Bundling and Streaming in Video Entertainment

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Abstract

Over the past decade, the video entertainment industry has shifted from cable bundles toward direct-to-consumer streaming services such as Netflix and Disney+, changing how content is bundled and distributed. Using U.S. data on viewing, subscriptions, prices, affiliation fees, and content availability from 2015 to 2023, we estimate a model of subscription and viewing choices, pricing, and channel-distributor bargaining. Counterfactuals show that eliminating television bundles reduces consumer surplus and industry profits, as fragmentation limits access to valued content. Full rebundling raises industry profits but lowers consumer surplus: broader catalogs benefit subscribers, while higher prices exclude households that prefer smaller subscriptions. Partial rebundling can increase both consumer surplus and industry profits by expanding bundled content while preserving standalone options. Licensing terms matter: per-subscriber carriage fees can offset consumer gains through double marginalization. Finally, we evaluate acquisitions of Warner Bros. Discovery by Netflix or Paramount. Common ownership with separate services has small effects on welfare, while combining catalogs into a single subscription lowers the combined price and raises consumer surplus.

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1 Introduction

The way media content is packaged determines both what consumers can access and how much of its value firms capture. Packaging strategies vary across markets and over time. Digital music has shifted from individual track purchases toward broad subscription bundles such as Spotify and Apple Music. In journalism, single-author newsletters have grown alongside newspaper and magazine subscriptions that bundle many authors. In video games, subscription bundles such as Game Pass coexist with purchases of individual titles. These differences raise a common economic question: which arrangements create the most surplus, and how are the gains divided between consumers and firms?

Bundling can create surplus when delivering content to additional consumers costs little but households value different parts of a catalog. Combining programs can expand access to content that households value but would not purchase at standalone prices. It also allows firms to price against consumers' combined willingness to pay and potentially capture a larger share of the surplus. Whether consumers benefit depends on the joint distribution of content valuations, bundle prices, and the smaller subscription options that remain available (Stigler, 1963; Adams and Yellen, 1976; McAfee et al., 1989). Broader access and higher industry profits therefore need not imply higher consumer welfare.

Competition and vertical relationships further shape these tradeoffs. Standalone services provide alternatives to a broad bundle, while each subscription's incremental value depends on the content a household already accesses elsewhere. Distributors assembling bundles must also acquire programming from suppliers with market power. Per-subscriber carriage fees transfer revenue within the industry but raise distributors' marginal costs and can induce higher retail prices. Common ownership can eliminate this additional markup (Spengler, 1950). Direct distribution can therefore remove a pricing layer while fragmenting content across separately priced services. Rebundling can restore broad access while reintroducing vertical markups. Its welfare effects depend on how competition translates the value of combined content into prices and access.

We study these questions in the U.S. television market, where the growth of streaming changed packaging and vertical integration together. Around 2010, roughly 85% of households subscribed to a cable or satellite service, typically through a broad channel bundle. By 2023, that share had fallen to about half, while streaming accounted for about 40% of viewing time in our data. Many of the same studios continued to produce programming, but services such as Disney+, HBO Max,

Paramount+, and Peacock increasingly delivered it directly to consumers. The transition thus combined partial unbundling with content suppliers' entry into distribution.

We develop and estimate an equilibrium model covering traditional pay television, free broadcast content, and seven major streaming services: Netflix, Amazon Prime Video, Hulu, Disney+, HBO Max, Paramount+, and Peacock. Households choose combinations of subscriptions and allocate viewing time across accessible programming. Services compete for spending and attention, including among households that subscribe to several of them. Their incremental value depends on households' viewing preferences and the content already available through other subscriptions. Distributors and streamers set subscription prices, while channel groups negotiate carriage fees with distributors. Firms owning several businesses account for how pricing and bargaining affect earnings across streaming, channels, and distribution. These incentives link the gains from attracting streaming subscribers to potential losses elsewhere in the television business.

Our data combine program-level viewing, household subscription and viewing patterns, content availability, subscription prices, advertising revenues, and carriage fees from 2015 to 2023. We estimate demand jointly from subscription choices and viewing allocations, which inform households' valuations of different catalogs and how services compete for spending and attention. On the supply side, we use observed subscription prices and carriage revenues to jointly recover the costs of serving subscribers and channels' bargaining power. This links households' content valuations to the fees suppliers negotiate and the subscription prices consumers pay.

We use the estimated model to compare packaging and ownership arrangements in a representative market in 2023. Some streaming services' observed prices appear to reflect objectives beyond current profits, such as building subscriber bases. For comparability, we use a common benchmark in which firms set prices to maximize current operating profits. Across scenarios, we hold the amount and quality of programming fixed while allowing prices, carriage fees, subscriptions, and viewing to adjust. These exercises measure how reorganizing existing content changes access, pricing, and the division of surplus, without capturing changes in content investment.

Our first counterfactual eliminates paid distributor bundles and moves their programming, including live sports and news, to streaming services. Households gain flexibility to assemble smaller subscriptions but lose the option of broad access through a distributor. Spending falls by about $40 per household per month, yet consumer surplus falls by $14.5 and industry profits also decline. Some households value programming spread across services but not enough to purchase every subscription needed to access it. They also lose benefits associated with distributor pack-

ages. Lower spending therefore accompanies a loss of valued content and services, illustrating why a smaller subscription bill need not imply higher consumer welfare.

The opposite extreme is full rebundling, in which all seven streaming services enter packages offered by competing distributors and cease selling standalone subscriptions. These bundles need not be supplied by legacy cable operators; firms such as YouTube TV could also act as intermediaries. Broader catalogs increase bundle value and viewing among subscribers, but households can no longer purchase just a few streaming services. High bundle prices exclude some households from paid programming altogether: the share relying solely on free broadcast programming rises from 19% to 40%. Consumer surplus falls by $10.0 per household per month, while industry profits rise by $18.9. Full rebundling thus increases total surplus while leaving consumers worse off on average.

Vertical pricing is important to these outcomes. When the cable programming moved to streamers is instead licensed from separate suppliers, per-subscriber fees raise streaming prices and further reduce subscriptions and consumer welfare. Under full rebundling, replacing Netflix and Amazon's per-subscriber carriage fees with a lump-sum transfer removes these payments from distributors' marginal costs. Bundle prices fall, turning the consumer-surplus loss into a gain of $9.7 per household per month relative to the benchmark. Although carriage payments transfer revenue within the industry, their per-subscriber form changes retail pricing incentives and can restrict access. Whether broader catalogs benefit consumers therefore depends on the terms under which distributors obtain content.

