_{gct} = 0$ to determine whether or not a deviation for c to supply g is profitable for both parties. Note that under the Nash-in-Nash (passive beliefs) bargaining assumption, the change in joint profit with satellite distributor g is calculated assuming that satellite distributor $g \neq g'$ does not have access to the RSN.

Multilateral Deviations. In the event of being offered a deviating deal for RSN c, satellite distributor g might instead think that the other satellite distributor g' had also been offered a deal. We instead make use of a necessary condition for non-supply of both satellite distributors to be an equilibrium regardless of the satellite distributors' beliefs. Specifically, we will determine whether, at the observed set of bundles, affiliate fees, and bundle prices, there are no gains from trade between c and *both* satellite providers g and g' (thereby ruling out the presence of this profitable

[31] To be specific, we define all markets in a DMA to be relevant for an RSN if, across all systems within that DMA, the average fraction of teams on that RSN that are not blacked out is greater than or equal to .30.

[32] Recall that a satellite distributor offers the same bundle in all markets, and that we assume that it carries any channel with which it has negotiated an agreement.

[33] To be precise, affiliate fees are not directly estimated; instead, we compute their implied values at the estimated parameters $\hat{\boldsymbol{\theta}}$: i.e., $\hat{\boldsymbol{\tau}} \equiv \boldsymbol{\tau}(\hat{\boldsymbol{\theta}})$, where $\boldsymbol{\tau}(\cdot)$ is the solution to the Nash bargaining first-order condition given by (10).

[34] We assume that satellite providers choose to carry an RSN in all relevant markets if supplied with the channel.

[35] The condition that there does not exist a deviation to carriage is not the same as testing whether carriage of c by g would comprise an equilibrium outcome, as this test would require (among other things) computing equilibrium prices and affiliate fees conditional on carriage of c by g being known and anticipated by all firms in the market.

deviation):

$$\sum_{m\in\mathcal{M}_c}\Bigg[[\Delta_{gc,g'c}\Pi^M_{gmt}(\{\mathcal{B}^o_{mt}\cup\{gc,g'c\}\},\boldsymbol{p}^o_{mt},\tilde{\boldsymbol{\tau}};\hat{\mu})]+[\Delta_{gc,g'c}\Pi^M_{g'mt}(\{\mathcal{B}^o_{mt}\cup\{gc,g'c\}\},\boldsymbol{p}^o_{mt},\tilde{\boldsymbol{\tau}};\hat{\mu})]\dots$$
$$+[\Delta_{gc,g'c}\Pi^C_{cmt}(\{\mathcal{B}^o_{mt}\cup\{gc,g'c\}\},\boldsymbol{p}^o_{mt},\tilde{\boldsymbol{\tau}};\hat{\mu},\lambda_R)]\Bigg]\leq 0\,, \tag{16}$$

where the three terms on the left-hand side of the inequality represent g, g', and c's gains from trade from both g and g' being supplied with channel c and carrying the channel in all of g's relevant markets, and $\tilde{\boldsymbol{\tau}}$ is equal to $\hat{\boldsymbol{\tau}}$ except that $\tilde{\tau}_{sct}=\tilde{\tau}_{s'ct}=0$. We refer to the sum of these terms as the *three-party-surplus* from carriage of c by satellite providers.[36] As in the case of bilateral deviations before, we test whether or not (16) holds when the negotiated affiliate fees between g and c and between g' and c equal 0.

We estimate a lower bound of λ_R, denoted $\hat{\underline{\lambda}}_R$, by finding the lowest value that ensures that (16) holds for the two cable-integrated RSNs that do not contract with satellite providers in the loophole markets.[37]

Incentives for Exclusion. It is instructive at this point to discuss the competing forces that would induce a cable provider to withold its integrated RSN from a satellite provider. This is equivalent to understanding when the gains created when satellite providers are supplied with the RSN are offset by the losses incurred by the cable provider.

The primary gains created when a satellite provider g is supplied with the RSN are through potential market expansion effects from carriage: i.e., if consumers who previously did not subscribe to an MVPD now would if satellite were to carry the RSN. Each household that substitutes from the outside good to g would generate additional bilateral surplus equal to the level of g's margins plus any additional advertising revenues generated by those households watching the RSN.

The primary losses generated by supplying g with the RSN would be incurred by the RSN's integrated cable owner if households substituted away from the integrated cable provider to g. Although these consumers would generate surplus for g, insofar as cable margins are higher than those of satellite providers (by 10+ percentage points in our data), any household that switched from cable to satellite as a result of supplying satellite with the RSN would reduce industry profits by this difference in margins.

Consequently, factors that would incentivize exclusion by cable of satellite (for $\lambda_r>0$) would include: a smaller share of consumers that are not subscribers to any MVPD and lower advertising rates (thereby reducing the potential gains generated by market expansion); and a larger cable "footprint" (market share) in the RSN's relevant market area, a larger diversion ratio between satellite and cable distribution, and a larger differential between cable and satellite margins (all

[36] Specificatlly, it can be shown that if the three-party-surplus is positive, then RSN c has a deviating pair of offers $\{\tilde{\tau}_g,\tilde{\tau}_{g'}\}$ it can make that the satellite distributors will both accept regardless of their beliefs and increases c's profits.

[37] For now, we will assume away the specification error introduced in (12): i.e., $\nu^2_{ct}=0$.

Table 2: Estimates of Key Parameters

	Parameter Estimate	SE
ν^S	0.60	
ν^{NS}	0.94	
γ_d (Distance Decay)	-3.5263	
γ_b (Blackout Decay)	-1.7108	
α_0	-0.2997	
β_v	0.0404	
$\rho^{sat}_{DirecTV}$	10.295	
ρ^{sat}_{Dish}	13.197	
μ	0.9286	
$\mu \times \underline{\lambda}_r$	0.997	

Notes: Key parameters from the first and second stage estimation of the full model. (Standard Errors TBA).

of which would exacerbate the losses from business stealing by satellite from cable). However, for lower values of λ_r (closer to 0), any losses that would be incurred by the RSN's integrated owner would be internalized less by the RSN when bargaining with g, reducing the likelihood of exclusion occurring.

5 Results

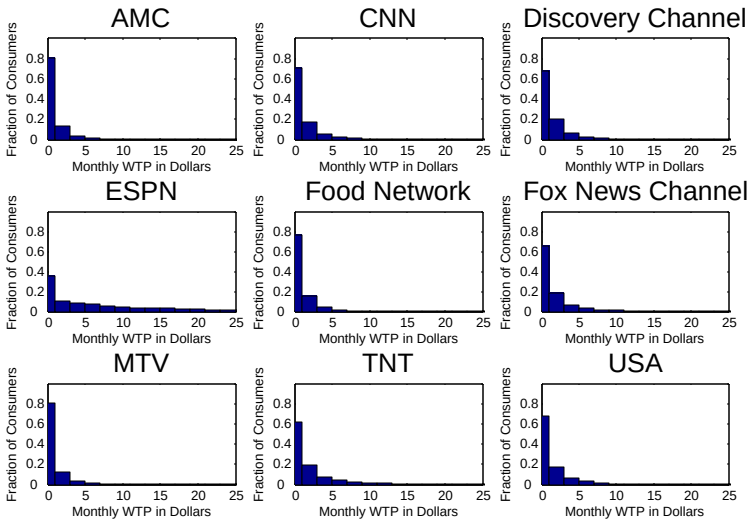
Preliminary estimates of the key parameters of our model are reported in Table 2. We discuss our estimates primarily through how they influence predicted moments relating to consumer viewership and subscription patterns, firm pricing and carraige decisions, and negotiated agreements.

5.1 Channel Valuations

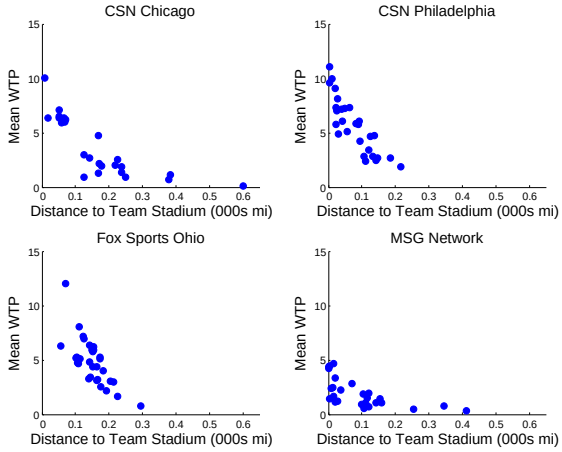
Our model predicts the willingness-to-pay (WTP) for each channel by household by computing the contribution of a given channel to bundle utility (v^*_{ijt} in (2)), and multiplying it by our estimates of β^v/α_i to convert it into dollars.

The distribution of household WTP for nine national channels in 2007 is provided in Figure 5a. In Appendix B, Table 10 reports WTP estimates for all national channels and Table 11 reports WTP estimates for the RSNs. Although most national channels have average WTP values below \$1/month (and other than sports channels ESPN and ESPN2, none exceed \$2), the pattern is very different for RSNs: only 2 out of 30 are predicted to have average WTP values less than \$1/month, and 80% are greater than \$2/month.

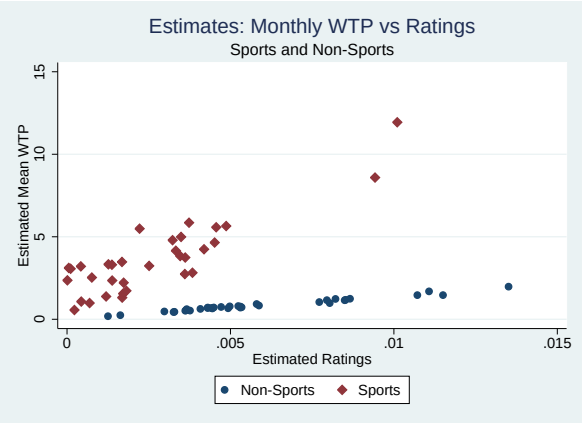
Our estimate of the RSN distance-decay is negative, and implies that consumers derive less utility from watching a RSN the further they are from the teams carried on the RSN: increasing the average distance of a household from an RSN's teams' stadiums from 0 to 100 miles reduces that household's value of the channel by 30% ($1 - \exp(-3.53 \times 0.1)$). Figure 5b illustrates this pattern, and plots the predicted mean WTP of households for four different RSNs as the distance from a household to an RSN's team stadium increases. Our blackout parameter is also negative,



(a) Histograms of monthly WTP for selected national channels.



(b) Mean WTP by market-RSN vs distance from market to RSN's teams' stadiums.



(c) Estimated monthly WTP vs estimated ratings for sports and non-sports channels

Figure 5: Predicted WTP for Channels (2007 values).

implying that being unable to watch 50% of the teams that the RSN normally carries due to blackout restrictions reduces the valuation of the channel by 58%.

Finally, we estimate different values of ν^S and ν^{NS}, where the higher value of ν^S implies that consumers' marginal utility from watching sports channels falls faster than for non-sports channels; in turn, this implies that consumers derive higher utility from sports channels than non-sports channels for the same amount of time spent watching each (for a given level of γ). Our model thus predicts that sports channels receive higher negotiated affiliate fees for the same viewership ratings, as depicted in Figure 5c.

Table 3: Elasticities and Margins

Elasticity of row with respect to price of column:	Cable	DirecTV	Dish
Cable	-2.093	0.280	0.192
DirecTV	1.895	-3.130	0.278
Dish	2.111	0.482	-3.333
Mean Cable Margin	0.678		
Mean DirecTV Margin	0.373		
Mean Dish Margin	0.401		
OLS Logit Price Coefficient	-0.0046**	(t: -2.40)	
IV Logit Price Coefficient	-0.0987***	(t: -6.17)	

Notes: This table reports mean price elasticities and margins by cable and the two satellite distributors, as well as the effect of the satellite tax instrument on the price coefficient in a logit demand system.

5.2 Pricing and Subscription Choices

In Table 3, we report average predicted own and cross price elasticities and implied margins for cable and satellite MVPDs predicted by our model. Demand for the average cable system is more inelastic (-2.1) than for satellite (-3.1 and -3.3), which is consistent with its larger market shares and higher predicted margins. Estimated values of $\rho^{sat}_{DirecTV}$ and ρ^{sat}_{Dish}, which govern the distribution of random preferences for satellite bundles, assist the model in predicting price-cost margins that are close to the observed Comcast, DirecTV, and Dish margins.

In addition, the bottom panel of Table 3 reports the effect of instrumenting for bundle prices using the satellite tax instrument that was discussed in the previous section. In a logit demand system, instrumenting for price yields a 20 times larger estimated price coefficient, consistent with the presence of a positive correlation between price changes and unobservable bundle characteristics.

5.3 Internalization and RRC Parameters.

We now turn to the estimates and magnitudes of μ and λ_R.

Our estimated value of μ indicates that firms do internalize the profits of other integrated units when making decisions: i.e., when pricing and determining carriage on its bundles, an MVPD internalizes potential effects on affiliate fees and advertising revenues accruing to integrated channels; and when bargaining internally, an integrated MVPD and channel face reduced double marginalization incentives. Insofar our estimated value of $\mu < 1$, however, such internalization may be imperfect.

