Estimating the Effects of a la Carte Pricing: The Case of Cable Television*

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Abstract

Consumer groups have been complaining about rising cable television prices. One proposed solution to combat these rising rates is to allow consumers to choose cable channels on a channel-by-channel basis (so-called "a la carte" offerings). In this paper, we explore the likely implications of a government regulation that would require cable and satellite operators to offer television channels on an a la carte basis. Using a policy simulation in which we explicitly model the strategic interaction between cable providers and programming networks, we find that consumer welfare goes up unambiguously under a la carte pricing. The expected monthly expenditure per household falls by approximately 15 to 20 percent and consumer welfare increases considerably. On the other hand, even ignoring the (technological) fixed costs associated with compliance with an a la carte regulation, we find that cable operator profits will fall. Finally, as we might expect, some programming networks benefit from a la carte pricing, while others are harmed (due, at least partially, to increased competition among close substitutes).

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1 Introduction

Consumer groups and politicians are becoming increasingly concerned with high prices for cable television services. New Jersey Senator Frank R. Lautenberg has been quoted as saying that he hears more from his constituents about cable prices than he does about such "hot-button" political issues as gay marriage.[1] A 2003 study by the U.S. General Accounting Office (GAO) reveals the source of consumer discontent. The GAO found that cable television rates had increased approximately 40 percent in the preceding five years. During the same time period, there was a 12 percent increase in general inflation. In the face of these rate increases, consumer groups (such as the Consumers Union) and politicians (such as Senator John McCain) have been exploring possible remedies. One of the most oft-cited potential solutions is to allow consumers to purchase cable networks on an "a la carte" basis. Under the current system, consumers typically face a choice of between two or three different cable packages. Each of these "packages" is essentially a bundle of a number of different cable stations. An a la carte regulation would force cable operators to allow consumers to, instead, select only the networks they wish to receive.

Proponents of a la carte pricing argue that allowing consumers to purchase stations individually will give them greater control over their cable bill and, presumably, lower the cost of cable for the average viewer. The above conclusion relies upon the assumption, however, that cable companies would not respond to a la carte regulations by changing the prices charged for each station. If cable providers (or upstream programming networks) respond to a la carte regulations, by raising prices, then it is not clear that a la carte pricing will be welfare-improving.

In May 2004, the U.S. House of Representatives Commerce Committee asked the Federal Communications Commission (FCC) to examine the feasibility of a la carte cable pricing. Since this time, the FCC has published two studies on a la carte cable pricing. The first report, released in November 2004, concluded that there would be little benefit to consumers and that a la carte regulation would, therefore, be undesirable (FCC (2004)). The second report, released in February 2006, reversed many of the findings of the previous study to conclude that consumers may, in fact, see "substantial benefits" from a la carte offerings (FCC (2006)). The Congressional Research Service (CRS), in examining the two FCC studies, noted that "none of the studies or reports issued to date can be deemed definitive," (CRS (2006)). Clearly, there is great need for careful studies in

[1] Pittsburgh Tribune Review, "A la Carte Cable Served Up as Solution," March 27, 2004.

this area.

The purpose of this study is to conduct a policy simulation, using the results from a cable demand estimation model, that will help quantify the benefits and costs from a proposed a la carte regulation. We run two different simulations. In the first one, we assume that cable and satellite operators (downstream firms) offer only bundles of channels. In the second one, we assume that due to an a la carte regulation downstream firms offer each channel separately. In addition to downstream cable providers, we also model the upstream sector where competition among TV channels takes place. We determine the equilibrium prices and consumer welfare under each scenario. Our results indicate that prices (in general) go up with a la carte pricing. To make this comparison, we look at the difference between the price of a bundle with the total price that consumers would pay *for all those same channels* under a la carte pricing.[2] In this way, buying all of those channels a la carte would be costlier. It is not the case, however, that consumers are worse off. Indeed, consumer welfare goes up unambiguously under a la carte pricing. This is due, primarily, to the fact that our model predicts that most consumers, under the a la carte regime, will *not* purchase channels that they do not value much. Therefore, the expected monthly payment per household falls by approximately 15 to 20 percent, following an a la carte regulation. An increase in the size of the consumer choice set contributes to the rise in welfare, as well.

For cable operators, such as Comcast and Time Warner, the results are not as promising. We find that cable operator profits fall under a la carte regulations, even when ignoring fixed costs.[3] The results are mixed for cable network owners, such as Viacom and NBC Universal. Perhaps not surprisingly, some channels will see their market share drop dramatically while others, such as the Disney-owned sports network ESPN, are predicted to be able to raise their prices following a la carte enactment with little impact on sales.

We also allow in our simulations for the smallest TV network to exit following an a la carte regulation. The idea is that in the presence of fixed costs, and given the an a la carte regulation will hurt profitability, some channels may not be able to survive. As expected, exit lowers the intensity of competition and reduces product variety, both of which impact consumer surplus negatively. Nevertheless, even when we factor the exit of a relatively big channel in (CNBC), consumer surplus

[2] This finding is consistent with a typical second degree price discrimination story.

[3] Cable operators have routinely argued that a significant fixed cost would be required to make a la carte cable technologically feasible. Our results show that cable operators are worse off, even in the absence of increased fixed costs.

in the a la carte scenario is higher than in the pre-regulation case.

The remainder of the paper is organized as follows: in Section 2, we present a brief literature review on studies of the cable industry. In Section 3, we discuss the data utilized in this study and we describe our empirical demand model in Section 4. Section 5 contains details of the estimation procedure. The parameter estimates from the demand estimation are presented in Section 6. In Section 7, we discuss the policy simulation and its results. Section 8 concludes.

2 Literature Review

There have been a number of previous studies examining various aspects of the cable television industry. Chipty (2001) assesses the impact of vertical integration between cable operators and cable television networks. An example of such vertical integration is the case of HBO and Time Warner. HBO, a popular movie network, is owned by Time Warner. Time Warner also operates a cable system (Time Warner Cable). Chipty's research attempts to identify the consequences of relationships of this type. Chipty finds that vertically integrated cable operators tend to exclude rival channels.[4] However, Chipty also finds that efficiency gains may result in higher consumer welfare.

Crawford (2000) examines the welfare implications of the 1992 Cable Act, which placed caps on the per-channel prices that could be charged for cable service. A significant contribution of Crawford (2000) was the methodology used to estimate consumer tastes and preferences (willingness-to-pay) for individual channels. We use Crawford's basic demand approach in this paper to recover willingness-to-pay values, which we then use in our numerical simulation.

Crawford (2006) examines cable operators' incentives to offer networks as bundles. There have been a number of theoretical papers that have asserted that a monopolist, offering several products for which consumers have heterogeneous tastes, may reduce that consumer heterogeneity and, therefore, earn more profit by bundling the products. Crawford tests for empirical support for this discriminatory "hypothesis" using cable television data. He finds strong support for the claim that cable operators use bundling as a method to enhance profits.

Petrin and Goolsbee (2004) estimate a consumer-level demand for satellite and cable offerings

[4] In Philadelphia, Comcast Cable does not carry Fox Sports, which many other cable operators offer. Rather, Comcast carries their own regional sports network (Comcast SportsNet).

in order to quantify the benefits that consumers have received from the emergence of satellite as a competitor to the traditional cable television (local) monopoly. They find that the emergence of satellite television offerings have significantly impacted the behavior of traditional cable operators. Because of their finding, we also allow for satellite competitors in our policy simulation.