Partial rebundling can expand bundled access while preserving standalone options for households that prefer smaller subscriptions. These alternatives also maintain competitive pressure on the bundle. We simulate all possible arrangements in which some, but not all, streaming services enter distributor packages. Some arrangements increase both consumer surplus and industry profits. The arrangement preferred by consumers raises their surplus by $12.6 per household per month; the arrangement maximizing total welfare raises total surplus by $40.5. Adding more services does not necessarily help consumers, and the arrangement maximizing industry profits leaves consumers worse off than the benchmark. Outcomes depend on which catalogs are combined, the standalone services that remain, and the fees negotiated for carrying the content.

Finally, we evaluate acquisitions of Warner Bros. Discovery (WBD) by Netflix or Paramount, distinguishing common ownership with separate subscriptions from combining HBO Max with Netflix or Paramount+ in a single subscription. Common ownership changes pricing incentives

across streaming and related television businesses, while combining catalogs also changes the product consumers can buy. With separate services, consumer welfare effects are small, although renegotiated carriage fees can redistribute profits among content owners and distributors. Combining the services lowers their joint subscription price and expands access, raising consumer surplus by about $2.5 per household per month for Netflix–WBD and $2.1 for Paramount–WBD. These gains arise without additional cost efficiencies or new programming.[1] Ownership and product integration can therefore have different implications for the consumer effects of consolidation.

Our paper relates to three strands of literature. The first studies television and streaming markets. Crawford and Yurukoglu (2012) estimate a model of viewership, subscriptions, pricing, and carriage bargaining to evaluate channel unbundling in cable television. They show that increases in negotiated input costs can offset the consumer benefits of purchasing channels individually. Crawford et al. (2018) study vertical integration between distributors and regional sports networks, quantifying the tradeoff between eliminating double marginalization and creating incentives to foreclose rivals or raise their costs. Recent work examines the transition to streaming. Malone et al. (2023) document substitution between traditional television and online video using household panel data on cord-cutting, while McManus et al. (2024) study broadband providers' incentives to accommodate streaming or steer consumers toward their own television services. Ivaldi and Zhang (2022) analyze mergers in French digital television, emphasizing interactions between viewers and advertisers.

Our analysis is closely related to Yuan (2025), who models subscriptions, viewing, pricing, and bargaining over exclusive content licenses to study title-level exclusivity across several streaming services. We study packaging and ownership changes for a fixed stock of programming, jointly modeling the seven largest streaming services, traditional pay television, and broadcast content using data from 2015 to 2023. This captures substitution across distribution modes and the interaction between content suppliers and distributors.

The second strand studies multihoming in platform markets. Empirical work examines competition with multihoming in daily deals (Kim et al., 2017), ride-sharing (Rosaia, 2025), and video games, where vertical integration and exclusive content shape platform adoption (Lee, 2013). In media markets, Ambrus et al. (2016) and Athey et al. (2018) show how overlapping audiences affect competition for advertisers, while Gentzkow et al. (2024) link consumers' multihoming patterns to advertising prices. Anderson et al. (2017) show that allowing consumers to purchase

[1] Our analysis does not account for merger effects in theatrical distribution, labor markets, or international markets.

multiple products changes the relationship between product quality and price competition. These studies highlight the incremental value of a platform to consumers who already use its rivals. In our setting, households subscribe to several services to obtain different, sometimes overlapping catalogs. Observing what they watch helps us measure how content overlap and differences in preferences shape competition and the value of bundling.

The third strand concerns bundling. The classic analyses of Stigler (1963), Adams and Yellen (1976), and McAfee et al. (1989) establish how bundling screens consumers with different valuations and how its profitability depends on the distribution and correlation of those valuations. Armstrong (2013) extends the analysis to nonadditive valuations and products supplied by separate sellers. Zhou (2017) studies how bundling affects prices and consumer welfare in oligopoly. Empirically, Gentzkow (2007) develops a demand model allowing joint consumption and complementarity between print and online newspapers. Chu et al. (2011) show that pricing by bundle size can closely approximate mixed-bundling profits, while Iaria and Wang (2026) develop a tractable demand model for bundles with large choice sets and apply it to quantity discounts.

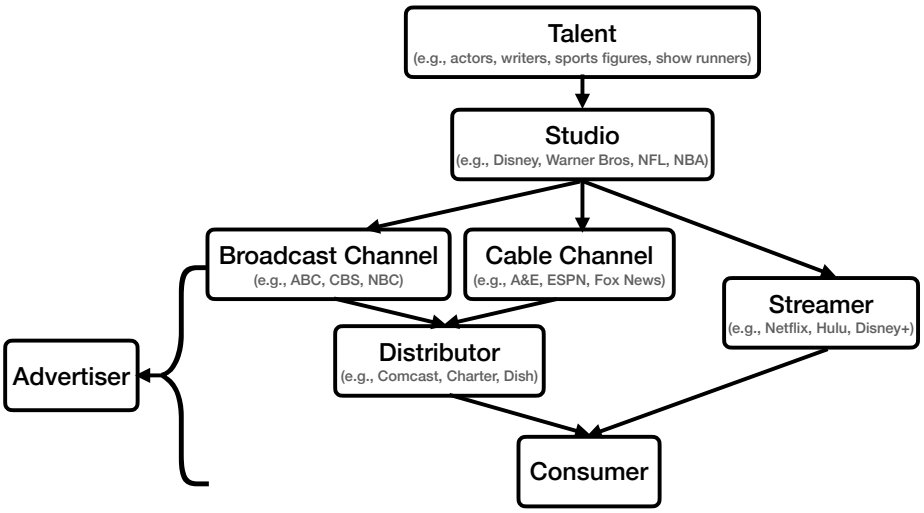
We contribute by evaluating bundling with competition and vertical integration at multiple stages of the video supply chain. Viewing and subscription data reveal which catalogs households value, while retail prices and negotiated carriage fees adjust to packaging changes. Our counterfactuals compare full rebundling, partial rebundling, and streaming-only distribution and distinguish the gains from combining content from the effects of supplier markups. Valuing streaming alongside traditional television also contributes to measuring welfare gains from new goods (Hausman, 1999; Petrin, 2002; Bresnahan and Gordon, 2008).