Our estimated lower bound for $\mu \times \underline{\lambda}_R$ is .997, which indicates that integrated channels' supply decisions vis-à-vis non-integrated rival distributors are significantly affected by foreclosure incentives. Figure 6 graphs the total three party surplus between the integrated channel and the two satellite distributors in the two loophole markets we examine (Philadelphia and San Diego). We see that for values of lower than .9, it is not an equilibrium for either channel to exclude both satellite distributors as there would be a profitable deviation (for some negotiated set of affiliate fees) for

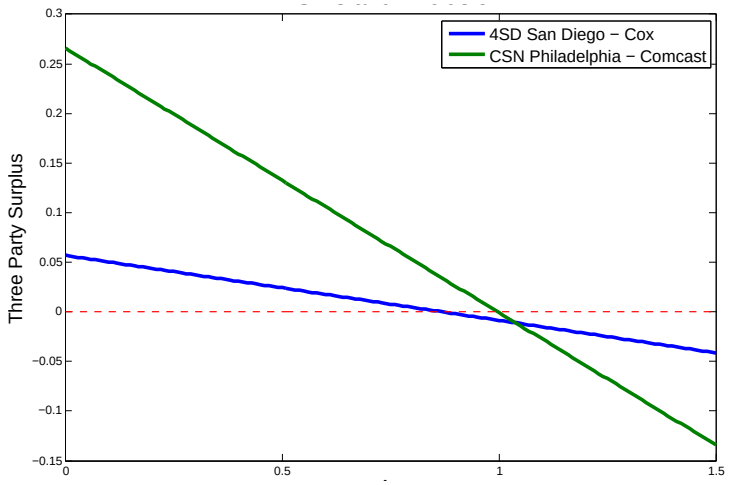


Figure 6: Three-party surplus between the integrated cable MVPD, DirecTV, and Dish as a function of $\mu \times \lambda_r$ in Philadelphia and San Diego.

the channel to be supplied. However, for values between approximately .9 and our estimate, we can rationalize exclusion in San Diego but not Philadelphia. Only for values of $\mu \times \underline{\lambda}_R \geq .997$ does our model rationalize exclusion in both of these loophole markets.

6 The Welfare Effects of Vertical Integration

In this section, we use estimates from our model to perform counterfactual exercises that illustrate how vertical integration affects affiliate fee negotiations, distributors' pricing and carriage decisions, and—ultimately—firm and consumer welfare.

We focus on 30 RSNs that are active in 2007, 16 of which were (at least partially) integrated with a downstream distributor (13 with a cable MVPD, 3 with DirecTV). Of these 16 integrated RSNs, two—CSN Philadelphia and 4SD—were owned by cable distributors in "loophole" markets, and were not provided to satellite. Consequently, there is variation in both integration and ownership as well as whether or not the RSN is subject to program access rules (PARs) during this time period. For every RSN, we aim to simulate market outcomes if the RSN is or is not integrated, and if it is integrated, whether or not PARs are enforced.

For our current analysis, we exclude from the analysis 3 RSNs (CSN NW, CSS, and Cox Sports TV) that did not supply either satellite provider in markets where PARs were in effect, leaving us with 27 RSNs.

6.1 Potential Effects

Before proceeding, it is instructive to highlight the effects of vertical integration that are captured by our model and that we attempt to quantify in our counterfactual exercises.

First, note that our model emphasizes three primary supply side decisions: negotiations over affiliate fees and supply, bundle pricing, and channel carriage conditional on supply. When an MVPD

and a channel are integrated, our estimated value for $\hat{\mu} > 0$ implies that integrated downstream and upstream units (at least partially) internalize joint profits when making all of these decisions; furthermore, our estimated value for $\hat{\underline{\lambda}}_R > 0$ implies that an integrated channel may have incentives to foreclosure a rival downstream distributor.

Assume now that MVPD f integrates with channel c, and that there is a rival MVPD g and another channel d. The following effects of vertical integration are thus admitted in our setting:

1. Bargaining Effects and Foreclosure: When c bargains with a rival MVPD g (since $\hat{\underline{\lambda}}_R > 0$), c internalizes lost revenues to its integrated downstream MVPD f if g is supplied; the gains-from-trade that accrue to c by supplying g are thus reduced, potentially leading to a higher negotiated affiliate fee τ_{gct} or—if gains-from-trade are eliminated altogether—non-supply.[38]

2. Pricing Effects:

   (a) f faces a lower "perceived" marginal cost as it internalizes affiliate fee payments made to c, thereby mitigating double marginalization incentives.

   (b) f internalizes affiliate fees paid by rival MVPD g to integrated channel c, thereby partly alleviating bundle pricing pressure across MVPDs (by increasing f's "effective" marginal cost) as f now partly benefits from customers lost to g (Chen, 2001).

3. Carriage Effects: an MVPD f may be more likely to carry c in markets where the gains-to-carriage are marginal as, again, f internalizes payments made to c and faces a lower perceived marginal cost of carriage.

The welfare effects of some of these incentives may be straightforward to sign ex ante; for others, it is not clear. Downstream foreclosure, for instance, may likely lead to consumer welfare losses: if g loses access to c or pays a higher affiliate fee τ_{gct}, g's subscribers may receive less utility from their bundle of channels (from reduced choice or higher prices); f's price may also increase in response to facing a weaker competitor.[39] However, the two pricing effects have potentially opposite effects: whereas 2a would favor lower bundle prices, 2b may mitigate price competition and push prices higher. Finally, increased carriage of channels may raise consumer welfare.

There are also other potential responses that are not accounted for in our model. Most importantly, we have not modeled investment in channel, programming, and distribution service quality, which may change upon integration (Bolton and Whinston, 1991; Hart, 1995). Consequently, although our counterfactuals are indeed rich, they are still only partial equilibrium results, and thus any interpretation of our findings must be made with this in mind.

[38] Although we do not focus on this, our model does admit the potential for "upstream" in addition to "downstream" foreclosure: i.e., when f negotiates with other channels d, f internalizes viewership changes to its integrated channel c when it carries channel d on its own bundles; if c and d are substitutable, f may be willing to pay a lower negotiated affiliate fee τ_{fdt} (and potentially have less of an incentive to carry d), as the gains from trade from f carrying d are partially mitigated by lost viewership and advertising revenues to c.

[39] If g lowers its price as a result of losing c, it is also possible that f may lower its price: e.g., f and g's prices could be strategic complements, and f could potentially reduce its marginal cost by negotiating lower affiliate fees with d (e.g., if g's loss of c reduces d's outside option from disagreement with f).

6.2 Implementation

For each RSN that is active in 2007, we compute market outcomes in that year under the following three scenarios:

1. Integration and no-PARs: In this environment, for any non-integrated RSN, we assume that the largest cable MVPD in that RSN's relevant DMAs is the new full owner of the channel; for any integrated RSN, we do not change its ownership structure. We assume that in this environment, $\mu = \hat{\mu}$ and $\lambda_R = \hat{\underline{\lambda}}_R$ so that all RSNs are allowed to potentially exclude and not supply rival MVPDs.

   For each cable-owned RSN, to determine whether the channel is supplied to satellite distributors, we will determine whether or not at the observed set of bundles, affiliate fees, and bundle prices, the *three-party-surplus* given by (16) is positive at the new values of μ and λ_R.[40] For the three RSNs owned by DirecTV, we use the bilateral surplus given by (15) to determine whether or not each cable MVPD and Dish Network is provided with the channel.[41]

2. Integration and PARs: We follow the same setup as in the Integration and no-PARs case, except that we assume that: $\lambda_R = 0$, the two integrated loophole RSNs—CSN Philadelphia and 4SD—are supplied to both satellite distributors, and the supply decisions of all other RSNs are unchanged.[42]

3. Non-Integration: We follow the same setup as in the Integration and PARs case, except that we assume that $\mu = 0$ so that all RSNs are effectively non-integrated (i.e., no MVPD or channel internalizes the profits of any other unit). This is equivalent to assuming that ownership shares $O_{fct} = 0$ for all MVPDs and RSNs.

In all scenarios, we recompute equilibrium negotiated affiliate fees $\boldsymbol{\tau}_{ct}$ for the RSN in question and bundle prices $\{p_{fmt}\}$ for all cable distributors, and we assume that national satellite prices are unchanged (see Appendix A.3 for further details). To account for potential carriage changes as integration status varies, we make the following adjustments:

1. For RSN c that was previously integrated with MVPD f but is now disintegrated, we take the minimum of: (i) the maximum distance between c's teams' stadiums and a non-integrated cable MVPD system that carried the RSN, and (ii) the minimum distance between c's teams' stadiums and a non-integrated cable MVPD system that did not carry the RSN. We then assume that any system that is beyond this minimum distance for the formerly integrated

[40] For the two loophole RSNs (CSN Philadelphia and 4SD), we do not need to redetermine supply as we utilize a value of λ_R that rationalizes non-supply of satellite.

[41] We also test whether or not these supply conditions hold at the updated equilibrium affiliate fees and bundle prices.

[42] Aside from the loophole RSNs, all RSNs are provided to all distributors in 2007 except in four cases: integrated RSNs CSN Northwest, Comcast/Charter Sports Southeast, and Cox Sports TV supply neither satellite provider; YES Network is independent and does not supply Dish. We exclude from our analysis the first three channels, and hold fixed YES's supply decisions when it is integrated.

MVPD f no longer carries c once c is disintegrated. As the distance from an RSN's teams' stadiums and a cable system correlates with the gains-from-carriage of that channel, we thus use the observation that non-integrated MVPDs did not carry c past a certain distance to approximate optimal behavior for f once it is disintegrated. This approach attempts to provide an upper bound on the degree to which carriage can increase between non-integration and integration: e.g., if we believe that the integrated MVPD f has greater gains-from-carriage of c for one of its systems with similar observables (i.e., distance) as a system belonging to a non-integrated MVPD (which is consistent with f choosing to integrate with c in the first place), then we may overstate potential carriage changes.

More sophisticated adjustments to carriage (which may include accounting for profit disturbances in carriage and allowing multiple MVPDs to adjust their carriage decisions) are the focus of ongoing work.

2. For an RSN that was previously non-integrated but becomes integrated, we assume that the RSN is carried by all of the new owner's systems in the RSN's relevant DMA. This also provides an upper bound on the extent to which vertical integration can increase the carriage of a channel by the integrated distributor.

6.3 Results

Table 4 reports market shares, prices, firm surpluses, and consumer welfare across the three different integration environments for six selected RSNs. Panel I contains the two cable-integrated RSNs that operate in terrestrial loophole markets; Panel II contains two selected cable-integrated RSNs located in non-loophole markets; and panel III contains two selected non-integrated RSNs that are assigned a cable owner in the integrated specifications. Note that for each panel, one of the specifications ("(i) VI, no PARs," "(ii) VI, PARs," and "(iii) No VI") corresponds to the actual observed setting: e.g., specification (i) is the setting for the terrestrial loophole RSNs described in Panel I. All reported figures except for market shares are in $ per household per month, and all percentage changes are relative to the non-integration specification (iii). Below each RSN name is the MVPD that either owns the channel or is assigned ownership of the RSN, the number of households and the MVPD owner's footprint (which is the percentage of households that the MVPD "passes" or plausibly could serve) in the RSN's relevant DMAs, and the predicted percentage change in the number of the integrated MVPD's households that carry the RSN once the channel is integrated. A missing "Aff Fees to Sat" value indicates that the RSN is not supplied to the two satellite distributors. Outcomes for all individual RSNs are reported in the Appendix in Tables 12-15.

Table 5 reports the same market outcomes averaged across all RSNs within each of the three panels in Table 4, as well as across all RSNs in our sample, weighted by the number of households in each RSN's relevant DMAs. "Aff Fees to Rival" represents the affiliate fees charged to the integrated MVPD's rival distributors (both satellite MVPDs if the channel is cable-integrated, each cable MVPD and Dish if the channel is integrated with DirecTV) *conditional on the channel*