While there have been a number of studies on the cable industry, there are only two papers (to our knowledge) that have explicitly examined the question of whether a la carte cable pricing would be welfare improving: Rennhoff and Serfes (2008) and Crawford and Cullen (2007). Rennhoff and Serfes (2008) use a Hotelling-based (symmetric) theoretical model of upstream-downstream competition to predict the likely impact of an a la carte regulation. They identify two strategic effects that are associated with an a la carte regulation: i) an *upstream effect* and ii) a *downstream effect*. Both effects act in lowering the standalone prices after an a la carte regulation. What influences the firms' decisions to offer the bundle in Rennhoff and Serfes (2008) is the strength of consumer preference for channel variety, defined as the incremental utility consumers derive from an additional channel.[5] If consumers value variety a lot, then firms, in equilibrium, offer only bundles of TV channels. In this case, an a la carte regulation will improve consumer welfare. The present paper extends Rennhoff and Serfes (2008) in the following directions: i) uses specific values for the key parameters which come from demand estimation, ii) allows for asymmetric firms, iii) models the advertising side, iv) uses a different consumer utility specification, v) assumes that license fees are the outcomes of bargaining processes among TV networks and carriers and vi) allows for exit of TV networks after an a la carte regulation.

Crawford and Cullen (2007) conduct a numerical simulation to assess the likely outcome of an a la carte regulation. They find that consumer surplus increases and cable operator profit falls in response to a la carte regulation. Their approach is, in many ways, not that dissimilar from ours. The primary difference between our work and theirs is that we explicitly model the role of the upstream programming networks and how their price may be influenced by advertising considerations. Crawford and Cullen do not directly account for the upstream firms. Subsequently, they are not able to directly determine the response of upstream firms to a la carte regulation nor the role of advertising in that decision.

A literature review on bundling can be found in Rennhoff and Serfes (2008).

[5] This incremental utility plays a key role in the present paper as well.

3 Data

The data used in this study come from several sources. The primary source of information is the *Television and Cable Factbook*. The *Television and Cable Factbook* contains information, for each cable system in the U.S., on the number of cable services offered, the prices of these services and the associated number of subscribers, and the identity of each channel included in a particular cable service. Beyond these demand-side elements, the *Factbook* also includes detailed information such as the corporate owner of the local cable operator, the number of homes "passed" by cable (this is a measure of the potential market size), the DMA rank of the market, the system's channel capacity, the primary county served by this cable system, and many other useful measures. In this paper, we use all cable systems in the 2005 *Factbook* for which complete information was available.[6] Using only complete observations allows us to use data on 1,419 cable systems for this study. Summary statistics for these included cable systems appear in Table 1:

[6] A number of systems contain incomplete records. For example, the number of subscribers may be missing from one record, while another record is missing price information.

Variable	
Prices	
Basic	$25.51
	(7.47)
Basic + Expanded Basic I	$30.56
	(8.84)
HBO	$10.90
	(1.72)
Cinemax	$10.16
	(2.01)
Showtime	$9.69
	(2.28)
The Movie Channel	$9.19
	(2.36)
Services Offered	
Any Expanded Basic Services	12.2%
One Expanded Basic Service	10.6%
Two Expanded Basic Services	1.6%
Any Digital Basic	1.1%
Any Pay Service	99.7%
HBO	91.0%
Cinemax	45.0%
Showtime	47.9%
The Movie Channel	21.6%
Starz!	4.9%
Encore	5.7%
Broadband Internet Services	18.2%
Channel Capacity	42.5%
	(16.13)
Market Share	
Basic	58.5%

Table 1: Summary Statistics

Table 2 expands upon these basic summary statistics by looking at the market shares of the various services, conditional upon the purchase of cable.

Service	Market Share (Conditional)
Basic	100%
Expanded Basic I	46.43%
Expanded Basic II	1.43%
HBO	18.87%
Showtime	9.04%
Cinemax	9.47%
The Movie Channel	3.94%

Table 2: Service Market Shares

It is clear that HBO is the most popular premium movie channel, while approximately 50 percent of households upgrade their cable selection to include expanded basic networks. Table 3 illustrates the programming networks that are included in the study, as well as their owners. Highlighted rows in Table 3 are to indicate those programming networks owned by a cable operator.

Programming Network	Owner
ABC Family	Disney
A&E	Disney, NBC Universal
Cinemax	Time Warner
CNBC	NBC Universal
CNN	Time Warner
CSPAN	National Cable Sat. Corp
Discovery Channel	Cox, Liberty Media
Disney Channel	Disney
E!	Comcast/Disney
Encore	SEG
ESPN	Disney
ESPN2	Disney
Food Network	E.W. Scripps
Fox News	Fox
FX	Fox
HBO	Time Warner
Lifetime	Disney
MTV	Viacom
Nickelodeon	Viacom
Showtime	Viacom
Spike TV	Viacom
Starz!	SEG
TBS	Time Warner
History Channel	Disney
Movie Channel	Viacom
Weather Channel	Landmark
TLC	Cox, Liberty Media
TNT	Time Warner
Toon Disney	Disney
USA	NBC Universal
VH1	Viacom

Table 3: Included Programming Networks

The data from the *Factbook* were supplemented with additional sources. Programming network license fees (their use will be discussed in Section 5.2) were obtained from Kagan Research. These license fees may be thought of as the "wholesale prices" cable operators pay the network owners for each subscriber receiving a given network. The values reported by Kagan Research are national averages.[7]

Demographic information for each of the included cable markets was obtained from the Census Bureau's *County and City Data Book*. The most recent version of the *County and City Data Book* was from the 2000 census. Unfortunately, new editions of the *Data Book* are not made available on an annual basis. As such, we use the information contained in the 2000 version. The *Data Book* contains useful demographic data at the county-level, such as information on the education, age, and income of county residents. These demographic variables were used in the demand equations

[7]It may well be the case that certain cable operator are able to negotiate lower license fees than other operators.

to help explain differences in the preferences for cable services.

Finally, advertising revenue data for each of the included channels was obtained from TNS Media Intelligence. More specifically, for each of the commercial-airing programming networks TNS Media Intelligence provided information on the amount of commercials each channel aired and the amount paid (by advertisers) to the network. Combining this information with subscriber information allows us to estimate a relationship between the number of subscribers a channel has and its advertising revenue.

4 A Model of Cable Demand

4.1 Basic Set-Up

Our model of cable demand is based on Crawford's (2000) specification.[8] We begin by specifying a household utility function. We then aggregate in order to derive market-level market shares. The basic model is as follows.

In each market n, the local cable operator offers a number of different cable services (ex. basic cable, expanded basic cable, HBO, etc.). Let C_n denote the set of services offered in market n. Now let B_n enumerate all possible combinations of services that may be purchased by households. The distinction between C_n and B_n may not be readily apparent so consider the following example: suppose that the cable operator in market n offers three services: basic cable, expanded basic cable, and HBO ($C_n = \{$Basic, Expanded Basic, HBO$\}$). Given these services, each household may choose one of five alternatives ($B_n = \{$No service, Basic only, Basic + Expanded Basic, Basic + HBO, Basic + Expanded Basic + HBO$\}$). The notational distinction is important because, while consumers choose from the elements of B_n, our data contains market shares for C_n. In Section 5, we will further discuss the market share mapping technique employed by Crawford.