2 Industry Overview and Data

2.1 Industry Overview

Figure 1 illustrates our conceptualization of the industry. Content producers combine talent and other inputs to create telecasts, which they license to broadcast channels, cable channels, or streaming services. Broadcast channels transmit content directly to consumers over the air and are also included in cable bundles. Streaming services sell directly to consumers with broadband access. Cable channels are bundled and sold by intermediary distributors, which may be traditional infrastructure providers like Comcast or virtual providers like YouTube TV. Both distributors and channels—including streaming services in recent years—can earn revenue from advertising.

Figure 1: Illustration of Industry Structure



Notes: This figure illustrates the structure of the industry, with arrows indicating the direction of service flows.

2.2 Data

Our main estimation sample spans the period from 2015 to 2023. We construct a comprehensive data set by merging several sources that cover different segments of the industry. The resulting data set includes: (i) viewership at the content producer-channel-year and content producer-streamer-year level; (ii) subscriber market shares and prices and an indication of a subscribers "favorite" streaming service at the combination of distributor-geography-year and streamer-year levels; (iii) average affiliate fees at the channel-year level; (iv) advertising revenue at the channel-year level; and (v) a crosswalk of ownership that maps each entity to its ultimate corporate parent. We describe each data source in more detail below.

Cable and Broadcast Content and Ratings The Nielsen National Television View (NNTV) provides program-level viewership ratings from 2015 to 2023. Each observation corresponds to a specific program on a particular channel in a given year—for example *American Idol* on Fox in 2017. The key variable is the rating, which captures the average fraction of U.S. households tuned into the program during an average minute when it aired. Beginning in [XX], this measure also includes time-shifted viewing. Additional fields include the number of telecasts, the average duration of telecasts, the Nielsen-designated genre of the program, and several indicators such as whether the program was original or acquired, and whether it was new or a re-airing. Using the rating and the duration of the telecasts, we compute the total minutes spent watching each

program on that channel in that year, averaged across all viewers.

Streaming Content and Ratings We obtain program-level rating data for streaming services from Plum Research's ShowLabs database. This data is analagous to the NNTV data but for streaming services. The database does not cover all services in all years. Data for Netflix begins in 2017. Coverage for Disney+ begins in 2020, although the service was launched in 2019. For years with missing data, we impute streaming ratings as described in Appendix [TBA] A.2.

Content Production Database We compiled a database of TV shows aired during our sample period, where each observation corresponds to a show available on a given channel or streaming service in a given year. We begin from the titles in the NNTV and ShowLabs data. We then manually identified the production companies associated with each show using IMDB, TMDB, Wikipedia, and Google Search.[2] Production companies range from major studios such as Warner Bros. and Paramount to mid-sized and smaller studios such as Lionsgate and Piehouse Productions, as well as sports leagues such as the NFL, NBA, Nascar, and PGA.

We also recorded whether a show was a rerun or a new program, based on whether its production years overlapped with the year of airing or whether the airing channel differed from the original broadcaster. For each non-syndicated new program, we treat the airing channel as one of its producers and assume it accounted for at least 50% of the show's production. Any remaining producers, if present, are assumed to split the remaining share equally.

Nielsen FOCUS Nielsen FOCUS provides annual cable headend data on zip codes served and channel carriage. We use this data to construct geographic markets in each year as the collection of zip codes served by a given combination of wire-based providers. Each market corresponds to either a single cable operator, a combination of a cable and a telco operator (e.g., Comcast and Verizon), or the "rural" market. Starting in 2020, we also include "virtual" cable providers YouTube TV and Hulu Live in each market. We use the Internet Archive to determine the channels available from DirecTV and Dish in each year.

MRI Survey of the American Consumer and Cord Evolution Survey We use individual-level surveys on consumer behavior conducted by the market research firm MRI to construct market

[2]We recorded up to three producers per program. If more than three were listed, we selected those with their own Wikipedia entries to capture the largest and most active studios. If none met this criterion or more than three remained, we selected producers at random.

shares for subscription choices and to measure various aspects of content viewership. Each observation in the MRI data corresponds to an individual respondent in a given year. On the subscription side, respondents report whether they subscribe to cable television or to a satellite service. Respondents also indicate whether they subscribe to premium services such as HBO and Showtime, as well as to streaming services such as Netflix. The Netflix subscription question began in 2015, which is the year Netflix enters our model.

On the viewership side, respondents report whether they regularly watch specific broadcast programs, how many hours per week they spend watching television overall, and how many hours per week they watch each television channel and each streaming service. The surveys also collect demographic information such as household income and head of household age.

A separate MRI survey, called the Cord Evolution Survey, asks more specific questions about television and streaming usage. From this survey, we use responses to the question of what is the respondent's "current favorite streaming service?" We interpret the response to this question equivalently to "if you could only subscribe to one streaming service, which one would it be?" for the purposes of model estimation.

ADD something about synthetic households.

FCC Price Survey We obtained cable system-level price data from the FCC for the years 2015 to 2023. For each distributor, we use the average price of the expanded basic package as its annual price. To supplement this, we collected price data for satellite and telco television services using historical newspaper archives and snapshots of provider websites from the Internet Archive.

S&P Market Intelligence We use S&P Market Intelligence's television networks database to obtain annual affiliation fee revenue and advertising revenue per subscriber for each channel. The database also provides annual programming expenditure for each channel or streaming service. We also use S&P to supplement subscriber data for virtual cable packages such as YouTube TV which appear in the latter end of the data sample.

Conglomerate Database We manually assembled a year-by-year database linking studios, channels, streaming services, and distributors to their parent conglomerates.

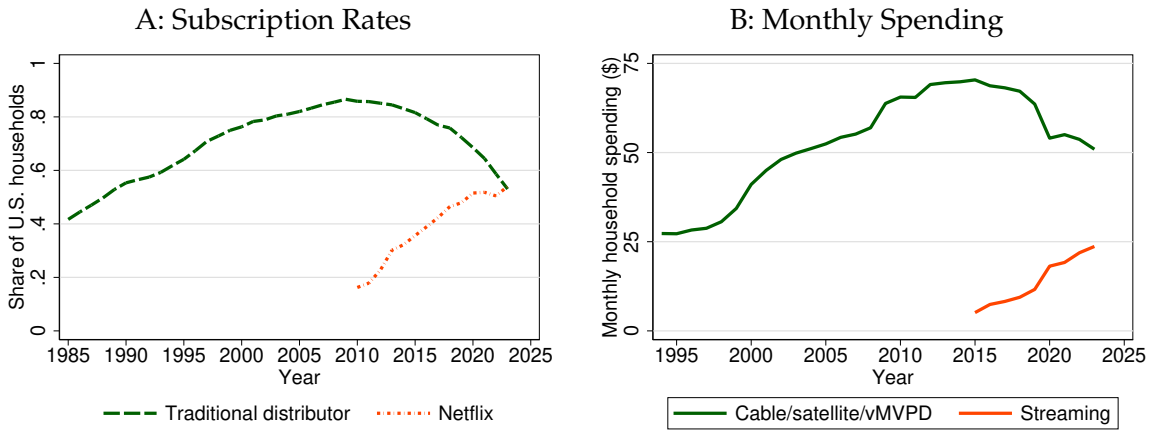
Estimating Aggregate Studio-Channel/Streamer Viewership Finally, we aggregate program-level viewing time by year and by channel or streaming service into the fraction of total time