Table 4: Simulated Market Outcomes for Selected RSNs

		(i) VI, no PARs		(ii) VI, PARs		(iii) No VI
		Level	% Change	Level	% Change	Level
I. VI, LOOPHOLE						
CSN PHIL	Avg Cable Mkt Share	0.65	4.78%	0.63	2.34%	0.62
Comcast	Avg Sat Mkt Share	0.16	-16.35%	0.19	-1.51%	0.19
Pop 4.25M	Avg Cable Prices	55.36	0.10%	54.57	-1.32%	55.31
Footprint 90%	Aff Fees to Sat	-	-	2.05	0.02%	2.05
	Cable Surplus	28.11	3.87%	27.05	-0.06%	27.06
Carriage +13%	Satellite Surplus	3.82	-8.42%	4.10	-1.54%	4.17
	RSN Surplus	1.91	-19.71%	2.44	2.91%	2.38
	Consumer Welfare	25.65	-4.03%	27.11	1.43%	26.73
	Total Welfare	59.48	-1.41%	60.70	0.61%	60.33
4SD	Avg Cable Mkt Share	0.73	0.81%	0.73	0.22%	0.73
Cox	Avg Sat Mkt Share	0.16	-3.41%	0.16	-0.34%	0.16
Pop 2.81M	Avg Cable Prices	54.62	-0.09%	54.58	-0.16%	54.67
Footprint 100%	Aff Fees to Sat	-	-	0.22	-0.28%	0.22
	Cable Surplus	44.93	0.72%	44.61	0.02%	44.61
Carriage +0%	Satellite Surplus	3.26	-2.66%	3.33	-0.33%	3.34
	RSN Surplus	0.52	-28.17%	0.71	-0.74%	0.72
	Consumer Welfare	26.20	-1.16%	26.56	0.20%	26.51
	Total Welfare	74.90	-0.37%	75.22	0.06%	75.18
II. VI, NON-LOOPHOLE						
CSN BAY AREA	Avg Cable Mkt Share	0.65	1.62%	0.65	1.69%	0.64
Comcast	Avg Sat Mkt Share	0.21	-1.13%	0.21	-1.19%	0.21
Pop 6.03M	Avg Cable Prices	56.00	-0.96%	55.97	-1.01%	56.55
Footprint 54%	Aff Fees to Sat	2.64	60.82%	1.62	-1.65%	1.64
	Cable Surplus	34.55	0.13%	34.56	0.17%	34.51
Carriage +0%	Satellite Surplus	4.21	-3.89%	4.34	-1.10%	4.38
	RSN Surplus	1.56	6.48%	1.42	-3.00%	1.46
	Consumer Welfare	29.14	1.02%	29.16	1.08%	28.85
	Total Welfare	69.46	0.38%	69.48	0.40%	69.20
CSN MID-ATL	Avg Cable Mkt Share	0.66	2.86%	0.66	2.12%	0.64
Comcast	Avg Sat Mkt Share	0.16	-11.84%	0.17	-2.19%	0.18
Pop 6.55M	Avg Cable Prices	58.44	0.01	57.40	-1.09%	58.03
Footprint 70%	Aff Fees to Sat	-	-	1.20	-8.93%	1.32
	Cable Surplus	23.40	2.62%	22.88	0.33%	22.81
Carriage +9%	Satellite Surplus	3.68	-4.44%	3.80	-1.30%	3.85
	RSN Surplus	1.22	-10.94%	1.31	-4.50%	1.37
	Consumer Welfare	25.59	-2.76%	26.67	1.35%	26.31
	Total Welfare	53.89	-0.83%	54.66	0.59%	54.34
III. NON-INTEGRATED						
FS DETROIT	Avg Cable Mkt Share	0.58	3.25%	0.58	3.46%	0.56
*Comcast	Avg Sat Mkt Share	0.16	-1.87%	0.16	-2.04%	0.17
Pop 4.84M	Avg Cable Prices	50.02	-1.81%	49.95	-1.95%	50.94
Footprint 82%	Aff Fees to Sat	2.83	75.78%	1.55	-3.25%	1.61
	Cable Surplus	19.99	0.49%	20.02	0.61%	19.89
Carriage +15%	Satellite Surplus	3.37	-6.49%	3.54	-1.80%	3.61
	RSN Surplus	1.97	8.52%	1.77	-2.32%	1.81
	Consumer Welfare	23.71	2.08%	23.74	2.23%	23.22
	Total Welfare	49.04	1.03%	49.07	1.10%	48.54
NESN	Avg Cable Mkt Share	0.68	9.09%	0.68	8.83%	0.63
*Comcast	Avg Sat Mkt Share	0.10	-20.16%	0.11	-7.83%	0.12
Pop 5.20M	Avg Cable Prices	58.37	-1.63%	55.53	-6.42%	59.34
Footprint 52%	Aff Fees to Sat	-	-	1.92	-11.34%	2.16
	Cable Surplus	29.97	5.27%	28.85	1.35%	28.46
Carriage +0%	Satellite Surplus	2.16	-11.20%	2.27	-6.35%	2.43
	RSN Surplus	3.51	-13.39%	3.59	-11.55%	4.05
	Consumer Welfare	24.95	0.03%	26.93	7.98%	24.94
	Total Welfare	60.58	1.16%	61.64	2.93%	59.89

Notes: This table presents observed and simulated market outcomes for individual RSNs. Specification (i) corresponds to assuming that $\lambda_R = \hat{\underline{\lambda}}_R$ and $\mu = \hat{\mu}$, and allowing the owner of the RSN not provide to rival MVPDs; specification (ii) corresponds to setting $\lambda_R = 0$ and prohibiting the RSN owner from excluding rivals; specification (iii) sets $\mu = 0$ and disintegrates the RSNs. Panel I shows the two cable-integrated RSNs located in terrestrial loophole markets; Panel II shows two selected cable-integrated RSNs located in non-loophole markets; Panel III shows two selected non-integrated RSNs that are assigned a cable owner in specifications (i) and (ii). All reported figures except for market shares are in $/household/month, and all % changes are relative to specification (iii). Beneath the channel name is the name of the MVPD that owns (or is assigned ownership of) the channel, the number of television households and the MVPD owner's footprint (% of households passed) in the RSN's relevant DMAs, and the % change in the integrated MVPD's households that obtain access to the channel upon moving from (iii) to (ii) in the RSN's relevant DMAs.

Table 5: Average of Simulated Market Outcomes

	(i) VI, no PARs		(ii) VI, PARs		(iii) No VI
	Level	% Change	Level	% Change	Level
I. VI, LOOPHOLE					
Avg Cable Mkt Share	0.68	3.04%	0.67	1.41%	0.66
Avg Sat Mkt Share	0.16	-11.71%	0.18	-1.09%	0.18
Avg Cable Prices	55.06	0.02%	54.58	-0.86%	55.05
Aff Fees to Sat	-	-	1.32	0.00%	1.32
Cable Surplus	34.81	2.22%	34.04	-0.02%	34.05
Satellite Surplus	3.59	-6.42%	3.80	-1.12%	3.84
RSN Surplus	1.35	-21.12%	1.75	2.30%	1.72
Consumer Welfare	25.87	-2.89%	26.89	0.94%	26.64
Total Welfare	65.63	-0.94%	66.49	0.36%	66.25
# Foreclosed to Sat	2/2		Carriage Increase:		7.66%
II. VI, NON-LOOPHOLE					
Avg Cable Mkt Share	0.65	1.33%	0.65	1.07%	0.65
Avg Sat Mkt Share	0.17	-3.80%	0.18	-0.99%	0.18
Avg Cable Prices	58.57	-0.24%	58.34	-0.64%	58.71
Aff Fees to Rivals	1.57	19.45%	1.08	-0.67%	1.09
Cable Surplus	27.30	0.56%	27.16	0.07%	27.15
Satellite Surplus	3.76	-2.34%	3.81	-0.91%	3.84
RSN Surplus	1.14	-2.00%	1.14	-0.45%	1.15
Consumer Welfare	27.15	-0.25%	27.41	0.74%	27.21
Total Welfare	59.34	-0.01%	59.52	0.30%	59.34
# Foreclosed to Sat	4/11		Carriage Increase:		3.33%
III. NON-INTEGRATED					
Avg Cable Mkt Share	0.61	1.79%	0.61	1.83%	0.60
Avg Sat Mkt Share	0.20	-2.04%	0.20	-1.41%	0.20
Avg Cable Prices	56.67	-0.71%	56.49	-1.02%	57.07
Aff Fees to Sat	1.39	38.55%	1.12	-0.50%	1.13
Cable Surplus	20.99	0.56%	20.92	0.28%	20.87
Satellite Surplus	4.44	-2.83%	4.50	-1.30%	4.55
RSN Surplus	1.17	9.26%	1.12	1.79%	1.14
Consumer Welfare	26.20	0.75%	26.34	1.28%	26.01
Total Welfare	52.80	0.44%	52.88	0.58%	52.57
# Foreclosed to Sat	2/14		Carriage Increase:		10.45%
ALL RSNS					
Avg Cable Mkt Share	0.63	1.73%	0.63	1.67%	0.62
Avg Sat Mkt Share	0.19	-3.08%	0.19	-1.36%	0.19
Avg Cable Prices	57.36	-0.54%	57.14	-0.97%	57.64
Aff Fees to Rivals	1.45	32.70%	1.11	-0.92%	1.12
Cable Surplus	23.95	0.65%	23.84	0.30%	23.80
Satellite Surplus	4.14	-3.38%	4.20	-1.24%	4.25
RSN Surplus	1.17	0.19%	1.15	-1.51%	1.16
Consumer Welfare	26.56	0.27%	26.78	1.19%	26.50
Total Welfare	55.82	0.20%	55.97	0.56%	55.71
# Foreclosed to Sat	8/27		Carriage Increase:		7.56%

Notes: This table presents the average across the simulated market outcomes for the RSNs located in each panel, weighted by the number of households in each RSN's relevant DMAs. All reported figures except for market shares are in $/household/month, and all % changes are relative to specification (iii). "Avg Fees to Rival" are computed conditional on supply (and represent average affilliate fees to the satellite MVPDs for cable-integrated RSNs, and to cable MVPDs for satellite-integrated RSNs), "# Foreclosed to Sat" reports the number of RSNs in each panel that are not provided to satellite MVPDs (in the case of a cable-integrated RSN; satellite-owned RSNs are never predicted to not supply cable MVPDs), and "Carriage Increase" is the % increase in the number of the integrated MVPD's households that can access the channel upon integration.

being supplied. "# Foreclosed to Sat" represents the number of RSNs in each panel that are not provided to satellite distributors (we predict that DirecTV-integrated RSNs are never withheld from cable distributors).

Efficiency Effects: Double Marginalization and Carriage. We first focus on the potential efficiency gains from vertical integration, which we capture via the difference between specification (ii), representing integration with PARs in effect ($\lambda_R = 0$), and specification (iii), non-integration. Across all RSNs (bottom panel of Table 5), integration and the elimination of double-marginalization for a single RSN yields on average approximately a \$0.50 (1%) decrease in cable prices. Though integration of most RSNs yields less than a \$1 decrease in cable prices, there are notable exceptions: e.g., integrating NESN with Comcast, reported in Table 4, results in average cable prices falling by nearly \$4 (6%) due to NESN's high estimated affiliate fees to Comcast (over \$5/month). Carriage of the integrated RSN, on average, increases by approximately 8% for the integrated MVPD's households, though again there is significant variation across channels.

Although it appears that cable providers are occasionally made worse off when integrated, this is only because the reported cable surplus counts downstream (distributor) profits alone; when a cable MVPD is integrated (and since $\mu > 0$), its pricing decisions will be optimal with respect to joint RSN and distributor profits. We thus always find that joint RSN and integrated cable surplus increases when moving from non-integration to integration with PARs. Satellite surplus falls by approximately 1% when cable integrates with the RSN.[43]

The net effect across all RSNs for total welfare from integrating each RSN but enforcing PARs is approximately \$0.26/household/month (.56%), with all of this coming from an increase in consumer surplus. As noted before, we believe that our approach for predicting counterfactual carriage may overstate the extent to which carriage increases upon integration, and thus caveat our findings accordingly. Even without carriage changes, for some channels such as NESN, surplus gains can be large: we predict a total and consumer welfare gain of nearly \$2/household/month (3% and 8%) when this channel is integrated (its carriage does not increase upon integration). Nevertheless, no other channel is predicted to generate total or consumer welfare gains from integration of over \$1.00.

Foreclosure Effects: Raising-Rivals'-Costs and Exclusion. Comparing specifications (i) and (ii) across all tables provides the impact of removing PARs (and allowing $\lambda_R > 0$) so that integrated RSNs internalize the profits of their downstream units when bargaining with rival MVPDs. For all RSNs, we find that allowing foreclosure strictly reduces consumer and total welfare from the case where integration was allowed but PARs were enforced ($\lambda_R = 0$).

This reduction is caused by two main effects. The first occurs when an RSN is excluded from rival MVPDs. We predict that none of the three DirecTV-owned RSNs would choose to exclude cable providers; however, we predict that 8 out of the 24 cable-integrated RSNs would wish to exclude satellite. We find that all excluded RSNs have cable owners with at least a 40% footprint, consistent with the discussion in Section 4.2.1 that noted that a larger cable footprint would increase the potential losses incurred by a cable provider upon supply of satellite. For

[43] In Table 12, we report market outcomes for the three satellite integrated RSNs. Although we assume that satellite MVPDs set national prices and do not adjust them in our counterfactuals, since specification (ii) also allows for $\mu > 0$ for other integrated-RSNs in the same relevant DMA, cable prices and hence market outcomes can change.

the selected set of RSNs described in Table 4, there are four channels—the two loophole RSNs, previously integrated CSN Mid-Atlantic, and previously independent NESN—that are predicted to exclude satellite distributors if PARs were lifted. In these cases, satellite markets shares and surplus fall.

When rival MVPDs are still supplied by integrated MVPDs but $\lambda_r > 0$, we find that raising-rivals'-costs effects can be large. Table 5 column (i) reports affiliate fees charged to rivals *conditional on supply*; we find that affiliate fees, upon agreement, increase by over 30% on average across all RSNs from the baseline of non-integration; focusing only on previously non-integrated RSNs, this figure is almost 40%. In some cases, including for CSN Bay Area and FS Detroit in Table 4, this increase is over \$1/month/subscriber. Although the impact of an increase in affiliate fees on a rival is not as significant as exclusion, the increase still results in a meaningful reduction in surplus.

Note, however, that even though we have assumed that satellite distributors do not adjust their prices in our counterfactuals, a cable-integrated RSN can still negatively harm consumer welfare by charging satellite distributors higher affiliate fees if this in turn induces the integrated cable owner to increase its own downstream prices. Intuitively, if a cable-integrated RSN increases its affiliate fees with satellite distributors, then the RSN's downstream cable MVPD is facing a higher effective marginal cost when pricing its cable bundle since it now internalizes lost affiliate fee revenues to the RSN from satellite. This effect, discussed in Chen (2001), can be seen clearly when comparing specifications (i) and (ii) when a channel is not excluded from its rivals: e.g., Comcast, the assigned owner of FS Detroit in Table 4, increases its own price of a bundle by \$0.07/month as a result of negotiating a 75% higher affiliate fee for FS Detroit from satellite distributors.[44]

Net Effects. By comparing specification (i) to (iii), we can estimate the net impact of integration of RSNs without restrictions on exclusion from a non-integrated baseline case. On average across all RSNs, the efficiency effects slightly dominate the foreclosure effects when examining total and consumer welfare. These averages, however, mask considerable heterogeneity. Foreclosure effects dominate if one focuses only on the already integrated RSNs—for which integration without PARs is predicted to reduce consumer and total welfare—versus RSNs that are not integrated in the data. Foreclosure effects also dominate when examining only the cases in which the RSN is predicted to exclude satellite distributors upon integration with a cable MVPD: consumer and total welfare fall in 6 of the 8 RSN cases where exclusion was predicted, with the two exceptions—Altitude Sports and NESN—being the only two that previously were disintegrated. For these two RSNs in which the consumer welfare losses from exclusion are not enough to offset the welfare gains from integration, the efficiency gains come either from a large increase in carriage (nearly 50% for Altitude) or a large reduction in cable prices due to mitigated double marginalization incentives (nearly \$4 for NESN).