4.2 Household Utility

In following the approach of Berry (1994) and Berry, Levinsohn, and Pakes (1995), we express each of the choices in B_n as a vector of attributes $(X_{bn}, p_{bn}, \xi_{bn})$, where X_{bn} is a vector of observable characteristics for choice b, p_{bn} is the price of choice b, and ξ_{bn} represents unobserved (by the econometrician) choice attributes. In following with Crawford (2000), we assume that consumers

[8] We will, therefore, be somewhat brief with the details. Interested readers are encouraged to read Crawford (2000).

make decisions about which cable service to purchase based on their tastes and preferences for the included networks. As such, we include in X_{bn} network dummy variables to capture the "contents" of each choice. Ideally, we would also like to estimate a detailed covariance structure that allows consumer tastes and preferences for channels to "change" depending on the other programming networks included in the bundle. For example, it might be reasonable to believe that your marginal utility from CNBC (a news channel) is different if you also have CNN and Fox News in your cable bundle. Unfortunately, it is not feasible for us to allow for such a rich specification. In order to make a modest attempt at capturing these effects, we include a select number of interaction terms.

We assume that household i's utility for each service $b \in B_n$ can be expressed:

$$\begin{aligned} U_{ibn} &= X'_{bn}\beta + \left(\alpha + D'_n\theta\right) p_{bn} + D'_n\gamma + \xi_{bn} + \varepsilon_{ibn} \\ &= \delta_{bn} + \varepsilon_{ibn} \end{aligned} \tag{1}$$

where D_n is a vector of demographic characteristics for market n, ε_{ibn} represents household i's idiosyncratic preferences for choice b, and α, β , and γ are parameters to be estimated.[9] The δ_{bn} term is commonly referred to as mean utility as it does not vary over individuals. We make the standard assumption regarding the distribution of ε; that it is distributed *iid* type I extreme value. This allows us to derive the market share of each choice b:

$$s_{bn} = \frac{e^{\delta_{bn}}}{\sum\limits_{k \in B_n} e^{\delta_{kn}}} \tag{2}$$

and the outside good choice:

$$s_{0n} = \frac{1}{\sum\limits_{k \in B_n} e^{\delta_{kn}}}. \tag{3}$$

Finally, we use the expressions in (2) and (3) to derive market shares for each service c (s_{cn}). The market share of service c is simply the summation of the market shares of each choice b that contain service c. This service-level market share can be written as follows:

[9] The demographics and a constant may be thought of as being market-specific demand shifters.

$$s_{cn} = \sum_{b \text{ cont.} c} s_{bn} = \sum_{b \text{ cont.} c} \frac{e^{\delta_{bn}}}{\sum\limits_{k \in B_n} e^{\delta_{kn}}}. \tag{4}$$

5 Estimation

5.1 Estimation Description

The estimation approach used in this study is derived from Berry (1994). In this manner, we invert the market share equations from (4) in order to obtain ξ as a function of the observable characteristics and their associated parameter values. This process is complicated somewhat, however, by the fact that the purchase of cable services are tied to a purchase of basic cable.[10] With this in mind, the estimating equation for any service except basic service has the following form:

$$\log(s_{cn}/s_{\bar{c}n}) = X'_{cn}\beta + \alpha p_{cn} + \xi_{cn} \tag{5}$$

with $s_{\bar{c}n} = s_{basic,n} - s_{cn}$ (for all services not equal to "basic"). The modified estimating equation for basic service can be written:

$$\log(s_{basic,n}/s_{0n}) - \sum_{c \neq basic} [1 + \log(s_{cn}/s_{\bar{c}n})] = X'_{basic,n}\beta + \alpha p_{basic,n} + D'_n\gamma + \xi_{basic,n} \tag{6}$$

where 0 indexes the so-called "outside option."

It is well-known that equations (5) and (6) suffer from an endogeneity problem. Our estimation strategy, therefore, is built upon the notion that a matrix of appropriate instruments are orthogonal to the ξ's (i.e. that $E[Z'\xi] = 0$). We treat this orthogonality as a moment condition in a GMM estimation procedure. Specifically, we solve for the vector of parameters (θ) that minimize the following objective function:

$$\xi'(\theta) Z \Sigma^{-1} Z' \xi(\theta) \tag{7}$$

where $\Sigma = var(Z'\xi)$.

[10] In other words, one cannot simply purchase HBO without having also purchased basic cable service.

5.2 Instruments

The use of instruments in estimating the equations outlined in (5) and (6) comes from our concern that the observed characteristics (X, p, and D) are correlated with the (market-service-specific) unobserved characteristics (ξ). If there is correlation, then we must find instruments correlated with the observed characteristics, but uncorrelated with the market-specific unobserved characteristics. In this section, we briefly address the need for instruments.

Demographic Characteristics (D). In following Crawford (2000) and others, we assume that a market's demographics are uncorrelated with ξ. D_n, therefore, serves as its own instrument.

Prices (p). It is likely that the price set by the cable operator is influence by ξ (which is observed by the cable operator when selecting price). We must, therefore, include appropriate instruments. As instruments, we follow the conventional wisdom and select variables that may be thought of as marginal cost shifters. Specifically, we include the number of homes passed, the number of subscribers served by the cable operator's corporate parent, dummy variables for vertical ties to programming networks, and average per-subscriber license fees (for those programming networks included in the specific service).

Observed Product Characteristics (X). As noted in Crawford (2000 & 2006), it may not be reasonable to assume that observed product characteristics are, indeed, exogenous. Just as cable operators have the ability to set their price, they also have the flexibility to select their channel line-up. In order to "break" this endogeneity, we use the method proposed in Crawford (2006). Namely, we use a cable operator's offerings in other markets (for the same service) as instruments in a probit regression of inclusion. For single market operators (i.e. small cable operators that serve only one market), we use the average offerings of other single market operators as instruments. We then use fitted values in estimating equations (5) and (6).[11]

6 Estimation Results

Minimizing the objective function in (7) yields consistent estimates of α, β,and γ.[12] These estimates can be used to yield willingness-to-pay estimates for each network by dividing β by the marginal

[11] Our estimation results, however, do not seem to be particularly sensitive to controlling for the potential endogeneity of channel line-ups.

[12] Because the willingness-to-pay estimates and their standard errors are our primary interest, we omit the remaining estimates for brevity.

utility of income (α). The estimated willingness-to-pay values for each of the programming networks and their standard errors are presented in Table 4:

Channel	Expected Willingness-to-Pay	Standard Error
Standard Programming		
Intercept	$6.48	(1.62)
ABC Family	$0.59	(.33)
with Other Family Channels	$0.33	(.73)
A&E	$1.58	(.71)
CNBC	-$0.12	(.22)
with CNN	$0.31	(.23)
with Fox News	$0.29	(.29)
with Both	$0.37	(.24)
CNN	$0.81	(.3)
with CNBC	$1.24	(.37)
with Fox News	$1.85	(.29)
with Both	$1.87	(.66)
CSPAN	-$0.39	(.72)
Discovery Channel	$0.46	(.24)
Disney	$1.31	(.56)
with Other Family Channels	$0.84	(.61)
E!	$0.60	(.58)
ESPN	$8.73	(1.46)
with ESPN2	$7.50	(1.77)
ESPN2	$2.68	(1.89)
with ESPN	$1.45	(.68)
Food Network	-$0.42	(.28)
Fox News	$0.53	(.39)
with CNN	$1.57	(.44)
with CNBC	$0.94	(.57)
with Both	$1.59	(.67)
FX	-$2.70	(2.84)
Lifetime	-$0.23	(.16)
MTV	$0.31	(.45)
Nickelodeon	$1.45	(.31)
with Other Family Channels	$2.48	(.71)
Spike TV	$0.17	(.21)
TBS	$1.58	(.7)
with Other General Interest Channels	$1.25	(.44)
History Channel	-$0.16	(.2)
Weather Channel	$0.06	(.2)
TLC	$0.15	(.22)
TNT	-$0.03	(.23)
with Other General Interest Channels	$0.94	(.43)
Toon	$0.06	(.62)
with Other Family Channels	$0.17	(.66)
USA	$1.21	(.51)
with Other General Interest Channels	$2.27	(1.01)
VH1	$0.09	(.18)
Premium Programming		
Cinemax	$3.37	(1.09)
Encore	$3.54	(2.69)
HBO	$7.22	(1.41)
Showtime	$5.32	(1.23)
The Movie Channel	$1.51	(1.86)

Table 4: Expected Willingness-to-Pay Estimates

The interpretation of some of these values may be difficult to comprehend, so let us further explain. Recall that, in order to more accurately reflect the fact that consumer willingness-to-pay may vary based on the included channels (for example, one may receive a higher marginal utility for ESPN if it is the only sports network available), we allowed for a number of interaction terms.[13] The numbers in the table may be interpreted as follows: an average household is willing to pay $8.73 for ESPN when it is the only sports channel included in a particular service (basic cable, for example). If combined with ESPN2, then the average household willingness-to-pay for ESPN falls to $7.50. This is presumably because ESPN2 offers some overlapping content with ESPN, thereby lowering the average consumer's marginal utility from ESPN (compared with the case when it is offered in isolation).

Our estimates are similar to Crawford's (2000) with regard to the consistency of the sign and the relative number of insignificant estimates. Our model requires considerable variation in order to accurately identify the programming network dummy variables. While we would prefer stronger statistical significance, the results seem quite plausible.

One estimate that requires additional comment is the "intercept" term. One may think of the willingness-to-pay for the intercept as the implicit value of cable above the outside option (which is normalized to zero), regardless of the programming networks included. In the numerical simulation described in the section that follows, we will specify the outside option to be the purchase of satellite television services (such as DirecTV or Dish Network). In this regard, the intercept estimate implies that consumers are willing to pay $6.48 more for cable than satellite. This value does not seem unreasonable given cable television's significantly larger market share.[14]

7 Policy Simulation: The Case of a la Carte Pricing

In this section, we describe a numerical simulation aimed at quantifying the likely impact of an a la carte regulation. We wish to emphasize that the exercise contained in this section is not a true "structural model counterfactual simulation." To make our results as plausible as possible, we make use of the demand estimates presented above. We will include additional items not explicitly captured by the estimation in the preceding sections and utilize some values that may be considered "reduced form." Nevertheless, we feel that our simulation presents a reasonable prediction of the

[13] Because identification in this model is driven by differences in shares across markets compared to differences in the offered programming networks, the inclusion of interaction terms makes identification more difficult. We, therefore, use what we consider to be a reasonable (minimum) number of interaction terms.

[14] To be clear, the "outside good" in the econometric model also includes the no purchase decision. We do not have information on the offerings (or sales) of satellite operators. The intercept, then, is not technically the premium households place on cable over satellite. For the purposes of our numerical simulation, however, it does seem to be a reasonable approximation to the cable premium. We, therefore, utilize it as such.

outcome of a la carte regulation.

7.1 Basic Simulation Overview

In each market n, households choose whether to purchase television services through their local cable or satellite provider or they choose not to purchase either service. We assume that consumer willingness-to-pay for programming networks is defined by the values in Table 4. We further assume that willingness-to-pay for programming networks does not vary with the method of distribution. This insures that, for example, cable viewers do not systematically value ESPN more than satellite viewers. On average, households have a preference for cable services over satellite services and this preference is captured through the intercept term (as discussed above).

In order to compare the impact on profits, prices, and welfare, we conduct a two-stage exercise. First, we solve for the equilibrium prices and shares in market n, under the assumption that programming networks are offered in a single bundle (for simplification, cable and satellite are assumed to offer the same bundle, although they are free to charge different prices). Then we force, through an a la carte regulation, the cable and satellite providers to offer the programming networks individually. For simplicity, we assume that household's cannot "mix-and-match" (i.e. they do not purchase CNN from their cable provider and ESPN from their satellite provider).[15] Each household purchases as many or as few of the offered programming networks as maximizes their utility. By comparing the new equilibrium with the bundling equilibrium, we may compare the welfare gains/losses for firms and households.

Recall the indirect utility function specified in equation (1). Market-specific demographics affect consumer choice through the intercept and through the price disutility coefficient. The demographics have little impact on the price coefficient, thereby reducing the role of demographics to be demand-shifters. Because of that, market-specific demographics play a relatively small role in our simulation. We, therefore, have selected a "representative" market (Collins County, Texas) to use in our simulation.

Due to the expanding size of the household choice set under a la carte pricing, we make a simplification and examine pricing on a category-by-category basis (ex. sports, news, general

[15] Carriers charge linear prices. In other words, *no* discounts can be offered when a viewer subscribes to multiple channels. If firms can use non-linear pricing, then they can implement the bundling outcome, even when they offer each channel separately, see Rennhoff and Serfes (2008). In such a case, an a la carte regulation loses much of its bite.

interest, etc.). To illustrate the rationale for this assumption, consider the case with three channels ({A,B,C}). With bundling, each household faces a choice set with *three* elements ({no purchase, purchase cable bundle, purchase satellite bundle}). With a la carte pricing, the size of the choice set expands to *15* choices ({no purchase, purchase A only on cable, purchase A only on satellite,...}). Recall that we estimated the willingness-to-pay for over 20 standard programming networks and allowing for such an extensive choice set would become infeasible very quickly.

In reality, consumers would likely choose networks from a number of different categories. A natural question, then, is whether it is fair to draw conclusions based on examining individual categories? We believe that the answer is yes. While it is conceivable that the prices in other categories may influence which news channels you purchase (for example), it seems more reasonable to believe that the strongest price competition will be among programming networks of the same genre, as they will be significantly closer substitutes. The cross-price elasticity between programming networks in different categories is likely to be significantly smaller than the cross-price elasticity within a given category. We, therefore, believe that the results will not change qualitatively if pricing is expanded to include additional categories simultaneously.

7.2 Bundling Equilibrium

Recall that under bundling, all of the programming networks (in a given category) act as inputs into the final product. The cable and satellite providers compete in prices (recall, we have assumed their bundles are symmetric in content). In this section, we characterize household demand, firm profits, and then outline the method for solving for predicted equilibrium prices in such an environment.[16]

Household Demand. Using a slightly modified version of the utility function outlined in equation (1), we can model the utility that household i receives from purchasing the bundle of television networks offered by television service provider j as:

$$U_{ijn} = \widehat{\lambda} d_{cable} + X_{jn}' \widehat{\beta} + \widehat{\alpha} p_{jn} + \varepsilon_{ijb} \tag{8}$$

where $\widehat{\lambda}$ represents consumer preferences for cable television services over satellite services (this includes the previously-discussed intercept term, as well as the demographic characteristics)[17],

[16] In Rennhoff and Serfes (2008), we ensure that pure bundling is an equilibrium outcome. This is not done in this paper. Rather, and in order to simulate reality closer, we assume that downstream firms offer the bundle.