spent on each studio-channel or studio-streamer combination. This yields observations at the year-studio-channel/streamer level. We then further aggregate studios to the conglomerate level. As detailed in Section 3, this is the unit of observation used in our model and estimation.

2.3 Summary Statistics

Panel A of Figure 2 shows that household penetration of the traditional cable bundle in the U.S. peaked at about 85% around 2010. The bundle usually included content from all major producers and was organized into individual channels.[3] In the early 2010s, Netflix began transitioning its DVD rental subscribers to its streaming service, initially offering movies and reruns of television series over the internet before expanding into original content. In 2023, the number of Netflix subscribers exceeded that of traditional bundle subscribers. Panel B shows that real average household spending on video services rose steadily until 2017. The increase in the mid-2010s reflects the fact that many households subscribed to both Netflix and a traditional cable or satellite service. After 2017, average spending started to decline, largely due to widespread "cord-cutting," i.e., as households canceled their traditional pay-TV subscriptions.

Figure 2: U.S. Household Video Service Subscriptions and Spending



Notes: This figure illustrates trends in U.S. household subscriptions to video services and corresponding spending over time. Panel A shows the share of households subscribing to traditional distributors or Netflix. Traditional distributors include cable, satellite, telco, and virtual multichannel video programming distributors (vMVPDs). Netflix subscriber estimates are derived from public reports. Panel B displays the average monthly household spending on video services in real terms.

Table 1 reports the most-watched channels and streaming services for the years 2003, 2013, and 2023. During the cable era, major broadcast networks such as ABC, CBS, and NBC dominated

[3]Premium content such as HBO and Showtime was not part of the basic bundle and was available for an extra fee.

household viewing. By 2023, however, Netflix had become the single most-watched destination, with several other streaming services also ranking among the top in terms of viewing time. Appendix Figure A.1 breaks down the average household's daily television viewing into time spent on cable content, broadcast content, and each of the seven streaming services in our sample. In 2023, streaming services accounted for about 40% of total viewing time.

Table 1: Top Channels and Streamers by Viewership

	2015		2019		2023	
	Channel/Streamer	Hours	Channel/Streamer	Hours	Channel/Streamer	Hours
1	Netflix	0.73	Netflix	0.87	Netflix	0.96
2	Hulu	0.51	Hulu	0.55	Prime Video	0.55
3	CBS	0.37	Prime Video	0.41	Hulu	0.54
4	Prime Video	0.35	CBS	0.33	Disney+	0.32
5	NBC	0.25	Fox News	0.24	CBS	0.31
6	ABC	0.24	NBC	0.24	Paramount+	0.29
7	Fox News	0.18	ABC	0.22	Peacock	0.29
8	Disney Channel	0.17	HBO Max	0.22	HBO Max	0.19
9	ESPN	0.15	Disney+	0.21	Fox News	0.19
10	Nickelodeon	0.15	MSNBC	0.15	ABC	0.16
	Others	4.63	Others	4.03	Others	3.18

Notes: This table reports the average daily hours viewed per U.S. household for the top 10 channels or streaming services in 2003, 2013, and 2023. Entries marked in red correspond to streaming services; the others are television channels. The row labeled "Others" aggregates viewing time for all remaining channels and streaming services.

Although the intermediary through which households access content has gradually shifted from traditional television channels to streaming services, the major content producers have remained relatively stable. Many of Netflix's most-watched programs were produced or co-produced by external studios.[4] Appendix Figure A.2 shows that by 2023, Netflix had become the largest content spender in the U.S., surpassing even ESPN which has high value sporting rights. Other streaming services, such as Amazon Prime Video, Hulu, and Disney+, were also among the top spenders.

Table 2 shows that in 2023, the number of viewing hours attributable to Netflix as a content producer was substantially lower than total hours households spent watching Netflix. This reflects the continued importance of licensed content, including older programming produced by others. The largest content producers in 2023 continued to be the major media conglomerates—Disney, Comcast NBCUniversal, Paramount, and Warner Bros. Discovery—all of whose constituent parts have been among the top producers for more than two decades.

[4]For example, Stranger Things was co-produced by 21 Laps Entertainment, and The Crown was co-produced by Sony.

Table 2: Top Conglomerates by Production of Viewership

	2015		2019		2023	
	Studio	Hours	Studio	Hours	Studio	Hours
1	Disney	0.71	Disney	0.70	Disney	0.90
2	Comcast	0.53	Comcast	0.57	Warner Bros. Discovery	0.59
3	News Corp	0.47	AT&T Time Warner	0.49	Comcast	0.58
4	Time Warner	0.47	Discovery	0.46	Paramount	0.57
5	CBS	0.45	News Corp	0.44	Netflix	0.35
6	Discovery	0.35	CBS	0.35	News Corp	0.26
7	Viacom	0.24	Netflix	0.27	Amazon	0.19
8	Scripps	0.18	Viacom	0.14	NFL	0.10
9	Netflix	0.17	A&E Networks	0.10	Sony	0.09
10	Sony	0.11	Amazon	0.10	Inspiration	0.06
	Others	4.04	Others	3.86	Others	3.29

Notes: This table reports the average daily hours viewed per U.S. household attributed to the production studios of the top 10 conglomerates in 2015, 2019, and 2023. The row labeled "Others" aggregates viewing time for all other studios.

3 Model

The model features household consumers (indexed by i) in market m, downstream distributors ($f \in \mathcal{F}_m$), television channels ($c \in \mathcal{C}_1$), streaming services ($c \in \mathcal{C}_2$), and production studios ($b \in \mathcal{B}$). Television channels reach consumers through distributors or over-the-air broadcasting, whereas streaming services sell subscriptions directly to consumers. A subscription package consists of at most one distributor and any subset of standalone streaming services. Let $j \in \mathcal{J}_m = (\mathcal{F}_m \cup \{\emptyset\}) \times 2^{\mathcal{C}_2}$ denote such a package.