[44]The welfare effects of these large increases in affiliate fees charged to satellite may be muted by our consideration of one vertical merger at a time, which motivated our holding satellite distributors' (national) prices fixed. Were integration to increase nationally and lead to higher affiliate fees charged to satellite distributors in many markets, we may expect satellite prices to increase response, lowering consumer welfare further.

Our analysis suggests that PARs are binding for some RSNs that are already integrated, and widespread enforcement—conditional on vertical integration status—may improve consumer and total welfare by prohibiting otherwise harmful foreclosure activities.

7 Concluding Remarks

This paper examines vertical integration of high value sports content in the U.S. cable and satellite television industry. Our framework accounts for consumer viewership and subscription decisions, distributor pricing and carriage decisions, and channel-distributor bargaining over affiliate fees. The framework allows for vertical integration to reduce double marginalization and increase carriage; to foreclose rivals from carrying integrated content or to raise their costs of carriage; and for the possibility that divisions within an integrated firm do not perfectly internalize each other's incentives.

We use the estimated model to examine the welfare effects of vertical integration regulatory policy towards the supply of integrated sports content. We find that relaxing program access rules would result in foreclosure of cable integrated RSNs to satellite distributors in a handful of large markets including New England, New York, and Washington DC, and enforcing these regulations in "loophole" markets would prevent existing exclusion. We predict that foreclosure decreases consumer surplus, resulting in losses as large as 3 to 4 percentage points per capita when a single channel is not supplied to satellite, as consumers with strong tastes for both satellite television and regional sports are unable to consume regional sports on their chosen distributor. Even if exclusion does not occur, we find evidence that foreclosure incentives can lead to significant increases in the affiliate fees charged to rival distributors. Finally, we find that the net effect of vertical integration—accounting for both foreclosure and efficiency effects—is heterogeneous, and positive for both consumer and total welfare when averaged across our entire sample of channels, but negative when averaged across only those channels that were integrated during our period of analysis.

As we have noted previously, this analysis is partial and can be extended in a number of directions. Incorporating additional responses to vertical integration—including investment and firm entry—and examining how predictions would be impacted by improved information sharing or alignment of incentives within the firm are important extensions. Furthermore, documenting and measuring the strength of these vertical integration effects in other industries remains a promising area for future research.

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A Further Estimation and Computational Details

A.1 Solving for Negotiated Input Fees and Bundle Marginal Costs

We will omit the subscript on $\Psi_{fct} \equiv (1-\zeta_{fct})/\zeta_{fct}$ for the expressions in this subsection. Let $\mathcal{B}^R_{fmt}$ be the observed set of RSNs carried by f in market m in period t.

Consider MVPD f bargaining with channel c over input fee τ_{fct}. Closed form expressions for MVPD and channel "GFT" terms defined in (8) can be derived as follows:

$$\begin{aligned} GFT^M_{fct} = \sum_{m\in\mathcal{M}_{fct}} \Bigg[& \Big[\mu_{fct}D_{fmt} - D^{\setminus fc}_{fmt}\Big]\tau_{fct} + \mu_{fct}(D_{fmt} + \sum_{g\neq f: c\in\mathcal{B}_{gmt}} [\Delta_{fc}D_{gmt}])a_{cmt} \\ & + \mu_{fct}\sum_{g\neq f: c\in\mathcal{B}_{gmt}} [\Delta_{fc}D_{gmt}]\tau_{gct} + \sum_{d\in\mathcal{V}_{ft}\setminus c}\sum_{g\in\mathcal{F}_{mt}: d\in\mathcal{B}_{gmt}} [\Delta_{fc}D_{gmt}]\mu_{fdt}(\tau_{gdt}+a_{dmt}) \\ & + [\Delta_{fc}D_{fmt}]\Big(p_{fmt} - mc_{fmt}\Big)\Bigg] \end{aligned} \tag{17}$$

$$\begin{aligned} GFT^C_{fct} = \sum_{m\in\mathcal{M}_{fct}} \Bigg[& (D_{fmt} - \mu_{fct}D^{\setminus fc}_{fmt})\tau_{fct} + (D_{fmt} + \sum_{g\neq f: c\in\mathcal{B}_{gmt}} [\Delta_{fc}D_{gmt}])a_{cmt} + \sum_{g\neq f: c\in\mathcal{B}_{gmt}} [\Delta_{fc}D_{gmt}](\tau_{gct}) \\ & + \sum_{g\in\mathcal{F}_{mt}} \lambda_{R:fct}[\Delta_{fc}D_{gmt}] \sum_{d\in\mathcal{B}_{gmt}\setminus c} \mu^C_{cdt}(\tau_{gdt}+a_{dmt}) + \sum_{g\in\mathcal{F}_{mt}} \mu_{gct}\lambda_{R:fct}[\Delta_{fc}D_{gmt}]\Big(p_{gmt} - mc_{gmt}\Big)\Bigg] \end{aligned} \tag{18}$$

where: $D^{\setminus fc}_{fmt}$ is the demand for f in market m if it dropped channel c; $\lambda_{R:fct} = \lambda_R$ if f and c are not integrated, and $\lambda_{R:fct} = 1$ otherwise; $\mu_{fct} = \mu \times O_{fct}$; and $\mu^C_{cdt} = \mu \times O^C_{cdt}$.

Focus on the bargain between an RSN c and MVPD f.[45] Using (17) and (18), the Nash Bargaining first-order condition $\forall f \in \mathcal{F}_{mt}, c \in \mathcal{C}^R_t$ given by (10) ($GFT^C_{fct} = \Psi GFT^M_{fct}$) can be re-written as:

$$\begin{aligned} \tau_{fct}\sum_{m\in\mathcal{M}_{fct}} \Big[(1+\Psi)(1-\mu_{fct})D_{fmt}\Big] + \sum_{g\neq f: c\in\mathcal{B}_{gmt}} \tau_{gct}\sum_{m\in\mathcal{M}_{fct}} (1-\Psi\mu_{fct})[\Delta_{fc}D_{gmt}] \\ + \sum_{g\in\mathcal{F}_{mt}}\sum_{d\in\mathcal{B}_{gmt}\setminus c} \tau_{gdt}((\Psi-\mu_{fct})\mathbb{1}_{g=f} + \mu^C_{cdt}\lambda_{R:fct} - \Psi\mu_{fdt}) \sum_{m\in\mathcal{M}_{fct}} [\Delta_{fc}D_{gmt}] \\ +(\Psi-\mu_{fct})\sum_{m\in\mathcal{M}_{fct}} mc^{\setminus R}_{fmt}[\Delta_{fc}D_{fmt}] = \\ \sum_{m\in\mathcal{M}_{fct}} \Big[(\Psi-\mu_{fct})[\Delta_{fc}D_{fmt}]p_{fmt}\Big] \\ - \sum_{m\in\mathcal{M}_{fct}} \Bigg[a_{cmt}\Big((1-\Psi\mu_{fct})D_{fmt} + (1-\Psi\mu_{fct})\sum_{g\neq f: c\in\mathcal{B}_{gmt}} [\Delta_{fc}D_{gmt}]\Big) \\ + \sum_{g\in\mathcal{F}_{mt}}\sum_{d\in\mathcal{B}_{gmt}\setminus c} a_{dmt}(\mu^C_{cdt}\lambda_{R:fct} - \Psi\mu_{fdt})([\Delta_{fc}D_{gmt}])\Bigg] \end{aligned} \tag{19}$$

where $mc^{\setminus R}_{fmt}$ represents non-RSN marginal costs: i.e., $mc^{\setminus R}_{fmt} \equiv mc_{fmt} - \sum_{d\in\mathcal{B}^R_{fmt}} \tau_{fdt}$.

We can also re-write the pricing first-order condition in (5), which provides the optimal set of prices for

[45] In estimation, we are assuming that $\lambda_R = 0$ in the "non-loophole" markets, and thus omit terms that would otherwise enter (e.g., if c were integrated with a rival MVPD f'). In the counterfactuals, we re-introduce these terms.)

every cable provider f in every market m, as:

$$\sum_{g\in\mathcal{F}_{mt}} \frac{\partial D_{gmt}}{\partial p_{fmt}}\Big(mc_{gmt}^{\setminus R}\mathbb{1}_{g=f} + \sum_{d\in\mathcal{B}_{gmt}^{R}} (\mathbb{1}_{g=f} - \mu_{fdt})\tau_{gdt}\Big) = \Big[D_{fmt} + \frac{\partial D_{fmt}}{\partial p_{fmt}} p_{fmt} + \sum_{g\in\mathcal{F}_{mt}} \frac{\partial D_{gmt}}{\partial p_{fmt}} \sum_{d\in\mathcal{B}_{gmt}^{R}} \mu_{fdt} a_{dmt}\Big] \tag{20}$$

However, if f is a satellite provider (denoted $f \in \mathcal{F}^{sat}$), we assume that there is a single national price p_{ft} and non-RSN marginal cost $\hat{mc}_{fmt}^{\setminus R}$ that applies across all markets; this implies that there is only a single pricing first-order condition for satellite firms:

$$\sum_{m}\sum_{g\in\mathcal{F}_{mt}} \frac{\partial D_{gmt}}{\partial p_{ft}}\Big(mc_{gt}^{\setminus R}\mathbb{1}_{g=f} + \sum_{d\in\mathcal{B}_{gmt}^{R}} (\mathbb{1}_{g=f} - \mu_{fdt})\tau_{gdt}\Big) = \tag{21}$$
$$\sum_{m}\Big(D_{fmt} + \frac{\partial D_{fmt}}{\partial p_{ft}} p_{ft} + \sum_{g\in\mathcal{F}_{mt}} \frac{\partial D_{gmt}}{\partial p_{ft}} \sum_{d\in\mathcal{B}_{gmt}^{R}} \mu_{fdt} a_{dmt}\Big) \qquad \forall f \in \mathcal{F}^{sat}$$

Equations (19), (20), and (21) express input fees and marginal costs as a function of demand parameters, prices, and advertising rates. We thus solve for the vector of RSN input fees $\{\tau_{fct}\}_{\forall f,t,c\in\mathcal{C}_t^R}$ for all RSNs and non-RSN bundle marginal costs $\{mc_{fmt}^{\setminus R}\}_{\forall fmt}$ via matrix inversion when evaluating the objective for any parameter vector $\boldsymbol{\theta}$.

National Channels. We use our estimates of RSN input fees and non-RSN bundle marginal costs to recover $\{\tau_{fct}\}_{\forall ft, c\notin\mathcal{C}_t^R}$ for non-RSN channels via matrix inversion on the following:

$$\tau_{fct}\sum_{m\in\mathcal{M}_{fct}}\Big[D_{fmt} + \Psi D_{fmt}^{\setminus fc}\Big] + \sum_{g\neq f: c\in\mathcal{B}_{gmt}} \tau_{gct}\sum_{m\in\mathcal{M}_{fct}}[\Delta_{fc}D_{gmt}] = \tag{22}$$
$$\sum_{m\in\mathcal{M}_{fct}}\Big[(\Psi)[\Delta_{fc}D_{fmt}](p_{fmt} - \hat{mc}_{fmt})\Big] + \sum_{g\in\mathcal{F}_{mt}}\sum_{d\in\mathcal{B}_{gmt}\setminus c}\mu_{fdt}\Psi\hat{\tau}_{gdt}\sum_{m\in\mathcal{M}_{fct}}[\Delta_{fc}D_{gmt}]$$
$$-\sum_{m\in\mathcal{M}_{fct}}\Big[a_{cmt}\Big(D_{fmt} + \sum_{g\neq f: c\in\mathcal{B}_{gmt}}[\Delta_{fc}D_{gmt}]\Big) + \sum_{g\in\mathcal{F}_{mt}}\sum_{d\in\mathcal{B}_{gmt}\setminus c} a_{dmt}(-\Psi\mu_{fdt})([\Delta_{fc}D_{gmt}])\Big]$$

where we construct estimates of each bundle's marginal costs from our recovered non-RSN marginal costs as follows: $\hat{mc}_{fmt} \equiv \hat{mc}_{fmt}^{\setminus R} + \sum_{d\in\mathcal{B}_{fmt}^{R}}\hat{\tau}_{fdt}$. We assume away integration incentives for non-RSNs so that $\mu_{fct} = 0\ \forall ft, c\notin\mathcal{C}_t^R$.

A.2 Computation of Disagreement Payoffs

Computation of several moments requires estimating $\Delta_{fc}[\Pi_{fmt}^{M}(\mathcal{B}_{mt}, \boldsymbol{p}_{mt}, \{\hat{\boldsymbol{\tau}}_{fct}, \boldsymbol{\tau}_{-fc,t}\})]$ and $\Delta_{fc}[\Pi_{cmt}^{C}(\mathcal{B}_{mt}, \boldsymbol{p}_{mt}, \{\hat{\boldsymbol{\tau}}_{fct}, \boldsymbol{\tau}_{-fc,t}\}; \lambda_R)]$ for each MVPD f and channel c that contract in each period. These "gains from trade" for each pair are comprised of agreement and disagreement profits.