[17] In other words, $\widehat{\lambda} = \widehat{intercept} + D_n' \widehat{\gamma}$.

d_{cable} is an indicator that takes on the value 1 if j = cable and the value 0 if j = satellite, X_{jn} is a matrix of indicators (and interactions) that represent the channels included in the bundle, p_{jn} is the price of the bundle offered by j, and $\widehat{\alpha}$ and $\widehat{\beta}$ are parameters from the demand estimation. We assume that both satellite and cable offer identical bundles, therefore, $X_{jn} = X_{-jn}$, where $-j$ indicates the rival carrier of j.

Household's purchase the bundle that yields them the greatest utility, or they select the no purchase option. We can then express market shares for the bundles as:

$$s_{jn} = \frac{e^{\delta_{jn}}}{1 + \sum_{k=1}^{2} e^{\delta_{kn}}} \tag{9}$$

where $\delta_{jn} = \widehat{\lambda} d_{cable} + X'_{jn}\widehat{\beta} + \widehat{\alpha} p_{jn}$.

These market shares are the percentage of the population purchasing the bundle from television service provider j. They also determine the number of subscribers for each programming network, which will be important as we think about the pricing strategies of firms.

Downstream Profits. The profits of television services provider j in market n can be written:[18]

$$\Pi_{jn} = M(p_{jn} - \overline{w}_{jn})s_{jn} \tag{10}$$

where M is the size of the market and $\overline{w}_{jn} = \sum_{c \text{ not owned by } j} w_{cjn}$. In words, $\overline{w}_{jn}$ represents the sum of all programming network license fees for networks not owned by j.

Upstream Profits. Let N_u be the set of cable networks owned by content provider u. We assume that the content provider must decide the license fee for each of her networks. This is not the programming network owner's only source of revenue, however. In addition to the license fee, the network owners also receive advertising revenue. This advertising revenue is assumed to be a function of the network's viewership, which is in turn, a function of the number of subscribers. We may write the profits of content provider u as the profits earned through operator j (from license fees), plus the profits earned from operator $-j$ (from license fees), plus advertising revenue, which depends on total subscribers to the network:

[18] We use the term "television services provider" or "carrier" to include both the cable provider and the satellite provider. We omit category subscripts for simplification.

$$\Pi_{un} = \sum_{c \in N_u} (w_{cjn} q_{cjn} + w_{c-jn} q_{c-jn} + r_c(q_{cjn} + q_{c-jn})) \quad (11)$$

where $q_{cjn} = Ms_{cjn}$ is the number of subscribers for network c through operator j, and $r_c(q_{cjn} + q_{c-jn})$ is network c's advertising revenue, as a function of the number of subscribers to network c. In order to approximate the advertising revenue function, we utilize the TNS Media Intelligence data to estimate a revenue equation as a function of a channel's genre and its number of subscribers.[19] Our real interest is in approximating the value for the derivative $\frac{\partial r_c(q_{cn})}{\partial q_{cn}}$ as, intuitively, the firm will face a trade-off in setting their license fee: a higher license fee earns the firm more per-subscriber, but this higher price (which will induce a price increase downstream) will result in fewer subscribers, which may lower advertising revenue. Due to data limitations, we are unable to estimate separate advertising revenue functions for each firm and, instead, estimate category-specific functions.[20] The estimated "slope" terms appear in Table 5 below:

Genre	$\partial Adv\, Rev_j / \partial Sub_j$ (Std. Error)
Family	\$0.15
	(0.094)
General	\$2.33
	(1.317)
News	\$0.52
	(0.427)
Sports	\$1.27
	(0.611)
All Others	\$0.22
	(0.210)

* Values in the second column should be interpreted as the derivative of advertising revenue with respect to the number of subscribers

Table 5: Impact of Additional Subscribers on Monthly Advertising Revenue

We simply assume that advertising revenue is an increasing function of the number of subscribers. However, fewer subscribers should not necessarily imply lower revenue. An a la carte regulation results in fewer but "more loyal" subscribers, which implies that the probability of watching an ad and making a purchase increases. The end result is ambiguous. Modeling this feature and endogenizing advertising fees go beyond the scope of this paper.

[19] A complete structural model of the advertising market is beyond the scope of this paper.

[20] Allowing for a small degree of arbitrary heterogeneity (within a category) does not change the results.

Bargaining. We adopt a Nash Bargaining approach in order to solve for equilibrium upstream prices. We assume that during the negotiations each upstream-downstream pair (e.g., CNN-Comcast) takes the outcomes from the other pairs (e.g., Fox News-Comcast and Fox News-DirecTV) as given. Hence, we will look for a Nash equilibrium between the bargaining problems. In other words, we assume that each upstream firm bargains with each downstream firm simultaneously and secretly, e.g., Horn and Wolinsky (1988) and Milliou and Petrakis (2007). As in Horn and Wolinsky (1988), we impose *pairwise proofness* on the equilibrium contracts. A contract between an upstream and a downstream firm is pairwise proof if there are no incentives on part of the negotiating firms for a bilateral deviation holding the contracts between all the other pairs constant. See Milliou and Petrakis (2007) for further references and discussion on this issue.

Here, we briefly describe our approach. We use j to index the downstream television providers ($j = \{\text{Cable, Satellite}\}$) and u to index the content owners in a given category ($u = \{\text{Time Warner,...}\}$). N_u is the set of networks owned by u. Let us define the Nash Product for the bargaining over the license fee between operator (downstream firm) j and network (upstream firm) c as follows:[21]

$$NP_{jc} = \left(\Pi_j^{ALL} - \Pi_j^{-c}\right)^{\lambda} \left(\Pi_{u|c\in N_u}^{BOTH} - \Pi_{u|c\in N_u}^{-j}\right)^{(1-\lambda)} \tag{12}$$

where $\lambda = \frac{1}{2}$ and Π_j^{ALL} is the profit that operator j receives when j reaches an agreement with all the channels in the bundle, Π_j^{-c} is the (disagreement) profit that j receives if it is unable to come to an agreement to carry programming network c, $\Pi_{u|c\in N_u}^{BOTH}$ is the total profit that content owner u receives when c is offered by both television service providers, and $\Pi_{u|c\in N_u}^{-j}$ is the (disagreement) profit that u earns when only $-j$ offers network c.[22]

If there are C programming networks (indexed by c) offered in a given category, and 2 television providers (carriers) j and $-j$, then we are searching for a vector $\mathbf{w}^*$ of license fees of length $2 * C$, such that:

$$w_{jc}^* \in \arg\max_{w_{jc}} NP_{jc}\left(w_{jc}|\mathbf{w}_{-j,-c}^*\right), \text{for all } c \text{ and } j. \tag{13}$$

[21] We omit market subscripts in order to simplify the exposition.

[22] This notation is made more difficult because certain owners (for example, Time Warner) may own multiple programming networks. In the case where each upstream firm owns only one programming network, then c and u are interchangeable and we can express the Nash Product as: $NP_{jc} = \left(\Pi_j^{ALL} - \Pi_j^{-c}\right)\left(\Pi_c^{BOTH} - \Pi_c^{-j}\right)$.