The model has three stages:

1. Channels negotiate carriage fees with distributors; distributors and streaming services simultaneously set subscription prices.

2. Consumers choose a subscription package.

3. Consumers allocate their time across the content available in their chosen package and non-TV activities.

We describe the model in reverse order and omit the time index for simplicity.

3.1 Consumers

3.1.1 Viewership Decision

We define a content product $r \in \mathcal{R}$ by its producing studio and the set of outlets (television channels or streaming services) on which it is available. Content from the same studio with different outlet availability constitutes separate products. For example, NFL content available exclusively on NFL Network is one product, while NFL content available on both NFL Network and Amazon is another. Each product is available on at most two outlets.

Let $\mathcal{R}_j$ denote the set of content products available in subscription package j, counting each product only once even if it is available on multiple outlets within the package. Consumer i allocates their total available time T across these products, t_{ir}, and non-TV activities, t_{i0}, by solving

$$v_{ij}^* = \max_{t_{i0}, \{t_{ir}\}_{r \in \mathcal{R}_j}} \log \left(\left(\gamma_{i0} t_{i0}^{\frac{\varepsilon-1}{\varepsilon}} + \sum_{r \in \mathcal{R}_j} \gamma_{ir} t_{ir}^{\frac{\varepsilon-1}{\varepsilon}} \right)^{\frac{\varepsilon}{\varepsilon-1}} \right), \tag{1}$$

$$\text{s.t.} \quad t_{i0} \geq 0, \quad t_{ir} \geq 0,$$

$$t_{i0} + \sum_{r \in \mathcal{R}_j} t_{ir} = T.$$

Here, γ_{ir} captures consumer i's taste for content product r, while γ_{i0} captures their utility from non-TV activities. We set the monthly time endowment to $T = 1,098$ hours, equivalent to 36 hours per day over an average month of 30.5 days.[5]

We parameterize content tastes as $\gamma_{ir} = \gamma_r \zeta_{ir}$, where $\gamma_r \geq 0$ captures the average attractiveness of product r, and ζ_{ir} is a consumer-specific preference shock with a standard exponential marginal distribution. This specification allows for skewed viewership, with a small fraction of consumers accounting for substantial viewing time.

We allow preference shocks to be correlated across products on related outlets. Specifically, we group television channels and streaming services into nine groups based on observed viewership correlations, net of total viewership. Each outlet belongs to at most one group, with groups chosen to maximize within-group correlations and minimize cross-group correlations.[6] Products within each group share a common correlation parameter, which may differ across groups. Preference

[5] Each consumer represents a household, which may have multiple televisions and other devices, allowing for more than 24 hours of cumulative viewing per day.

[6] For example, all streaming services belong to one group, while sports channels such as ESPN, NFL Network, and MLB Network belong to another.

shocks for products in different groups are uncorrelated.

The utility weight on non-TV activities, γ_{i0}, depends on household demographics:

$$\gamma_{i0} = 1 + \beta_\gamma (X_i - \bar{X}), \tag{2}$$

where X_i includes log household income, age, and the number of adults, and $\bar{X}$ denotes their sample means. The constant normalizes the utility weight to one at mean demographics. This specification allows total viewing time to vary with household characteristics, capturing patterns such as higher-income households watching less television. We impose a lower bound of zero on γ_{i0} to ensure that the utility weight on non-TV activities is nonnegative.

With a constant elasticity of substitution $\varepsilon > 1$, the optimization problem in Equation (1) yields closed-form solutions for optimal time allocation and indirect utility:

$$t^*_{i0} = \frac{\gamma^\varepsilon_{i0}}{\gamma^\varepsilon_{i0} + \sum_{r' \in \mathcal{R}_j} \gamma^\varepsilon_{ir'}} T, \qquad t^*_{ir} = \frac{\gamma^\varepsilon_{ir}}{\gamma^\varepsilon_{i0} + \sum_{r' \in \mathcal{R}_j} \gamma^\varepsilon_{ir'}} T,$$
$$v^*_{ij} = \log \left[\left(\gamma^\varepsilon_{i0} + \sum_{r \in \mathcal{R}_j} \gamma^\varepsilon_{ir} \right)^{\frac{1}{\varepsilon - 1}} T \right]. \tag{3}$$

We define the baseline indirect utility from consuming no television content as

$$\underline{v}_i = \log(\gamma_{i0}^{\frac{\varepsilon}{\varepsilon-1}} T), \tag{4}$$

corresponding to $t_{ir} = 0$ for all r and $t_{i0} = T$.

3.1.2 Subscription Decision

A market m consists of a collection of zip codes served by the same combination of wire-based providers in a given month. Consumer i chooses a subscription package j in market m to maximize indirect utility:

$$\begin{aligned} u_{ijm} \;=\; & \beta_v (v^*_{ij} - \underline{v}_i) - \alpha_i p_{jm} + \sum_{s \in S(j)} \rho_{is} + \rho_{i,f(j)} + \beta_{sports} t^{\text{sports}}_{ij} + \beta_{age,1} Age_i Traditional_j + \\ & \beta_{age,2} Age_i Streaming_j + \beta x_{jm} + \xi_{jm} + \epsilon_{ijm} = \delta_{ijm} + \epsilon_{ijm}. \end{aligned} \tag{5}$$

The first term captures the utility gain from viewing content available in package j, where v_{ij}^* is the optimal viewership utility from Equation (3) and $\underline{v}_i$ is the baseline utility from non-TV activities. The price p_{jm} is the total subscription cost of the distributor and streaming services included in the package. We parameterize consumer i's price sensitivity as $\alpha_i = \exp(\alpha + \beta_\alpha(X_i - \bar{X}))$, allowing it to vary with household income.

The terms ρ_{is} and $\rho_{i,f(j)}$ capture household-specific preferences for streaming services and distributors, respectively. For each streaming service s, we specify $\rho_{is} = \sigma_s E_{is}$, where E_{is} follows a standard exponential distribution. Consumers receive a separate utility contribution from each streaming service $s \in S(j)$ included in their package. Similarly, distributor-specific preferences are given by $\rho_{if} = \sigma_d E_{if}$, where E_{if} also follows a standard exponential distribution. We set $\rho_{i,f(j)} = 0$ for packages without a distributor.