Profits from agreement (as a function of $\boldsymbol{\theta}$) can be computed from observed prices and bundle composition using MVPD and Channel profits specified by (4) and (7). Profits from disagreement between MVPD f and channel c are recomputed in each market given the following assumptions:

1. Bundle composition does not change for other MVPDs: $\mathcal{B}'_{gmt} = \mathcal{B}_{gmt}\ \forall\ g \neq f$; bundles for MVPD f just drop c, but do not adjust otherwise;
2. Input prices $\hat{\tau}_{-fc,t}$ for all other MVPD-conglomerate pairs do not adjust;
3. Bundle prices for satellite and cable providers do not adjust.

The second and third assumptions are consistent with the timing of our game and the simultaneous determination of input and bundle prices.

A.3 Recomputing Counterfactual Equilibria when Channels are Added or Removed from Satellite

When we explore counterfactuals when a RSN channel c is either added or removed from satellite providers (and potentially un-integrated), we compute market outcomes when input and bundle prices are allowed to re-equilibrate. Note that this is different than in the previous subsection, where we explore the computation of disagreement points which occur off the equilibrium path, since here changes are anticipated by all players (e.g., if the terrestrial loophole were closed). We assume that:

1. satellite distributors either carry or do not carry c in all (relevant) markets, and (with national pricing) do not change the prices of its bundles;
2. cable systems may change their prices (since demand elasticities may be affected by changes in carriage) but do not change any carriage or bundling decisions;
3. input prices of RSNs (but not national channels) are allowed to adjust.

We compute the new counterfactual equilibrium where c is either now supplied or removed from satellite in a given period t as follows:

1. Given new bundles $\{\mathcal{B}^{R,CF}_{fmt}\}$ and potentially new values for $\{\lambda^{CF}_{R:fct}, \mu^{CF}_{fct}\}$, we iterate on the following until we obtain convergence on counterfactual input prices $\{\tau^{CF}_{fct}\}$, bundle prices $\{p^{CF}_{fmt}\}$, bundle demands $\{D^{CF}_{fmt}\}$, and elasticities $\{\partial s^{CF}_{fmt}/\partial p_{gmt}\}$:

   (a) Solve for the values of $\{\tau^{CF}_{fct}\}_{c\in\mathcal{C}^{RSN}_t}$ given values of $\{D^{CF}_{fmt}\}$, $\{\partial s^{CF}_{fmt}/\partial p_{gmt}\}$, $\{\hat{mc}^{\setminus R}_{fmt}\}$, μ, λ_R, Ψ using the following system of equations:

$$\begin{aligned}
&\tau^{CF}_{fct}\sum_{m\in\mathcal{M}_{fct}}\Big[(1+\Psi)(1-\mu_{fct})D^{CF}_{fmt}\Big] + \sum_{g\neq f: c\in\mathcal{B}^{R,CF}_{gmt}}\tau^{CF}_{gct}\sum_{m\in\mathcal{M}_{fct}}(1-\Psi\mu_{fct}-\mu_{gct}\lambda_R)[\Delta_{fc}D^{CF}_{gmt}] \\
&+\sum_{g\in\mathcal{F}_{mt}}\sum_{d\in\mathcal{B}^{R,CF}_{gmt}\setminus c}\tau^{CF}_{gdt}((\Psi-\mu_{fct})\mathbb{1}_{g=f}+\mu^{C}_{cdt}\lambda_{R:fct}-\Psi\mu_{fdt}-\mu_{gct}\lambda_R)\sum_{m\in\mathcal{M}_{fct}}[\Delta_{fc}D^{CF}_{gmt}] = \\
&\qquad\sum_{m\in\mathcal{M}_{fct}}\Big[(\Psi-\mu_{fct})(p^{CF}_{fmt}-\hat{mc}^{\setminus R}_{fmt})[\Delta_{fc}D^{CF}_{fmt}]-\mu_{f'ct}\lambda_R(p^{CF}_{fmt}-\hat{mc}^{\setminus R}_{f'mt})[\Delta_{fc}D^{CF}_{f'mt}]\Big] \\
&\qquad\qquad-\sum_{m\in\mathcal{M}_{fct}}\Bigg[a_{cmt}\Big((1-\Psi\mu_{fct})D^{CF}_{fmt}+(1-\Psi\mu_{fct})\sum_{g\neq f: c\in\mathcal{B}^{R,CF}_{gmt}}[\Delta_{fc}D^{CF}_{gmt}]\Big) \\
&\qquad\qquad\qquad+\sum_{g\in\mathcal{F}_{mt}}\sum_{d\in\mathcal{B}^{R,CF}_{gmt}\setminus c}a_{dmt}(\mu^{C}_{cdt}\lambda_{R:fct}-\Psi\mu_{fdt})([\Delta_{fc}D^{CF}_{gmt}])\Bigg] \qquad \forall f,c
\end{aligned} \tag{23}$$

   where f and f' represent the MVPDs with which c is potentially integrated. Equation (23) differs from (19) insofar that we now allow for the possibility that $\lambda_R > 0$, and that c may be integrated with a rival MVPD f' when bargaining with f.

   (b) Market by market, update bundle prices $\{p^{CF}_{fmt}\}$ for all cable distributors to maximize profits given new values of $\{\tau^{CF}_{fct}\}$. Update bundle demands $\{D^{CF}_{fmt}\}$ and elasticities $\{\partial s^{CF}_{fmt}/\partial p_{gmt}\}$ at the new computed prices.

   Currently we only update $\{\tau_{fct}\}_{\forall f}$ for the given channel c that is being examined, and not for other channels d that may be active in c's relevant markets.

B Additional Figures and Tables

Table 6: Regional Sports Networks Availability, Affiliate Fees, and Viewership

	Kagan Availability		Kagan Affiliate Fees					Nielsen Viewing			
	Systems Served	HH Served	Years	Mean	StDev	Min	Max	Obs	All HH	Has DTV	Has Dish
Comcast RSNs											
Comcast SportsNet Bay Area	137	4.7	11	$1.70	$0.53	$1.01	$2.52	720	0.41	0.45	0.33
Comcast SportsNet California	1,960	59.4	7	$0.91	$0.14	$0.75	$1.10	720	0.17	0.17	0.17
Comcast SportsNet Chicago	67	0.9	7	$2.02	$0.18	$1.90	$2.37	360	0.54	0.59	0.36
Comcast SportsNet Mid-Atlantic	23	1.7	11	$2.03	$0.74	$0.85	$3.10	1,440	0.13	0.09	0.03
Comcast SportsNet New England	15	1.0	11	$1.26	$0.32	$0.90	$1.89	1,080	0.27	0.30	0.17
Comcast SportsNet Northwest	137	4.7	4	$1.93	$0.09	$1.81	$2.04	—	—	—	—
Comcast SportsNet Philadelphia	135	10.0	11	$1.94	$0.61	$1.05	$2.85	360	0.91	0.06	0.05
Comcast SportsNet Southwest	335	5.7	—	—	—	—	—	—	—	—	—
Comcast/Charter Sports Southeast	194	6.2	11	$0.36	$0.09	$0.20	$0.50	3,600	0.04	0.00	0.00
The mtn	195	7.0	5	$0.20	$0.02	$0.19	$0.23	720	0.04	0.05	0.00
News Corp RSNs											
Fox Sports Arizona	106	3.7	11	$1.58	$0.50	$0.82	$2.28	—	—	—	—
Fox Sports Chicago	342	4.8	7	$1.45	$0.44	$1.08	$2.13	—	—	—	—
Fox Sports Detroit	284	5.3	11	$1.75	$0.45	$1.05	$2.34	360	1.02	0.94	0.68
Fox Sports Florida	152	6.7	11	$1.34	$0.33	$0.90	$1.95	2,160	0.14	0.12	0.12
Fox Sports Houston	48	3.3	—	—	—	—	—	—	—	—	—
Fox Sports Midwest	695	7.4	11	$1.42	$0.44	$0.57	$2.01	1,800	0.31	0.31	0.26
Fox Sports North	620	4.5	11	$1.97	$0.60	$1.15	$2.88	720	0.79	1.04	0.70
Fox Sports Ohio	306	7.0	11	$1.61	$0.49	$0.75	$2.42	2,160	0.34	0.31	0.29
Fox Sports South	905	15.3	17	$1.63	$0.52	$0.52	$2.17	3,600	0.13	0.08	0.07
Fox Sports Southwest	924	12.7	11	$1.68	$0.50	$0.80	$2.43	5,040	0.14	0.15	0.12
Fox Sports West	167	9.2	11	$1.80	$0.44	$0.87	$2.35	1,080	0.16	0.12	0.07
Fox Sports Wisconsin	136	2.2	—	—	—	—	—	—	—	—	—
Big Ten Network	1,960	59.4	—	—	—	—	—	—	—	—	—
Prime Ticket (New)	132	8.2	11	$1.52	$0.46	$0.60	$2.07	720	0.16	0.12	0.09
SportSouth (New)	532	11.3	11	$0.31	$0.13	$0.15	$0.52	—	—	—	—
Sun Sports	234	8.3	11	$1.36	$0.54	$0.55	$2.27	2,160	0.20	0.16	0.12
Liberty RSNs											
Root Sports Northwest	281	5.4	11	$1.73	$0.52	$0.70	$2.54	—	—	—	—
Root Sports Pittsburgh	316	4.5	11	$1.81	$0.53	$1.05	$2.55	—	—	—	—
Root Sports Rocky Mountain	479	5.4	11	$1.58	$0.42	$0.75	$2.06	—	—	—	—
Cablevision RSNs											
Madison Sq. Garden (MSG)	219	9.9	11	$1.82	$0.30	$1.45	$2.44	1,080	0.23	0.24	0.17
MSG Plus	165	7.5	11	$1.24	$0.15	$1.01	$1.61	360	0.07	0.05	0.06
Cox RSNs											
Channel 4 San Diego	15	1.0	11	$0.87	$0.26	$0.53	$1.32	360	0.48	0.03	0.00
Cox Sports Television	70	2.1	9	$0.55	$0.05	$0.50	$0.64	360	0.22	0.01	0.08
Time Warner RSNs											
Metro Sports Network	8	0.6	—	—	—	—	—	—	—	—	—
SportsNet New York	314	20.1	5	$1.91	$0.18	$1.71	$2.20	1,080	0.13	0.13	0.09
Independent/Other RSNs											
Altitude Sports & Entertainment	130	2.8	7	$1.99	$0.29	$1.70	$2.47	360	0.24	0.21	0.22
Bright House Sports Network	—	—	—	—	—	—	—	360	0.02	0.00	0.00
Empire Sports Network	87	1.9	—	—	—	—	—	—	—	—	—
Mid-Atlantic Sports Network (MASN)	109	5.2	6	$1.58	$0.12	$1.45	$1.77	1,440	0.13	0.10	0.13
New England Sports Network (NESN)	213	4.5	11	$1.99	$0.49	$1.30	$2.72	1,080	0.95	1.00	0.48
Royals Sports	18	0.2	6	$0.19	$0.02	$0.16	$0.21	—	—	—	—
SportsTime Ohio	196	9.0	5	$1.51	$0.17	$1.30	$1.73	720	0.33	0.40	0.20
Yankees Entertainment & Sports (YES)	304	15.8	9	$2.13	$0.41	$1.18	$2.62	1,440	0.27	0.30	0.00

Notes: Reported are availability, affiliate fees and average viewing of the major Regional Sports Networks (RSNs) in the United States. Affiliate fees are the monthly per-subscriber fees paid by cable and satellite distributors to television networks for the right to distribute the network's programming to subscribers. Availability and affiliate fee information is provided by SNL Kagan as part of its Media & Communications Package. RSN viewership is from Nielsen and covers 2000-2010.

Table 7: Sample Statistics - Prices, Market Shares, and Channels

		Unweighted				Weighted by Households			
	Obs	**Mean**	**StdDev**	**Min**	**Max**	**Mean**	**StdDev**	**Min**	**Max**
Total Markets	6,138	6,138							
Average Households (M)	6,138					31.5			
Cable									
Year	6,138	2004	2.9	2000	2010	2004	2.8	2000	2010
Price	6,138	$51.40	$10.33	$8.67	$130.96	$53.02	$8.84	$8.67	$130.96
Market Share	6,138	0.624	0.161	0.005	0.965	0.630	0.137	0.005	0.965
Cable Networks	6,138	42.6	15.4	0	87	44.9	14.0	0	87
RSNs	6,138	1.6	0.9	0	5	1.8	0.9	0	5
Total Channels	6,138	44.2	15.9	1	90	46.6	14.5	1	90
DirecTV									
Year	6,138	2004	2.9	2000	2010	2004	2.8	2000	2010
Price	6,138	$53.25	$6.57	$46.05	$76.73	$53.27	$6.34	$46.05	$76.73
Market Share	6,138	0.092	0.062	0.002	0.499	0.094	0.064	0.002	0.499
Cable Networks	6,138	80.5	10.3	66	97	81.2	10.1	66	97
RSNs	6,138	1.7	0.9	0	6	1.9	0.9	0	6
Total Channels	6,138	82.2	10.5	66	103	83.0	10.3	66	103
Dish									
Year	6,138	2004	2.9	2000	2010	2004	2.8	2000	2010
Price	6,138	$53.89	$4.75	$44.28	$68.33	$53.96	$4.53	$44.28	$68.33
Market Share	6,138	0.064	0.055	0.000	0.406	0.059	0.052	0.000	0.406
Cable Networks	6,138	70.8	13.2	54	91	71.8	12.9	54	91
RSNs	6,138	1.6	0.8	0	5	1.7	0.7	0	5
Total Channels	6,138	72.4	13.3	54	96	73.5	13.0	54	96

Notes: Reported are the price, market share, and cable, Regional Sport Network (RSN), and total channels for each of the local cable operators and two national satellite providers serving each of our markets. Markets are defined as the set of continuous zip codes within a cable system facing the same portfolio of competitors. We exclude (the relatively few) markets facing competition between cable operators. All the data cover the years 2000-2010. To be included, we required information on each of price, market share, and channels. Cable system subscriber and channel information is from the Nielsen FOCUS dataset. Cable system price information is drawn from the Internet Archive, newspaper reports, and the TNS Bill Harvesting database. Satellite system channel and price information is drawn from the Internet Archive. Cable and satellite subscriber market shares are estimated from the MRI (2000-2007) and Simmons (2008-2010) household surveys. We restrict attention to those markets with at least 5 observations in any year. See the text for more details.