The vector $\mathbf{w}^* = \left(w_{j1}^*, w_{j2}^*, ..., w_{jC}^*, w_{-j1}^*, w_{-j2}^*, ..., w_{-jC}^*\right)$ constitutes an equilibrium bargaining outcome. It maximizes the Nash product from each bargaining process and no (programming network owner-television services provider) pair has an incentive to bilaterally deviate.

7.3 A la Carte Equilibrium

The approach taken in the a la carte case does not differ substantially from the bundling case. In fact, we utilize the same Nash Bargaining approach in order to solve for the optimal prices. The only difference is in the specification of consumer demand and network market shares. Namely, rather than simply choosing between the two bundles (and the no purchase option), consumers now face a substantially larger choice set (as mentioned in Section 7.1).

Household Demand. Consumers now have the option of buying a single programming network or combinations of multiple networks. Indeed, consumers have the ability to "create" the original bundle on their own. Household demand will, again, be built upon the foundation of utility maximization. Because the choices households face are different than what we have seen up to this point, some new notation will need to be introduced.

Let us define B_{jn} as the set of choices offered by television services provider j. For example, suppose that j carries two programming networks: A and B. The set of choices offered by j is $B_{jn} = \{A,\ B,\ A+B\}$. Let us further denote b_{jn} as an element of the set B_{jn} (note: b_{jn} may be a single programming network or a combination of multiple networks). We can then express the utility that household i receives from purchasing choice b_{jn}:

$$U_{ib_{jn}} = \widehat{\lambda} d_{cable} + \sum_{c \in b_{jn}} \widehat{\beta}_c + \widehat{\alpha} p_{b_{jn}} + \varepsilon_{ib_{jn}} \tag{14}$$

where the first, third, and final terms in the equation are defined as in the previous section, and where the second term is the summation of the coefficients on the programming network dummies for all networks contained in b_{jn}.

To help illustrate this, consider the simple example above where $B_{jn} = \{A,\ B,\ A+B\}$. In this case, the three utility equations (for provider j) can be written:

$$
\begin{aligned}
U_{iA} &= \widehat{\lambda} d_{cable} + \widehat{\beta}_A + \widehat{\alpha} p_A + \varepsilon_{iA} \\
U_{iB} &= \widehat{\lambda} d_{cable} + \widehat{\beta}_B + \widehat{\alpha} p_B + \varepsilon_{iB} \\
U_{iA+B} &= \widehat{\lambda} d_{cable} + \widehat{\beta}_A + \widehat{\beta}_B + \widehat{\alpha} p_{A+B} + \varepsilon_{iA+B}.
\end{aligned}
$$

The market share of b_{jn} can be written:

$$
s_{b_{jn}} = \frac{e^{\delta_{b_{jn}}}}{1 + \sum_r \sum_k e^{\delta_{r_{kn}}}} \tag{15}
$$

The market share of provider j is the summation of market shares for all choices (b_{jn}) in B_{jn}. The market share of any given station c is simply the summation of the market shares of all choices that contain c.

We again assume that programming network owners simultaneously and independently bargain with the downstream television services operators. We omit a discussion of the Nash bargaining as the technique and the general notation are similar to that outlined in equation (12).

7.4 Simulation Results

Using the predicted prices under bundling and under a la carte pricing, we can predict household purchasing decisions and, therefore, evaluate consumer welfare and firm profits. We have conducted the policy simulation for three of the most prominent programming network categories: news channels, sports channels, and general interest channels. Below, we present our simulation results for each category.

7.4.1 News Channels

From our demand estimation, we identified the willingness-to-pay for three popular news channels: CNN, Fox News, and CNBC. We use these three networks in our simulation. Table 6 contains predicted prices, market shares, and consumer surplus measures from the simulation:

	No Government Regulation		With A La Carte Regulation	
	Downstream Price		Downstream Price	
CNBC (Cable)	--		$1.59	
CNN (Cable)	--		$3.22	
Fox News (Cable)	--		$3.03	
Cable Bundle	$6.96		--	
CNBC (Satellite)	--		$0.93	
CNN (Satellite)	--		$2.19	
Fox News (Satellite)	--		$2.00	
Satellite Bundle	$4.95		--	
	License Fees		License Fees	
	Cable	Satellite	Cable	Satellite
CNBC	$0.15	$0.10	$0.15	$0.09
CNN	$1.59	$1.44	$1.21	$1.14
Fox News	$1.40	$1.27	$1.03	$1.01
Consumer Surplus	$1.9739		$2.4506	
	Market Share		Market Share	
CNBC only (Cable)	--		1.89%	
CNN only (Cable)	--		4.24%	
Fox News only (Cable)	--		3.72%	
CNBC + CNN (Cable)	--		4.81%	
CNBC + Fox News (Cable)	--		3.67%	
CNN + Fox News (Cable)	--		21.40%	
Cable Bundle	59.11%		21.47%	
Cable Total	59.11%		61.20%	
CNBC only (Sat.)	--		0.80%	
CNN only (Sat.)	--		1.96%	
Fox News only (Sat.)	--		1.72%	
CNBC + CNN (Sat.)	--		2.65%	
CNBC + Fox News (Sat.)	--		2.02%	
CNN + Fox News (Sat.)	--		15.39%	
Satellite Bundle	27.00%		13.00%	
Satellite Total	27.00%		37.54%	

Table 6: Comparison of Results for News Networks

The first column in Table 6 shows the predicted equilibrium under bundling. Our model predicts that the cable operator charges a price of $6.96 for the bundle of news channels and receives a 59.11 percent market share. The satellite operator, on the other hand, charges $4.95 for the same bundle and receives a 27 percent market share. Average consumer surplus per household is approximately $1.97 and the expected per-household expenditure on television services is $6.03 (the last figure does not appear in table 6). The license fees range from $0.10 to $0.15 per-subscriber for CNBC to $1.44 to $1.59 per-subscriber for CNN. The predicted license fees seem reasonable given the willingness-to-pay estimates in Table 4.

The second column in Table 6 shows the predicted equilibrium under a la carte pricing. There is an increase in the number of households purchasing either cable and satellite, although it is clear that most households no longer purchase all three channels. With a la carte pricing, approximately 21.40 percent of households purchase all three channels on cable and 13 percent on satellite. This figure compares with the approximately 59.11 percent of households that purchased the bundle on cable and 27 percent on satellite prior to the a la carte regulation. Furthermore, after a la carte, 31.84 percent purchase CNBC on cable, 51.92 percent purchase CNN on cable and 50.26 percent purchase Fox News on cable. (We can similarly compute the network shares on satellite). A key observation here is that all three networks experience a demand reduction relative to the pre-regulation demand (which was 59.11 percent).

The expected consumer expenditure on television services is \$5.26 with a la carte pricing, relative to \$6.03 prior to a la carte (these figures are not presented in the table). Consumers do not purchase channels for which they have a low valuation. Average consumer surplus per household under a la carte pricing is approximately \$2.45, which is a 24.3 percent increase over the consumer surplus from bundling. This is due to the reduction in expenditures (i.e. consumers are no longer "forced" to purchase less desired channels) and the increase in choice.[23]

Let's now try to gain some intuition about the above results. Rennhoff and Serfes (2008), in an upstream-downstream symmetric theoretical model, identify two effects that affect equilibrium prices following an a la carte regulation: i) a downstream effect and ii) an upstream effect. The downstream effect lowers downstream prices and the upstream effect lowers upstream prices, after an a la carte regulation. The same effects are at play here with a difference that firms in the present paper are asymmetric.