We allow an additional preference for sports content in the subscription decision, proportional to household i's predicted sports viewing hours t_{ij}^{sports} under package j. The term $\beta_{sports} t_{ij}^{\text{sports}}$ enters subscription utility but not the time-allocation problem, so it does not affect viewing decisions conditional on the package. This reduced-form specification allows sports viewing to generate additional subscription value beyond its contribution to modeled viewership utility, so that an hour of sports viewing can be valued more highly than an hour of other content.[7]

The coefficients $\beta_{age,1}$ and $\beta_{age,2}$ allow preferences for traditional television and streaming services to vary with household age. Specifically, $Traditional_j = 1$ if package j includes a traditional television provider (cable, satellite, or telecommunications), and $Streaming_j = 1$ if it includes at least one streaming service ($S(j) \neq \emptyset$). The vector x_{jm} includes observed characteristics, such as year and distributor fixed effects, while ξ_{jm} captures unobserved package quality. Finally, ϵ_{ijm} is an idiosyncratic preference shock following a Type I extreme value distribution.

The outside option $j = 0$ corresponds to subscribing to no paid service and watching only free broadcast channels. We set its price to $p_{0m} = 0$ and normalize its unobserved quality to $\xi_{0m} = 0$.

The market share of subscription package j is

$$s_{jm}(\boldsymbol{p}_m, \Gamma) = \int \frac{\exp(\delta_{ijm})}{\sum_{k \in \mathcal{J}_m} \exp(\delta_{ikm})} \mathrm{d}F(i), \tag{6}$$

where $\boldsymbol{p}_m$ is the vector of distributor and streaming service prices in market m, and Γ denotes the

[7] We classify as sports content all programming on ESPN, ESPN2, Fuel TV, Golf Channel, MLB Network, NBA TV, NFL Network, Speed Channel, Tennis Channel, and Versus, as well as selected programming on CBS, Fox, NBC, and other channels.

carriage network linking channels and distributors. The distribution $F(i)$ captures heterogeneity in household demographics, content preferences, price sensitivity, and tastes for distributors and streaming services.

Let $\mathcal{J}_f$ denote the set of subscription packages containing distributor f. The market share of distributor f is

$$s_{fm}(\boldsymbol{p}_m, \Gamma) = \sum_{j \in \mathcal{J}_f} s_{jm}(\boldsymbol{p}_m, \Gamma). \tag{7}$$

Similarly, the market share of streaming service $c \in \mathcal{C}_2$ is

$$s_{cm}(\boldsymbol{p}_m, \Gamma) = \sum_{j \in \mathcal{J}_m : c \in S(j)} s_{jm}(\boldsymbol{p}_m, \Gamma). \tag{8}$$

We abstract from consumers' broadband subscription decisions and the bundling of television and broadband services. McManus et al. (2024) study distributors' incentives to offer both services. In our framework, the average value from bundling broadband with television is absorbed by the unobserved demand component ξ_{jm} for a given distributor and year.

3.2 Supply Side

We now turn to firm behavior. Distributors and streaming services simultaneously set subscription prices, while channels and distributors negotiate per-subscriber carriage fees. For simplicity, we first consider a setting without vertical or horizontal integration, in which each distributor offers a single subscription package. We relax these assumptions in Section 3.3.

3.2.1 Distributor Prices

Each distributor sets the subscription price of its package. Satellite distributors (Dish and DirecTV) and vMVPDs (YouTube TV and Hulu Live) charge uniform national prices, whereas cable and telecommunications distributors can vary prices across markets.

Let $\mathcal{C}(f) \subset \mathcal{C}_1$ denote the set of channels carried by distributor f, and let $\boldsymbol{\tau}_f = \{\tau_{fc}\}_{c \in \mathcal{C}(f)}$ denote the corresponding per-subscriber carriage fees. Distributor f incurs a constant marginal cost ω_{fm} of serving an additional subscriber in market m, excluding carriage fees. Its total marginal cost is therefore $mc_{fm} = \omega_{fm} + \sum_{c \in \mathcal{C}(f)} \tau_{fc}$.

In addition to subscription revenue, distributors earn advertising revenue r_{fm} per subscriber. Each cable or telecommunications distributor chooses market-specific prices $\{p_{fm}\}_m$ to maximize

total profits:

$$\max_{\{p_{fm}\}_m} \Pi_f(\boldsymbol{p}, \boldsymbol{\tau}, \Gamma) = \sum_m N_m \left(p_{fm} + r_{fm} - \omega_{fm} - \sum_{c \in \mathcal{C}(f)} \tau_{fc} \right) s_{fm}(\boldsymbol{p}_m, \Gamma), \tag{9}$$

where N_m is the number of consumers in market m, $\boldsymbol{p} = \{\boldsymbol{p}_m\}_m$ and $\boldsymbol{\tau} = \{\boldsymbol{\tau}_f\}_f$ collect prices and carriage fees across all markets and distributors, respectively, and $s_{fm}(\boldsymbol{p}_m, \Gamma)$ is distributor f's market share in market m, as defined in equation (7).

For satellite distributors and vMVPDs, we assume that marginal costs, excluding carriage fees, are constant across markets: $\omega_{fm} = \omega_f$. Each distributor chooses a single national price p_f to maximize profits across all markets:

$$\max_{p_f} \Pi_f(\boldsymbol{p}, \boldsymbol{\tau}, \Gamma) = \sum_m N_m \left(p_f + r_{fm} - \omega_f - \sum_{c \in \mathcal{C}(f)} \tau_{fc} \right) s_{fm}(\boldsymbol{p}_m, \Gamma). \tag{10}$$

3.2.2 Streaming Service Prices

Streaming services also charge uniform national prices. Unlike distributors, they do not pay per-subscriber carriage fees. We abstract from streaming advertising revenue, which was absent or negligible for many services during our sample period. Each streaming service $c \in \mathcal{C}_2$ chooses its national price p_c to maximize total profits:

$$\max_{p_c} \Pi_c(\boldsymbol{p}, \Gamma) = \sum_m N_m (p_c - \omega_c) s_{cm}(\boldsymbol{p}_m, \Gamma), \tag{11}$$

where ω_c is the marginal cost per subscriber and $s_{cm}(\boldsymbol{p}_m, \Gamma)$ is streaming service c's market share in market m.