Table 8: Sample Statistics - National Cable Channel Affiliate Fees and Viewership, Part 1

	Affiliate Fees					Viewership					
	Kagan					Nielsen		Combined MRI / Simmons			
	Years	Mean	StDev	Min	Max	Obs	Mean	Obs	Mean	SDev	Percent Positive
Channels (A-L)											
ABC Family Channel	11	$0.19	$0.02	$0.16	$0.22	747	0.418	277,535	0.344	1.149	0.176
AMC	11	$0.22	$0.02	$0.20	$0.25	747	0.491	277,535	0.351	1.183	0.156
Animal Planet	11	$0.07	$0.01	$0.06	$0.09	747	0.275	277,535	0.344	1.108	0.203
A&E	11	$0.21	$0.03	$0.16	$0.26	747	0.664	277,535	0.472	1.373	0.230
BBC America	11	$0.09	$0.03	$0.03	$0.12	703	0.053	225,618	0.091	0.617	0.041
BET	11	$0.14	$0.02	$0.11	$0.17	747	0.382	277,535	0.184	1.017	0.070
Bio	11	$0.07	$0.03	$0.00	$0.11	447	0.082	98,567	0.104	0.618	0.023
Bloomberg Television	11	$0.04	$0.02	$0.02	$0.06	—	—	150,165	0.029	0.373	0.010
Boomerang	10	$0.05	$0.03	$0.00	$0.08	280	0.131	—	—	—	—
Bravo	11	$0.15	$0.03	$0.11	$0.20	747	0.277	277,535	0.169	0.804	0.092
Cartoon Network	11	$0.14	$0.03	$0.08	$0.18	747	0.989	277,535	0.231	1.098	0.106
CMT	11	$0.06	$0.02	$0.01	$0.08	—	—	277,535	0.120	0.732	0.067
CNBC	11	$0.24	$0.04	$0.16	$0.30	747	0.217	277,535	0.313	1.185	0.170
CNN	11	$0.43	$0.05	$0.35	$0.52	747	0.550	277,535	0.701	1.744	0.319
CNN en Espanol	—	—	—	—	—	463	0.013	—	—	—	—
CNN International	11	$0.11	$0.02	$0.09	$0.13	567	0.012	—	—	—	—
Comedy Central	11	$0.11	$0.02	$0.08	$0.14	747	0.449	277,535	0.280	0.997	0.162
Discovery Channel	11	$0.27	$0.04	$0.22	$0.35	747	0.535	277,535	0.628	1.462	0.327
Disney Channel	11	$0.81	$0.06	$0.75	$0.91	747	1.171	277,535	0.246	1.074	0.116
E! Entertainment TV	11	$0.19	$0.02	$0.15	$0.21	747	0.315	277,535	0.201	0.788	0.137
ESPN	11	$2.81	$1.12	$1.14	$4.34	747	0.836	277,535	0.675	1.767	0.257
ESPN 2	11	$0.37	$0.14	$0.17	$0.58	747	0.262	277,535	0.334	1.220	0.151
ESPN Classic Sports	11	$0.14	$0.03	$0.10	$0.18	636	0.037	277,535	0.072	0.521	0.047
ESPN deportes	—	—	—	—	—	280	0.035	—	—	—	—
ESPNews	11	$0.10	$0.06	$0.02	$0.17	636	0.043	277,535	0.143	0.782	0.084
ESPNU	6	$0.14	$0.03	$0.10	$0.17	280	0.037	—	—	—	—
Fine Living Network	—	—	—	—	—	55	0.003	150,165	0.025	0.324	0.009
FitTV	11	$0.05	$0.02	$0.02	$0.07	205	0.005	—	—	—	—
Flix	—	—	—	—	—	—	—	101,275	0.013	0.165	0.004
Food Network	11	$0.06	$0.03	$0.03	$0.14	747	0.411	277,535	0.396	1.364	0.175
Fox News Channel	11	$0.32	$0.18	$0.17	$0.70	747	0.785	277,535	0.697	1.961	0.267
Fuse	11	$0.06	$0.01	$0.05	$0.08	747	0.024	225,618	0.018	0.308	0.009
FX	11	$0.34	$0.06	$0.27	$0.43	747	0.463	277,535	0.258	0.976	0.137
G4	9	$0.07	$0.02	$0.05	$0.09	591	0.051	225,618	0.036	0.411	0.016
GSN	11	$0.07	$0.03	$0.04	$0.10	747	0.154	277,535	0.088	0.703	0.036
Golf Channel	11	$0.20	$0.05	$0.13	$0.26	580	0.065	277,535	0.084	0.633	0.041
Hallmark Channel	11	$0.04	$0.02	$0.01	$0.06	699	0.307	225,618	0.301	1.268	0.088
Headline News	—	—	—	—	—	747	0.214	277,535	0.278	0.983	0.173
HGTV	11	$0.08	$0.04	$0.03	$0.14	747	0.500	277,535	0.397	1.446	0.162
History Channel	11	$0.18	$0.04	$0.13	$0.23	747	0.531	277,535	0.531	1.462	0.251
HSN	—	—	—	—	—	580	0.038	252,217	0.044	0.395	0.031
IFC	11	$0.18	$0.01	$0.17	$0.19	—	—	277,535	0.045	0.424	0.023
Investigation Discovery	11	$0.04	$0.03	$0.00	$0.07	441	0.121	174,621	0.067	0.628	0.018
Lifetime	11	$0.21	$0.06	$0.13	$0.29	747	0.679	277,535	0.554	1.650	0.199
Lifetime Movie Network	11	$0.07	$0.03	$0.00	$0.09	328	0.185	225,618	0.250	1.174	0.068

Notes: Reported are affiliate fees and average viewing of the major cable television networks included in our demand system. Affiliate fees are the monthly per-subscriber fees paid by cable and satellite distributors to television networks for the right to distribute the network's programming to subscribers. Affiliate fee information is provided by SNL Kagan as part of its Media & Communications Package. Nielsen viewership data reports the average rating on each channel across between 44 and 56 Designated Market Areas (DMAs) between 2000 and 2010. MRI / Simmons viewership data reports the average viewership and the percent of households with any (positive) viewership of each channel by households in the MRI (2000-2007) and Simmons (2008-2010) household surveys.

Table 9: Sample Statistics - National Cable Channel Affiliate Fees and Viewership, Part 2

	Affiliate Fees					Viewership					
	Kagan					Nielsen		Combined MRI / Simmons			
	Years	Mean	StDev	Min	Max	Obs	Mean	Obs	Mean	SDev	Percent Positive
Channels (M-Z)											
MSNBC	11	$0.14	$0.02	$0.12	$0.17	747	0.343	277,535	0.330	1.181	0.182
MTV	11	$0.27	$0.05	$0.20	$0.35	747	0.568	277,535	0.235	0.983	0.127
MTV Hits	11	$0.01	$0.00	$0.01	$0.01	280	0.030	—	—	—	—
MTV Jams	11	$0.01	$0.01	$0.01	$0.02	280	0.038	—	—	—	—
MTV2	11	$0.03	$0.01	$0.01	$0.05	601	0.082	277,535	0.070	0.542	0.042
Nat Geo Wild	6	$0.07	$0.02	$0.04	$0.09	112	0.068	—	—	—	—
Nat Geo Channel	11	$0.17	$0.06	$0.00	$0.21	608	0.136	225,618	0.212	0.883	0.096
NBA TV	11	$0.31	$0.06	$0.19	$0.37	280	0.035	—	—	—	—
NBC Sports / Versus	8	$0.50	$0.33	$0.11	$0.85	55	0.047	—	—	—	—
NFL Network	4	$0.45	$0.09	$0.32	$0.53	56	0.027	—	—	—	—
NHL Network	11	$0.11	$0.06	$0.00	$0.18	376	0.082	—	—	—	—
Nickelodeon	11	$0.37	$0.05	$0.29	$0.47	747	1.555	277,535	0.200	0.991	0.096
NickToons TV	9	$0.05	$0.03	$0.00	$0.07	447	0.128	—	—	—	—
OWN	11	$0.06	$0.03	$0.00	$0.09	280	0.130	—	—	—	—
Outdoor Channel	11	$0.04	$0.01	$0.03	$0.05	—	—	174,621	0.068	0.594	0.021
Ovation	11	$0.06	$0.02	$0.03	$0.08	280	0.027	—	—	—	—
Oxygen	11	$0.07	$0.04	$0.00	$0.10	656	0.131	225,618	0.114	0.658	0.052
ReelzChannel	—	—	—	—	—	280	0.033	—	—	—	—
Science Channel	11	$0.04	$0.02	$0.00	$0.07	592	0.072	174,621	0.092	0.635	0.030
ShopNBC	—	—	—	—	—	280	0.025	—	—	—	—
SoapNet	11	$0.11	$0.05	$0.02	$0.15	656	0.135	174,621	0.109	0.833	0.022
Speed Channel	11	$0.17	$0.03	$0.11	$0.21	747	0.091	277,535	0.097	0.679	0.046
Style Network	11	$0.10	$0.04	$0.03	$0.14	646	0.063	225,618	0.040	0.416	0.019
Sundance Channel	11	$0.23	$0.04	$0.16	$0.27	—	—	174,621	0.037	0.397	0.012
SyFy	11	$0.17	$0.04	$0.12	$0.22	747	0.427	277,535	0.301	1.207	0.126
TBS	11	$0.37	$0.12	$0.19	$0.54	747	0.905	277,535	0.497	1.345	0.243
TechTV	4	$0.02	$0.01	$0.00	$0.03	47	0.006	51,917	0.012	0.202	0.002
The Hub	11	$0.04	$0.02	$0.01	$0.06	441	0.037	—	—	—	—
TLC	11	$0.16	$0.01	$0.14	$0.17	747	0.422	277,535	0.342	1.151	0.173
Toon Disney	—	—	—	—	—	376	0.146	177,590	0.096	0.644	0.034
Travel Channel	11	$0.07	$0.02	$0.04	$0.11	747	0.166	277,535	0.157	0.712	0.106
truTV	11	$0.09	$0.01	$0.08	$0.10	747	0.384	277,535	0.233	1.081	0.101
Turner Classic Movies	11	$0.22	$0.03	$0.16	$0.27	580	0.286	277,535	0.268	1.142	0.105
TNT	11	$0.83	$0.16	$0.55	$1.10	747	1.219	277,535	0.592	1.553	0.263
TV Guide Network	11	$0.03	$0.01	$0.02	$0.05	656	0.101	277,535	0.082	0.488	0.082
TV Land	11	$0.08	$0.03	$0.01	$0.12	376	0.412	277,535	0.190	0.979	0.086
TV One	7	$0.03	$0.03	$0.00	$0.08	280	0.129	123,885	0.050	0.572	0.008
USA	11	$0.46	$0.07	$0.36	$0.57	747	1.081	277,535	0.503	1.442	0.230
VH1	11	$0.12	$0.02	$0.09	$0.16	747	0.336	277,535	0.151	0.717	0.101
VH1 Classic	11	$0.05	$0.01	$0.02	$0.07	55	0.024	149,303	0.044	0.422	0.016
Weather Channel	11	$0.10	$0.01	$0.08	$0.12	747	0.234	204,189	0.380	0.879	0.266
WE	11	$0.09	$0.01	$0.07	$0.11	328	0.084	225,618	0.096	0.621	0.041

Notes: Reported are affiliate fees and average viewing of the major cable television networks included in our demand system. Affiliate fees are the monthly per-subscriber fees paid by cable and satellite distributors to television networks for the right to distribute the network's programming to subscribers. Affiliate fee information is provided by SNL Kagan as part of its Media & Communications Package. Nielsen viewership data reports the average rating on each channel across between 44 and 56 Designated Market Areas (DMAs) between 2000 and 2010. MRI / Simmons viewership data reports the average viewership and the percent of households with any (positive) viewership of each channel by households in the MRI (2000-2007) and Simmons (2008-2010) household surveys.