Downstream effect. Although downstream price comparison is not straightforward because before regulation there is only one price (the bundle price) and after regulation there are three prices, we can nevertheless, as a reference point, assume that each channel's pre-regulation price is the bundle price divided by three. For example, the price of each one of the three news channels on cable is \$6.96/3 = \$2.32. An a la carte regulation leads to lower price for CNBC and higher prices for CNN and Fox News (on cable). If channels were symmetric, an a la carte regulation would lower downstream prices (holding upstream prices fixed), as in Rennhoff and Serfes (2008). Carriers would lower prices in order to induce more viewers to subscribe to more channels. We call this a competitive downstream effect. Under asymmetry, there is an additional force. Cable (or satellite) would find it profitable to raise the price of the more popular channels, relative to the reference point price. We call this an asymmetry downstream effect. Not surprisingly, more

[23] A property of the logit model is that, holding all else constant, consumer surplus increases with the introduction of an additional choice as long as the value of the choice is greater than negative infinity.

popular channels command a lower price elasticity of demand, at the reference point price of $2.32, due to the high market share (a similar story can be told for satellite). Consequently, the cable operator will have the tendency to raise the prices of the more popular channels (CNN and Fox News in our exercise). This allows price increases across the board. Which effect outweighs the other (i.e., the competitive or the asymmetry effect) depends, among other things, on the degree of asymmetry.

Upstream effect. Now let's turn our attention to upstream pricing. An a la carte regulation increases the price elasticity of demand for each TV network, which leads to lower license fees. This can be seen as follows. Fix the license fees at the pre-regulation levels (as given in table 6). Then, we have shown that the shares on cable are given as follows: CNBC, 33.50 percent; CNN, 51 percent and Fox News: 49.27 percent. (Similarly, we can derive the shares on satellite). All shares are lower relative to the share of the bundle on cable, which is 59.11 percent. Moreover, an a la carte regulation increases the average subscriber loyalty of those who stay with each channel.[24] Both of these effects contribute to the increase of the price elasticity of demand for each TV network. As a result, equilibrium license fees drop. Lower license fees imply lower downstream prices (relative to what they would have been had the license fees not decreased).

Table 7 contains profit values for the upstream and downstream firms, ignoring any fixed costs:

	Bundling	A La Carte	% change
Cable Operator	$3,756.39	$2,507.28	-33.25%
Satellite Operator	$960.97	$819.74	-14.70%
NBC Univerisal (CNBC)	$626.98	$364.38	-41.88%
Time Warner (CNN)	$2,649.60	$1,304.43	-50.77%
Fox (Fox News)	$2,382.22	$1,142.19	-52.05%

Table 7: Firm Profit Comparison

Interestingly, we predict that profits fall for all firms in the vertical channel.[25] While cable and satellite operators both increased their subscriber counts, each subscriber is spending less (on average), thereby resulting in a modest reduction in profits. The cable news networks fair worse than the service providers. Fox and Time Warner earn considerably more profit than NBC

[24] For instance, those who continue to purchase CNN when they have a choice, have stronger preferences for this channel relative to those who were receiving CNN as a channel in the bundle.

[25] This is consistent with the findings in Rennhoff and Serfes (2008).

Universal, although the reduction is greater as a percentage.

CNBC exits An argument against a la carte pricing is that such a regulation will force smaller channels to exit and this will have adverse effects on variety and consumer welfare. To provide an assessment about the validity of this argument, we assume that CNBC (the network with the lowest profits) cannot cover its fixed costs after the regulation and exits.

	With A La Carte Regulation	
	Downstream Price	
CNN (Cable)	$3.43	
Fox News (Cable)	$3.31	
Cable Bundle	--	
CNN (Satellite)	$2.42	
Fox News (Satellite)	$2.18	
Satellite Bundle	--	
	License Fees	
	Cable	Satellite
CNBC	--	--
CNN	$1.41	$1.38
Fox News	$1.30	$1.26
Consumer Surplus	$2.0121	
	Market Share	
CNN only (Cable)	10.35%	
Fox News only (Cable)	8.86%	
Cable Bundle	34.16%	
Cable Total	53.37%	
CNN only (Sat.)	8.24%	
Fox News only (Sat.)	6.92%	
Satellite Bundle	28.89%	
Satellite Total	44.05%	

Table 8: A la Carte Pricing Without CNBC

The results are presented in table 8 and are consistent with what one would have expected. Fewer TV networks implies less competition both at the upstream and at the downstream levels. As a result, license fees and downstream prices go up relative to the a la carte equilibrium with CNBC (table 6). Consumer surplus decreases from $2.45 in the a la carte case with CNBC to $2.01 in the a la carte case without CNBC. It is, however, higher than in pre-regulation case ($1.97). This exercise demonstrates that even the exit of a relatively big channel (CNBC is purchased by 31.84 percent of the subscribers if it does not exit) is not enough to make consumers worse off. In reality, it seems more likely that fringe networks will exit, if any. The negative impact this exit will have on consumer surplus is likely not to be strong enough in order to offset the positive effects of an a la carte regulation.

7.4.2 Sports Channels

From our demand estimation, we identify the willingness-to-pay for two popular sports networks: ESPN and ESPN2. We use these two networks in our simulation. Both networks are owned by Disney. Table 9 contains predicted prices, market shares, and consumer surplus measures from the simulation:

	No Government Regulation		With A La Carte Regulation	
	Downstream Price		Downstream Price	
ESPN (Cable)	--		$12.49	
ESPN2 (Cable)	--		$3.73	
Cable Bundle	$13.45		--	
ESPN (Satellite)	--		$10.03	
ESPN2 (Satellite)	--		$3.24	
Satellite Bundle	$11.85		--	
	License Fees		License Fees	
	Cable	Satellite	Cable	Satellite
ESPN	$7.23	$7.20	$8.46	$7.92
ESPN2	$0.59	$0.48	$1.85	$1.41
Consumer Surplus	$0.7376		$1.7472	
	Market Share		Market Share	
ESPN only (Cable)	--		30.76%	
ESPN2 only (Cable)	--		17.63%	
Cable Bundle	42.79%		8.37%	
Cable Total	42.79%		56.76%	
ESPN only (Sat.)	--		12.79%	
ESPN2 only (Sat.)	--		8.26%	
Satellite Bundle	19.39%		4.76%	
Satellite Total	19.39%		25.81%	

Table 9: Comparison of Results for Sports Networks

We see a number of similar patterns when comparing the results for the sports networks with the results for the news networks. For example, the price of the sports bundle is less than the sum of the individual prices. There is also an increase in the number of households purchasing cable or satellite and a decrease in the number of households buying both networks under a la carte pricing. In addition, consumer welfare increases due to a la carte regulations and the expected expenditure per household falls (albeit marginally in this case) from approximately $8.05 a month to $8.03.