3.2.3 Channel Carriage Fees

Channels and distributors simultaneously engage in bilateral bargaining over carriage fees. For each channel-distributor pair (f, c), τ_{fc} denotes the monthly per-subscriber fee that distributor f pays to channel c for carrying its content. Let $\mathcal{F}(c)$ denote the set of distributors carrying channel c. In addition to carriage fees, each channel earns advertising revenue r_c per subscriber. Channel c's total profit is

$$\Pi_c(\boldsymbol{p}, \boldsymbol{\tau}, \Gamma) = \sum_m N_m \sum_{f \in \mathcal{F}(c)} (\tau_{fc} + r_c) s_{fm}(\boldsymbol{p}_m, \Gamma). \tag{12}$$

We take the carriage network Γ as given and assume that each bilateral pair $(f, c) \in \Gamma$ solves a Nash bargaining problem, holding fixed all other carriage agreements:

$$\begin{aligned} \max_{\tau_{fc}} \quad & \left[\Pi_f(\boldsymbol{p}, \boldsymbol{\tau}, \Gamma) - \Pi_f(\boldsymbol{p}_{-fc}, \boldsymbol{\tau}_{-fc}, \Gamma_{-fc})\right]^{1-\zeta_c} \\ & \times \left[\Pi_c(\boldsymbol{p}, \boldsymbol{\tau}, \Gamma) - \Pi_c(\boldsymbol{p}_{-fc}, \boldsymbol{\tau}_{-fc}, \Gamma_{-fc})\right]^{\zeta_c}, \end{aligned} \tag{13}$$

where Π_f is distributor f's profit, defined in equations (9) and (10). The network Γ_{-fc} excludes the agreement between f and c, while $\boldsymbol{\tau}_{-fc}$ denotes the remaining carriage fees. The parameter $\zeta_c \in [0, 1]$ captures channel c's bargaining power, and $\boldsymbol{p}_{-fc}$ denotes the equilibrium downstream prices following disagreement between f and c.

The solution to these bilateral bargaining problems constitutes a variant of the Nash-in-Nash equilibrium (Horn and Wolinsky, 1988; Crawford and Yurukoglu, 2012; Lee et al., 2021). We assume that each pair holds downstream prices fixed when evaluating an agreement but anticipates a new pricing equilibrium in the event of disagreement, when channel c is removed from distributor f's package. This timing lies between the fully sequential approach of Crawford and Yurukoglu (2012), which recomputes downstream prices for each candidate agreement and disagreement, and the fully simultaneous approach of Crawford et al. (2018), which holds prices fixed in both cases. Our assumption reflects the distinction between changes in carriage fees, which may not trigger immediate price adjustments, and the breakdown of an agreement, which substantially changes the distributor's content offerings and may induce repricing. This approach captures competitive responses to disagreement while maintaining computational tractability.

3.3 Integration Within and Across Segments

Many media conglomerates own businesses across distribution, television channels, streaming services, and content production. For example, in 2023, Comcast Corporation owned a cable distributor (Xfinity), television channels (including NBC, CNBC, and E!), production studios (including Universal Pictures), and a streaming service (Peacock). Similarly, the Walt Disney Company controlled a vMVPD (Hulu Live), owned television channels (including ABC, Disney Channel, and ESPN) and production studios (including Walt Disney Pictures), and operated streaming services (Disney+ and Hulu).[8]

[8] In 2023, Disney held a 67% ownership stake in Hulu and exercised full operational control, while Comcast's NBCUniversal held the remaining 33%.

Our model accommodates arbitrary patterns of vertical and horizontal integration within and across these segments. We assume that each integrated firm maximizes the joint profits of all businesses under common ownership, fully internalizing the effects of their decisions on one another and efficiently managing intra-firm transactions.[9]

For simplicity, Section 3.2.1 assumes that each distributor offers a single subscription package containing most major channels. In practice, distributors typically offer multiple packages, with premium channels such as HBO and Showtime available for an additional fee. We therefore allow each distributor to offer four packages: a basic package containing all major channels except HBO and Showtime, and three variants that add HBO, Showtime, or both. Each distributor jointly sets the prices of these four packages to maximize total profits.

To account for horizontal integration, we model carriage bargaining between channel and distributor groups. Channels under common ownership generally negotiate jointly, while distributors under common ownership negotiate on behalf of all their subscription packages.[10] Each negotiation determines a single per-subscriber carriage fee for carrying the entire channel group, with a group-specific bargaining-power parameter. Both sides evaluate their gains from agreement based on the joint profits of their parent firms. Following disagreement, all channels in the negotiating group are removed from the affected distributor packages. We then update households' content access and predicted viewing and solve for a new pricing equilibrium. Each side's disagreement payoff equals its parent firm's joint profit in this equilibrium.

We allow several exceptions to ownership-based channel grouping. Premium channels such as HBO and Showtime negotiate separately from their owners' other channels. If removing a premium channel makes a package identical to another package offered by the same distributor, we eliminate the redundant alternative. We also treat ESPN and ESPN2 as a separate bargaining group from Disney's other channels. Broadcast channels do not participate in carriage-fee bargaining, and their fees are set to zero. Finally, we exclude negotiations between businesses under common ownership and normalize their internal carriage fees to zero.

[9] Crawford et al. (2018) find evidence of near-complete internalization between vertically integrated regional sports networks and cable distributors.

[10] For example, in 2023, NBCUniversal owned Bravo, CNBC, E!, MSNBC, Syfy, and USA Network; Paramount Global owned BET, Comedy Central, MTV, and Nickelodeon; and Warner Bros. Discovery owned Cartoon Network, CNN, Discovery Channel, Food Network, HGTV, TBS, TLC, and TNT.

3.4 Equilibrium

An equilibrium consists of subscription prices $\boldsymbol{p}$ and carriage fees $\boldsymbol{\tau}$ such that each distributor and streaming service optimally sets its prices, accounting for common ownership, and each channel-distributor pair solves a bilateral Nash bargaining problem, holding other carriage fees fixed and prices fixed under agreement while allowing prices to adjust following disagreement.

4 Estimation and Results

We estimate the model in two steps. First, we estimate the demand parameters governing viewership and subscription choices. Second, we use the estimated demand system, observed prices, and equilibrium conditions to jointly recover the marginal costs of distributors and streaming services and estimate channel-distributor bargaining parameters, matching model-implied carriage fees to observed affiliate fees.

4.1 Demand Estimates

The demand model consists of two stages: viewership and subscription choice. The subscription-choice stage follows the random-coefficients discrete choice framework of Berry et al. (1995), incorporating viewership utility alongside additional subscription preferences and demographic effects. As emphasized by Lee et al. (2021), the two stages must be estimated jointly to account for selection into subscription packages.