Table 10: Monthly WTP for Non-RSNs

Channel Name	Mean WTP	Fraction Positive	Mean Among Positive
ABC Family Channel	0.60	0.79	0.76
AMC	0.68	0.70	0.97
Animal Planet	0.46	0.67	0.68
Arts Entertainment AE	1.06	0.64	1.64
BET	0.60	0.36	1.65
Bravo	0.49	0.58	0.85
Cartoon Network	0.79	0.54	1.45
CMT	0.24	0.40	0.60
CNBC	0.55	0.62	0.89
CNN	1.21	0.77	1.58
Comedy Central	0.76	0.59	1.30
Discovery Channel	1.23	0.91	1.36
Disney Channel	0.74	0.62	1.20
E Entertainment TV	0.45	0.59	0.77
ESPN	8.67	0.71	12.15
ESPN 2	4.23	0.57	7.41
ESPN Classic	1.39	0.43	3.22
Food Network	0.92	0.71	1.29
Fox News Channel	1.61	0.81	2.01
FX	0.70	0.65	1.08
Golf Channel	0.19	0.36	0.53
Hallmark Channel	0.69	0.60	1.15
Headline News	0.52	0.64	0.82
HGTV	0.97	0.75	1.29
History Channel	1.18	0.78	1.51
Lifetime	1.13	0.67	1.70
MSNBC	0.70	0.67	1.05
MTV	0.74	0.56	1.32
Nickelodeon	1.40	0.51	2.75
SyFy, Sci-Fi	0.82	0.55	1.48
TBS	1.21	0.77	1.58
TLC	0.80	0.69	1.15
truTV, Court TV	0.72	0.46	1.56
Turner Classic Movies	0.68	0.57	1.18
TNT	1.94	0.81	2.41
USA	1.50	0.74	2.02
VH1	0.45	0.55	0.81
Weather Channel	0.66	0.87	0.75

Notes: This table presented estimated mean monthly willingness-to-pay in dollars for 38 national channels in 2007. The first column is the unconditional mean. The second column is the fraction of consumers with positive valuations. The third column is the mean conditional on having a positive valuation.

Table 11: Monthly WTP for RSNs

RSN Name	Mean WTP	Fraction Positive	Mean Among Positive
Altitude Sports	3.31	0.85	3.87
Channel 4 San Diego (4SD)	3.48	0.26	13.48
Comcast SportsNet (CSN) Bay Area	5.85	0.78	7.54
CSN California	3.21	0.52	6.15
CSN Chicago	3.74	0.78	4.79
CSN Mid-Atlantic	3.83	0.65	5.90
CSN New England	4.16	0.81	5.13
CSN Northwest	5.49	0.71	7.71
CSN Philadelphia	5.65	1.00	5.66
ComcastCharter Sports Southeast (CSS)	2.36	0.91	2.59
Cox Sports TV	3.06	0.64	4.79
Fox Sports Detroit	4.65	0.85	5.50
Fox Sports Florida	0.98	0.78	1.26
Fox Sports Midwest	0.56	0.21	2.72
Fox Sports North	2.74	0.95	2.87
Fox Sports Ohio	4.79	1.00	4.81
Fox Sports South	2.35	0.97	2.42
Fox Sports Southwest	1.73	0.99	1.75
Fox Sports West	3.24	1.00	3.25
MSG Plus	3.33	0.66	5.08
Madison Square Garden Network (MSG)	1.55	0.67	2.34
Mid-Atlantic Sports Network (MASN)	2.53	0.51	4.92
New England Sports Network (NESN)	11.94	0.51	23.35
Prime Ticket	2.22	0.59	3.75
Root Sports Northwest	5.58	0.94	5.94
Root Sports Pittsburgh	4.99	0.92	5.45
Root Sports Rocky Mountain	1.07	0.90	1.19
SportsNet New York (SNY)	1.31	0.52	2.55
Sun Sports	3.11	0.71	4.38
Yankees Entertainment Sports (YES)	2.82	0.60	4.68

Notes: This table presented estimated mean monthly willingness-to-pay in dollars for RSNs in 2007. The first column is the unconditional mean. The second column is the fraction of consumers with positive valuations. The third column is the mean amongst those with positive valuations.

Table 12: Simulated Market Outcomes for Integrated, Non-Loophole RSNs (1/2)

		(i) VI, no PARs		(ii) VI, PARs		(iii) No VI
		Level	% Change	Level	% Change	Level
CABLE OWNED RSNs (1/2)						
CSN BAY AREA	Avg Cable Mkt Share	0.65	1.62%	0.65	1.69%	0.64
Comcast	Avg Sat Mkt Share	0.21	-1.13%	0.21	-1.19%	0.21
Pop 6.03M	Avg Cable Prices	56.00	-0.96%	55.97	-1.01%	56.55
Footprint 54%	Aff Fees to Sat	2.64	60.82%	1.62	-1.65%	1.64
	Cable Surplus	34.55	0.13%	34.56	0.17%	34.51
Carriage +0%	Satellite Surplus	4.21	-3.89%	4.34	-1.10%	4.38
	RSN Surplus	1.56	6.48%	1.42	-3.00%	1.46
	Consumer Welfare	29.14	1.02%	29.16	1.08%	28.85
	Total Welfare	69.46	0.38%	69.48	0.40%	69.20
CSN CA	Avg Cable Mkt Share	0.70	0.48%	0.70	0.48%	0.69
Comcast	Avg Sat Mkt Share	0.18	-0.37%	0.18	-0.37%	0.18
Pop 3.86M	Avg Cable Prices	53.73	-0.28%	53.73	-0.28%	53.88
Footprint 10%	Aff Fees to Sat	1.15	68.57%	0.68	-0.38%	0.68
	Cable Surplus	44.57	-0.01%	44.57	-0.01%	44.57
Carriage +0%	Satellite Surplus	3.79	-0.52%	3.79	-0.37%	3.81
	RSN Surplus	0.08	11.86%	0.07	2.96%	0.07
	Consumer Welfare	28.07	0.27%	28.07	0.27%	27.99
	Total Welfare	76.50	0.08%	76.50	0.08%	76.44
CSN CHICAGO	Avg Cable Mkt Share	0.59	0.60%	0.59	0.65%	0.59
Comcast	Avg Sat Mkt Share	0.23	-0.40%	0.23	-0.44%	0.23
Pop 9.62M	Avg Cable Prices	61.54	-0.29%	61.53	-0.31%	61.72
Footprint 76%	Aff Fees to Sat	1.96	34.72%	1.45	-0.56%	1.45
	Cable Surplus	19.77	0.09%	19.77	0.13%	19.75
Carriage +1%	Satellite Surplus	5.27	-1.71%	5.34	-0.40%	5.36
	RSN Surplus	1.53	4.46%	1.45	-1.06%	1.47
	Consumer Welfare	27.70	0.35%	27.71	0.38%	27.61
	Total Welfare	54.27	0.16%	54.28	0.17%	54.18
CSN MID-ATL	Avg Cable Mkt Share	0.66	2.86%	0.66	2.12%	0.64
Comcast	Avg Sat Mkt Share	0.16	-11.84%	0.17	-2.19%	0.18
Pop 6.55M	Avg Cable Prices	58.44	0.70%	57.40	-1.09%	58.03
Footprint 70%	Aff Fees to Sat	-	-	1.20	-8.93%	1.32
	Cable Surplus	23.40	2.62%	22.88	0.33%	22.81
Carriage +9%	Satellite Surplus	3.68	-4.44%	3.80	-1.30%	3.85
	RSN Surplus	1.22	-10.94%	1.31	-4.50%	1.37
	Consumer Welfare	25.59	-2.76%	26.67	1.35%	26.31
	Total Welfare	53.89	-0.83%	54.66	0.59%	54.34
CSN NE	Avg Cable Mkt Share	0.64	3.37%	0.64	2.92%	0.62
Comcast	Avg Sat Mkt Share	0.11	-10.19%	0.12	-2.33%	0.12
Pop 5.2M	Avg Cable Prices	59.38	-0.30%	58.33	-2.06%	59.56
Footprint 85%	Aff Fees to Sat	-	-	1.19	-0.53%	1.20
	Cable Surplus	28.88	1.99%	28.36	0.17%	28.31
Carriage +4%	Satellite Surplus	2.32	-5.24%	2.39	-2.29%	2.44
	RSN Surplus	1.57	-8.07%	1.67	-2.30%	1.70
	Consumer Welfare	24.59	-0.95%	25.45	2.49%	24.83
	Total Welfare	57.35	0.11%	57.86	1.00%	57.29
MSG	Avg Cable Mkt Share	0.69	1.92%	0.68	0.85%	0.68
Cablevision	Avg Sat Mkt Share	0.14	-7.98%	0.15	-0.93%	0.15
Pop 11.7M	Avg Cable Prices	59.78	-0.10%	59.52	-0.53%	59.84
Footprint 41%	Aff Fees to Sat	-	-	0.72	2.48%	0.71
	Cable Surplus	27.99	1.32%	27.62	-0.01%	27.63
Carriage +0%	Satellite Surplus	2.86	-4.50%	2.96	-1.03%	2.99
	RSN Surplus	0.82	-10.75%	0.92	0.58%	0.92
	Consumer Welfare	26.45	-1.10%	26.90	0.59%	26.74
	Total Welfare	58.12	-0.28%	58.41	0.22%	58.28

Notes: This table presents observed and simulated market outcomes for individual RSNs in non-loophole markets. All reported figures except for market shares are in $/household/month, and all % changes are relative to specification (iii). Beneath the channel name is the name of the MVPD that owns the channel, the number of television households and the MVPD owner's footprint (% of households passed) in the RSN's relevant DMAs, and the % change in the integrated MVPD's households that obtain access to the channel upon moving from (iii) to (ii) in the RSN's relevant DMAs.

Table 13: Simulated Market Outcomes for Integrated, Non-Loophole RSNs (2/2)

		(i) VI, no PARs		(ii) VI, PARs		(iii) No VI
		Level	% Change	Level	% Change	Level
CABLE OWNED NON-LOOPHOLE RSNs (2/2)						
MSG PLUS	Avg Cable Mkt Share	0.70	1.16%	0.70	0.67%	0.70
Cablevision	Avg Sat Mkt Share	0.14	-4.58%	0.15	-0.83%	0.15
Pop 9.46M	Avg Cable Prices	59.58	-0.20%	59.46	-0.41%	59.70
Footprint 49%	Aff Fees to Sat	-	-	0.83	-0.01%	0.83
	Cable Surplus	29.98	0.93%	29.71	0.02%	29.70
Carriage +0%	Satellite Surplus	2.89	-0.78%	2.89	-0.81%	2.91
	RSN Surplus	0.62	-22.45%	0.79	-0.75%	0.79
	Consumer Welfare	27.67	-0.49%	27.95	0.52%	27.81
	Total Welfare	61.15	-0.10%	61.33	0.20%	61.21
SNY	Avg Cable Mkt Share	0.68	0.90%	0.68	0.90%	0.68
Comcast, TWC	Avg Sat Mkt Share	0.15	-0.97%	0.15	-0.97%	0.15
Pop 11.7M	Avg Cable Prices	59.52	-0.54%	59.52	-0.54%	59.84
Footprint 35%	Aff Fees to Sat	0.53	0.75%	0.53	-0.03%	0.53
	Cable Surplus	27.62	0.02%	27.62	0.02%	27.62
Carriage +14%	Satellite Surplus	2.96	-0.99%	2.96	-0.97%	2.99
	RSN Surplus	0.80	1.84%	0.80	1.76%	0.79
	Consumer Welfare	26.90	0.61%	26.90	0.61%	26.74
	Total Welfare	58.29	0.27%	58.29	0.27%	58.13
SATELLITE OWNED RSNs						
ROOT NW	Avg Cable Mkt Share	0.63	0.36%	0.63	0.90%	0.62
DirecTV	Avg Sat Mkt Share	0.22	-0.31%	0.22	-0.73%	0.22
Pop 4.15M	Avg Cable Prices	53.66	-0.30%	53.46	-0.68%	53.82
	Aff Fees to Rivals	2.74	22.94%	2.23	0.09%	2.23
	Cable Surplus	23.92	-1.67%	24.33	-0.01%	24.33
	Satellite Surplus	4.59	-1.52%	4.63	-0.73%	4.66
	RSN Surplus	2.95	18.99%	2.49	0.70%	2.48
	Consumer Welfare	28.53	0.28%	28.64	0.67%	28.45
	Total Welfare	59.99	0.12%	60.09	0.29%	59.92
ROOT PITT	Avg Cable Mkt Share	0.65	0.77%	0.65	1.02%	0.65
DirecTV	Avg Sat Mkt Share	0.16	-0.64%	0.16	-0.85%	0.17
Pop 5.09M	Avg Cable Prices	56.27	-0.35%	56.19	-0.49%	56.47
	Aff Fees to Rivals	2.59	12.41%	2.30	-0.52%	2.31
	Cable Surplus	27.63	-0.48%	27.76	0.00%	27.76
	Satellite Surplus	3.82	-1.04%	3.83	-0.85%	3.86
	RSN Surplus	1.78	9.06%	1.63	0.07%	1.63
	Consumer Welfare	25.50	0.42%	25.55	0.58%	25.40
	Total Welfare	58.73	0.13%	58.77	0.20%	58.65
ROOT ROCKY MTN	Avg Cable Mkt Share	0.52	-0.04%	0.52	0.00%	0.52
DirecTV	Avg Sat Mkt Share	0.31	0.03%	0.31	0.00%	0.31
Pop 4.19M	Avg Cable Prices	58.42	0.03%	58.40	0.00%	58.40
	Aff Fees to Rivals	-0.03	-62.93%	-0.08	0.00%	-0.08
	Cable Surplus	16.46	-0.09%	16.47	0.00%	16.47
	Satellite Surplus	7.30	-0.08%	7.31	0.00%	7.31
	RSN Surplus	0.44	5.41%	0.42	0.00%	0.42
	Consumer Welfare	29.84	-0.03%	29.85	0.00%	29.85
	Total Welfare	54.04	-0.01%	54.05	0.00%	54.05

Notes: This table presents observed and simulated market outcomes for individual RSNs in non-loophole markets. All reported figures except for market shares are in $/household/month, and all % changes are relative to specification (iii). Beneath the channel name is the name of the MVPD that owns the channel, the number of television households and the MVPD owner's footprint (% of households passed) in the RSN's relevant DMAs, and the % change in the integrated MVPD's households that obtain access to the channel upon moving from (iii) to (ii) in the RSN's relevant DMAs. "Aff Fees to Rivals" for the three satellite integrated RSNs are an average across cable MVPDs and Dish Network.