The only substantive difference between the news and sports categories lies in the change in license fees. Notice that the license fees for each network actually increase. We believe that the explanation for this outcome is due to the fact that the networks share a single owner (Disney). With the initiation of a la carte pricing, we do not see the "upstream effect" in the same manner that we did for the news channels.[26] When the license fees are fixed after an a la carte at the pre-regulation levels the market share of ESPN increases and the market share of ESPN2 decreases, relative to the pre-regulation shares. For example, ESPN's market share on cable is 44.02 percent and ESPN2's share on cable is 30.45 percent after an a la carte regulation, relative to the 42.72 percent in the bundle (further details are omitted). A key observation is that the average market share of ABC/Disney does not fall much due to the regulation, when license fees are fixed (as compared, for example, to news channels). This, in conjunction with the absence of upstream competition (joint ownership), allows the upstream firm to raise its licence fees. This strategic effect can be seen in the fact that Disney's profit actually increases due to a la carte regulations, whereas Fox, Time Warner, and NBC Universal's profits all fell in the news category. The profits for all firms appear in Table 10:

	Bundling	A La Carte	% change
Cable Operator	$4,006.30	$3,435.32	-14.25%
Satellite Operator	$1,344.64	$1,012.05	-24.73%
ABC/Disney	$8,372.05	$10,943.09	30.71%

Table 10: Comparison of Firm Profits

Once again we predict that downstream profits will fall. As noted above, Disney's profits actually rise. Intuition tells us, however, that this may have more to do with the specifics of joint ownership than it does with some general feature of a la carte regulations. It, therefore, seems more likely that the news category results may be more representative of the overall trend.

7.4.3 General Interest Channels

Finally, from our demand estimation, we identify the willingness-to-pay for three popular general interest networks: TNT, TBS, and USA Network. These three networks show similar programming, including movies, syndicated broadcasts of popular network television shows, such as "Law & Order," and a number of original programs. We use these three networks in our simulation. Both TNT and TBS are owned by Time Warner. USA Network is owned by NBC Universal. Table 11

[26] A potential strategy to inject the "upstream effect" into the sports category simulation would be to include one (or more) of the "regional sports networks." Examples of these regional sports networks include Comcast Sports Southeast, Fox Sports Pittsburgh, etc. The difficulty with including such channels is that they appear in relatively few cable markets (only in markets in larger cities), making estimation of consumer willingness-to-pay difficult or imprecise.

contains predicted prices, market shares, and consumer surplus measures from the simulation:

	No Government Regulation		With A La Carte Regulation	
	Downstream Price		Downstream Price	
TNT (Cable)	--		$1.68	
TBS (Cable)	--		$2.20	
USA (Cable)	--		$3.20	
Cable Bundle	$6.17		--	
TNT (Satellite)	--		$1.56	
TBS (Satellite)	--		$2.10	
USA (Satellite)	--		$3.08	
Satellite Bundle	$5.09		--	
	License Fees		License Fees	
	Cable	Satellite	Cable	Satellite
TNT	$0.63	$0.59	$0.56	$0.52
TBS	$0.88	$0.80	$0.72	$0.69
USA	$1.39	$1.31	$1.05	$1.01
Consumer Surplus	$1.3986		$3.0676	
	Market Share		Market Share	
TNT only (Cable)	--		9.98%	
TBS only (Cable)	--		11.89%	
USA only (Cable)	--		9.55%	
TNT + TBS (Cable)	--		10.02%	
TNT + USA (Cable)	--		10.05%	
TBS + USA (Cable)	--		8.63%	
Cable Bundle	52.98%		9.72%	
Cable Total	52.98%		69.84%	
TNT only (Sat.)	--		3.61%	
TBS only (Sat.)	--		4.28%	
USA only (Sat.)	--		3.45%	
TNT + TBS (Sat.)	--		3.68%	
TNT + USA (Sat.)	--		3.70%	
TBS + USA (Sat.)	--		3.23%	
Satellite Bundle	22.33%		3.57%	
Satellite Total	22.33%		25.52%	

Table 11: Comparison of Results for General Interest Networks

Many of the findings from the News and Sports categories hold here, as well (for example, the bundle price is offered at a discount, relative to the sum of the individual component prices). Average household expenditure falls from approximately $4.40 per month to $3.71 per month, which represents an approximate 16 percent decrease in expenditure. As with the other categories, consumer surplus increases substantially due to the change in pricing regimes, from $1.3986 to $3.0676.

As we have also seen in the news category, license fees fall because of imposed a la carte restrictions. The decrease in price is not uniform, however. Our simulation predicts that the license fee for NBC Universal's USA Network falls by a greater percentage than the license fees for Time Warner's TNT and TBS networks. This is likely driven by the fact that TNT and TBS are jointly owned, allowing Time Warner better coordination in setting the upstream license fee.

The profits for all firms appear in Table 12:

	Bundling	A La Carte	% change
Cable Operator	$2,881.06	$2,716.55	-5.71%
Satellite Operator	$887.52	$786.72	-11.36%
Time Warner (TNT, TBS)	$1,886.57	$1,733.01	-8.14%
NBC Universal (USA)	$1,711.14	$1,222.42	-28.56%

Table 12: Comparison of Firm Profits

Again, the results in Table 12 are similar to the other categories. Profit decreases across the board, with the effect being smallest for Time Warner.

8 Conclusions & Comments

In this paper we have attempted to shed some light on the debate over the impact of a la carte cable regulations by quantifying the predicted changes in welfare and profits. We made these predictions with a numerical simulation of firm pricing strategies, using willingness-to-pay values derived from a logit model of demand. We find support for claims that consumers would benefit from an a la carte regulation. Consumer welfare increases unambiguously for the three categories we have examined (news, sports and general interest channels). We also find that cable operator profits fall due to the a la carte regulation, which should not be surprising given the cable industry's opposition to such a requirement. Such profit declines would be more pronounced if a la carte regulation necessitated costly technical upgrades. Any calculation of social surplus would require a reasonable estimate of these technical costs.

An additional consideration is the importance of dynamics. Specifically, the likelihood of some channels exiting because of the elimination of the implicit "subsidy" they receive from being sold as part of a bundle with more "popular" channels. If a number of channels exit, this could decrease consumer surplus in two important ways: (1) a reduction in the number of channels will reduce the *upstream* and *downstream effects* and likely result in higher prices and (2) a reduction in the number of channels will reduce total consumer surplus, as some individuals have utility for channels that will no longer be available. Our simulation shows (when we allow CNBC to exit) that these negative effects are likely to be dominated by the positive effects of a la carte pricing.

Another issue is that less popular TV channels (less popular than CNBC, for example) may be forced to exit in the a la carte scenario. Our simulation includes only relatively "popular" channels, such as CNN, ESPN and TBS. If we assume that the elimination of the Lifetime Network, for example, which shows programs targeted at women viewers, has no impact on the prices of channels such as ESPN or CNN, then the conclusions in this paper, regarding price, are likely to be accurate. The primary impact of such channel reductions would be felt through a household's aggregate consumer surplus across all categories, something we do not directly address in this paper.

To identify the likelihood of channel exit more properly, one would need accurate information on the channel's fixed costs. Unfortunately, we do not have access to such information. The willingness-to-pay estimates, however, provide some guidance about potential suspects. If we look at some of the channels with willingness-to-pay estimates that are negative or very close to zero, we will see channels such as C-SPAN, Food Network, FX, History Channel, Lifetime, Spike TV, and VH1. In addition, a number of channels that were not included in our estimation (because they are not available on a sufficiently wide basis), may also face the possibility that it is not feasible to continue broadcasting under an a la carte pricing requirement.[27] The approach utilized in this paper, along with detailed channel-specific financial information, may allow one to examine these dynamic effects.

[27] Some have noted that non-traditional avenues of distribution (such as programming available over the internet) may be attractive alternatives for these "low-demand" channels. A number of networks, such as NBC and CBS, already make a large portion of their programming available for online viewing.

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