Table 14: Simulated Market Outcomes for Non-Integrated RSNs (1/2)

		(i) VI, no PARs		(ii) VI, PARs		(iii) No VI
		Level	% Change	Level	% Change	Level
NON-INTEGRATED RSNs (1/2)						
ALTITUDE SPORTS	Avg Cable Mkt Share	0.58	4.12%	0.58	3.72%	0.56
*Comcast	Avg Sat Mkt Share	0.26	-5.00%	0.27	-2.74%	0.27
Pop 7.12M	Avg Cable Prices	57.60	-1.62%	57.15	-2.38%	58.54
Footprint 74%	Aff Fees to Sat	-	-	1.98	4.46%	1.90
	Cable Surplus	17.00	3.85%	16.69	1.99%	16.37
Carriage +49%	Satellite Surplus	6.24	-2.71%	6.24	-2.68%	6.41
	RSN Surplus	0.48	-35.40%	0.57	-23.36%	0.74
	Consumer Welfare	28.16	0.99%	28.72	3.00%	27.88
	Total Welfare	51.87	0.92%	52.22	1.59%	51.40
FS DETROIT	Avg Cable Mkt Share	0.58	3.25%	0.58	3.46%	0.56
*Comcast	Avg Sat Mkt Share	0.16	-1.87%	0.16	-2.04%	0.17
Pop 4.84M	Avg Cable Prices	50.02	-1.81%	49.95	-1.95%	50.94
Footprint 82%	Aff Fees to Sat	2.83	75.78%	1.55	-3.25%	1.61
	Cable Surplus	19.99	0.49%	20.02	0.61%	19.89
Carriage +15%	Satellite Surplus	3.37	-6.49%	3.54	-1.80%	3.61
	RSN Surplus	1.97	8.52%	1.77	-2.32%	1.81
	Consumer Welfare	23.71	2.08%	23.74	2.23%	23.22
	Total Welfare	49.04	1.03%	49.07	1.10%	48.54
FS FLORIDA	Avg Cable Mkt Share	0.63	1.34%	0.63	1.52%	0.62
*Comcast	Avg Sat Mkt Share	0.23	-1.28%	0.23	-1.49%	0.23
Pop 6.20M	Avg Cable Prices	61.77	-0.71%	61.72	-0.81%	62.22
Footprint 67%	Aff Fees to Sat	1.46	87.94%	0.78	0.23%	0.77
	Cable Surplus	20.29	0.01%	20.30	0.02%	20.29
Carriage +0%	Satellite Surplus	5.94	-3.96%	6.09	-1.50%	6.19
	RSN Surplus	0.98	20.23%	0.81	-0.55%	0.81
	Consumer Welfare	27.73	0.90%	27.77	1.01%	27.49
	Total Welfare	54.95	0.31%	54.97	0.34%	54.78
FS MIDWEST	Avg Cable Mkt Share	0.61	0.66%	0.61	0.67%	0.60
*Comcast	Avg Sat Mkt Share	0.21	-0.46%	0.21	-0.47%	0.21
Pop 10.40M	Avg Cable Prices	54.46	-0.29%	54.46	-0.30%	54.62
Footprint 26%	Aff Fees to Sat	0.32	17.73%	0.27	0.04%	0.27
	Cable Surplus	16.83	-0.01%	16.83	-0.01%	16.83
Carriage +15%	Satellite Surplus	4.89	-0.55%	4.89	-0.43%	4.91
	RSN Surplus	0.11	7.62%	0.11	1.72%	0.11
	Consumer Welfare	27.19	0.33%	27.19	0.34%	27.10
	Total Welfare	49.02	0.14%	49.02	0.15%	48.95
FS NORTH	Avg Cable Mkt Share	0.61	0.13%	0.61	0.14%	0.61
*Charter	Avg Sat Mkt Share	0.15	-0.16%	0.15	-0.17%	0.15
Pop 5.77M	Avg Cable Prices	55.69	-0.08%	55.69	-0.09%	55.74
Footprint 12%	Aff Fees to Sat	1.28	21.18%	1.06	-0.06%	1.06
	Cable Surplus	22.65	0.00%	22.65	0.02%	22.65
Carriage +0%	Satellite Surplus	3.57	-0.86%	3.60	-0.16%	3.60
	RSN Surplus	1.62	1.59%	1.59	-0.19%	1.59
	Consumer Welfare	22.03	0.12%	22.03	0.14%	22.00
	Total Welfare	49.86	0.04%	49.86	0.05%	49.84
FS OHIO	Avg Cable Mkt Share	0.62	1.94%	0.62	2.10%	0.61
*TWC	Avg Sat Mkt Share	0.16	-1.36%	0.16	-1.52%	0.16
Pop 8.16M	Avg Cable Prices	53.44	-0.99%	53.39	-1.07%	53.97
Footprint 51%	Aff Fees to Sat	2.75	35.13%	2.01	-0.95%	2.03
	Cable Surplus	18.35	0.28%	18.36	0.37%	18.29
Carriage +2%	Satellite Surplus	3.49	-4.02%	3.58	-1.49%	3.64
	RSN Surplus	1.80	5.00%	1.69	-1.70%	1.72
	Consumer Welfare	24.13	1.30%	24.15	1.41%	23.82
	Total Welfare	47.77	0.63%	47.79	0.68%	47.46
FS SOUTH	Avg Cable Mkt Share	0.60	1.13%	0.60	1.17%	0.60
*TWC	Avg Sat Mkt Share	0.22	-0.74%	0.22	-0.78%	0.22
Pop 13.20M	Avg Cable Prices	58.17	-0.50%	58.16	-0.52%	58.46
Footprint 33%	Aff Fees to Sat	1.49	15.76%	1.28	-0.24%	1.29
	Cable Surplus	21.09	0.00%	21.10	0.01%	21.10
Carriage +2%	Satellite Surplus	5.06	-1.70%	5.11	-0.75%	5.15
	RSN Surplus	1.02	5.84%	0.97	0.36%	0.97
	Consumer Welfare	26.85	0.59%	26.86	0.61%	26.70
	Total Welfare	54.03	0.23%	54.03	0.24%	53.91

Notes: This table presents observed and simulated market outcomes for individual non-integrated RSNs. All reported figures except for market shares are in $/household/month, and all % changes are relative to specification (iii). Beneath the channel name is the name of the MVPD that is assigned ownership of the channel, the number of television households and the MVPD owner's footprint (% of households passed) in the RSN's relevant DMAs, and the % change in the integrated MVPD's households that obtain access to the channel upon moving from (iii) to (ii) in the RSN's relevant DMAs.

Table 15: Simulated Market Outcomes for Non-Integrated RSNs (2/2)

		(i) VI, no PARs		(ii) VI, PARs		(iii) No VI
		Level	% Change	Level	% Change	Level
NON-INTEGRATED RSNs (2/2)						
FS SOUTHWEST	Avg Cable Mkt Share	0.57	1.50%	0.57	1.53%	0.56
*Cox	Avg Sat Mkt Share	0.22	-0.64%	0.22	-0.67%	0.23
Pop 12.70M	Avg Cable Prices	53.88	-0.73%	53.88	-0.75%	54.28
Footprint 37%	Aff Fees to Sat	1.38	9.51%	1.27	0.48%	1.26
	Cable Surplus	15.52	-0.02%	15.52	-0.01%	15.52
Carriage +0%	Satellite Surplus	5.28	-1.11%	5.31	-0.62%	5.34
	RSN Surplus	1.00	2.66%	0.97	-0.25%	0.97
	Consumer Welfare	28.32	0.68%	28.33	0.70%	28.13
	Total Welfare	50.12	0.31%	50.12	0.32%	49.96
FS WEST	Avg Cable Mkt Share	0.56	1.40%	0.56	1.53%	0.55
*TWC	Avg Sat Mkt Share	0.24	-0.79%	0.24	-0.90%	0.24
Pop 8.43M	Avg Cable Prices	55.58	-0.71%	55.55	-0.78%	55.98
Footprint 53%	Aff Fees to Sat	1.39	57.00%	0.88	-0.78%	0.89
	Cable Surplus	22.55	0.06%	22.56	0.09%	22.54
Carriage +0%	Satellite Surplus	4.93	-3.25%	5.05	-0.86%	5.10
	RSN Surplus	1.34	9.76%	1.20	-1.25%	1.22
	Consumer Welfare	26.56	0.64%	26.58	0.70%	26.39
	Total Welfare	55.39	0.24%	55.40	0.26%	55.25
MASN	Avg Cable Mkt Share	0.67	1.57%	0.67	1.73%	0.66
*Comcast	Avg Sat Mkt Share	0.16	-1.78%	0.16	-2.09%	0.17
Pop 8.25M	Avg Cable Prices	58.23	-0.26%	58.18	-0.34%	58.38
Footprint 52%	Aff Fees to Sat	1.48	93.22%	0.75	-2.46%	0.77
	Cable Surplus	23.74	0.42%	23.74	0.43%	23.64
Carriage +69%	Satellite Surplus	3.56	-4.35%	3.65	-1.85%	3.72
	RSN Surplus	0.56	92.00%	0.45	54.94%	0.29
	Consumer Welfare	25.98	1.44%	26.01	1.55%	25.61
	Total Welfare	53.84	1.07%	53.85	1.11%	53.26
NESN	Avg Cable Mkt Share	0.68	9.09%	0.68	8.83%	0.63
*Comcast	Avg Sat Mkt Share	0.10	-20.16%	0.11	-7.83%	0.12
Pop 5.20M	Avg Cable Prices	58.37	-1.63%	55.53	-6.42%	59.34
Footprint 85%	Aff Fees to Sat	-	-	1.92	-11.34%	2.16
	Cable Surplus	29.97	5.27%	28.85	1.35%	28.46
Carriage +0%	Satellite Surplus	2.16	-11.20%	2.27	-6.35%	2.43
	RSN Surplus	3.51	-13.39%	3.59	-11.55%	4.05
	Consumer Welfare	24.95	0.03%	26.93	7.98%	24.94
	Total Welfare	60.58	1.16%	61.64	2.93%	59.89
PRIME TICKET	Avg Cable Mkt Share	0.56	0.87%	0.56	0.95%	0.55
*TWC	Avg Sat Mkt Share	0.24	-0.49%	0.24	-0.56%	0.24
Pop 8.32M	Avg Cable Prices	55.73	-0.44%	55.71	-0.49%	55.98
Footprint 53%	Aff Fees to Sat	0.89	62.14%	0.55	0.28%	0.55
	Cable Surplus	22.54	0.03%	22.55	0.04%	22.54
Carriage +0%	Satellite Surplus	4.99	-2.09%	5.07	-0.56%	5.10
	RSN Surplus	0.77	11.36%	0.68	-0.90%	0.69
	Consumer Welfare	26.50	0.40%	26.51	0.44%	26.39
	Total Welfare	54.80	0.15%	54.81	0.17%	54.72
SUN SPORTS	Avg Cable Mkt Share	0.65	-0.19%	0.65	-0.19%	0.65
*TWC	Avg Sat Mkt Share	0.16	0.55%	0.16	0.54%	0.16
Pop 3.41M	Avg Cable Prices	64.77	-0.05%	64.77	-0.05%	64.80
Footprint 65%	Aff Fees to Sat	1.75	0.30%	1.75	0.16%	1.75
	Cable Surplus	17.67	-0.08%	17.67	-0.08%	17.69
Carriage +0%	Satellite Surplus	4.40	0.52%	4.40	0.52%	4.37
	RSN Surplus	0.82	2.51%	0.82	2.45%	0.80
	Consumer Welfare	19.97	0.08%	19.97	0.08%	19.95
	Total Welfare	42.86	0.10%	42.86	0.10%	42.82
YES[a]	Avg Cable Mkt Share	0.68	1.24%	0.68	1.27%	0.68
*TWC	Avg Sat Mkt Share	0.15	-1.39%	0.15	-1.42%	0.15
Pop 11.40M	Avg Cable Prices	59.48	-0.72%	59.47	-0.73%	59.91
Footprint 35%	Aff Fees to Sat	0.93	25.88%	0.75	1.18%	0.74
	Cable Surplus	27.75	0.04%	27.75	0.05%	27.74
Carriage +0%	Satellite Surplus	2.90	-2.52%	2.93	-1.46%	2.97
	RSN Surplus	1.69	1.79%	1.65	-0.34%	1.66
	Consumer Welfare	26.92	0.85%	26.93	0.86%	26.70
	Total Welfare	59.26	0.33%	59.27	0.33%	59.07

Notes: This table presents observed and simulated market outcomes for individual non-integrated RSNs. All reported figures except for market shares are in $/household/month, and all % changes are relative to specification (iii). Beneath the channel name is the name of the MVPD that is assigned ownership of the channel, the number of television households and the MVPD owner's footprint (% of households passed) in the RSN's relevant DMAs, and the % change in the integrated MVPD's households that obtain access to the channel upon moving from (iii) to (ii) in the RSN's relevant DMAs.

[a] YES does not supply DISH Network in 2007; we assume that it does not supply Dish in any specification.