We estimate demand using data from 2015–2023. The viewership parameters include the average taste γ_r for each content product in each year; the effects of log income, age, and the number of adults on non-TV utility β_γ; the elasticity of substitution ε; and the nine content-group correlation parameters ρ_g. The subscription-choice parameters include the mean price sensitivity α and its interaction with log income β_α; the weight on viewership utility β_v; the seven streaming-service random-coefficient standard deviations σ_s and the common distributor random-coefficient standard deviation σ_d; the age interactions for traditional television and streaming packages $\beta_{age,1}$ and $\beta_{age,2}$; and the additional sports-viewing utility parameter β_{sports}.

We estimate these parameters using the Method of Moments. For each trial value of the outer-loop parameters, which include all demand parameters described above except γ_r, we jointly recover package-market-year intercepts η_{jm} and average content-taste parameters γ_r. We apply the contraction mapping of Berry et al. (1995) to match predicted and observed subscription shares,

normalizing the broadcast-only package's intercept to zero, and recover γ_r year by year to match observed average viewing time. This joint procedure accounts for selection into subscription packages, as content tastes affect both viewing allocations and subscription choices. We then choose the outer-loop parameters to match the following moments.

We use three sets of moments constructed from MRI survey data to discipline the viewership model. Because our model operates at the household level whereas MRI data are collected at the individual level, we construct synthetic households by matching survey respondents (see Appendix for details). First, to identify the effects of log income, age, and the number of adults on non-TV utility β_γ, we match the coefficients from a regression of household daily TV viewing time on these demographic variables, controlling for year fixed effects. Second, to identify the CES elasticity ε, we match the average household Herfindahl–Hirschman Index (HHI) of cable-channel viewing in 2023, targeted to 0.1712. Third, to identify the nine content-preference correlation parameters ρ_g, we match the average pairwise correlations of channel viewing time within each content group in 2023. We calculate these correlations after regressing each channel's viewing time on a constant and total viewing time excluding that channel.

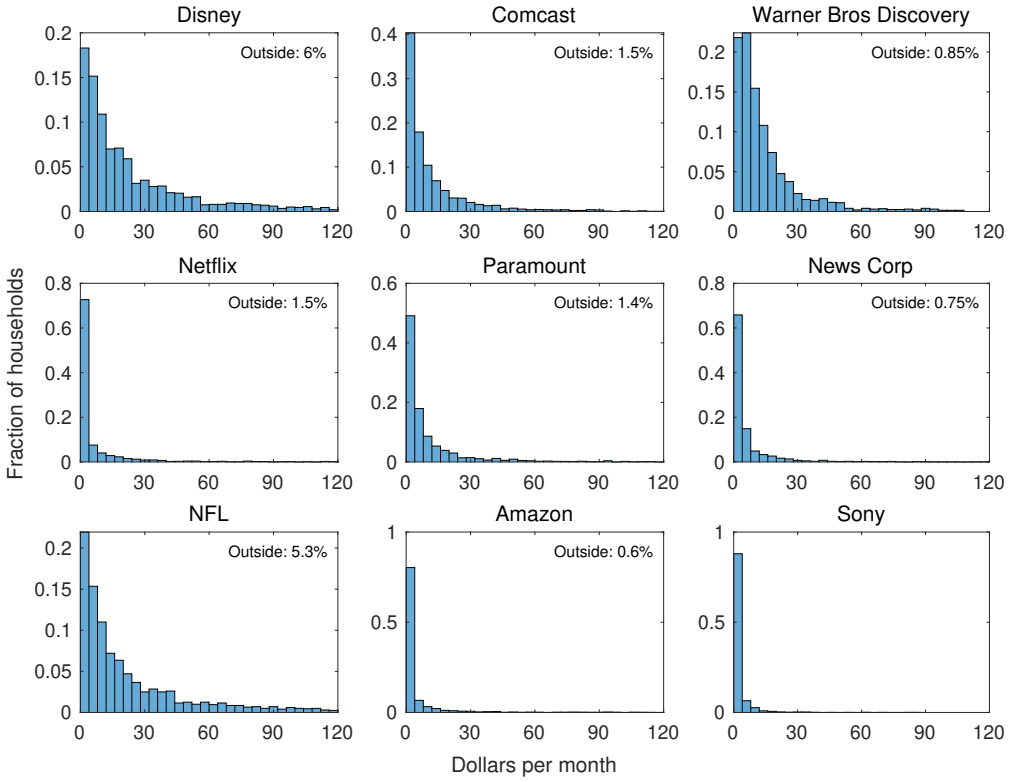
To discipline subscription choices, we match four additional demographic regression coefficients from MRI survey data: the effects of log income, age, and the number of adults on traditional pay-TV subscription, and the effect of age on the number of standalone streaming subscriptions. The two age coefficients help identify $\beta_{age,1}$ and $\beta_{age,2}$, while the income coefficient informs the income dependence of price sensitivity β_α. The number-of-adults coefficient helps identify the weight on viewership utility β_v, under the assumption that, conditional on income and age, the number of adults affects subscription choices only through viewership utility, rather than through other components of subscription utility. We also identify the additional sports-viewing utility parameter β_{sports} by matching a target of 2.13 million additional Peacock subscribers when NFL content available on NFL Network is also offered on Peacock, holding prices fixed.

We also match seven survey-based favorite-service probabilities among households subscribing to exactly two streaming services. For each service, we calculate the probability of choosing it from a restricted choice set containing all available single-service options, retaining their original utilities. We average these probabilities across households and markets, weighting by the probability of choosing a package with exactly two streaming-service accesses that includes the service. These moments are analogous to the second-choice moments in Berry et al. (2004) and Grieco et al. (2024) and help identify the dispersion of streaming-service preferences σ_s.

Finally, we match two price-related moments. The first is the mean annual own-price elasticity of Netflix subscriptions over 2015–2023, targeted to -0.5, which informs mean price sensitivity α. The second is the mean implied cable margin in 2023, targeted to 0.4175, calculated as the average negative inverse of cable providers' own-price elasticities. This moment helps identify the dispersion of distributor-specific preferences σ_d.

Figure 3 shows the distribution of monthly willingness to pay (WTP) across households for access to content produced by selected major studios in 2023. We calculate WTP relative to the baseline of no television viewing, incorporating both the gain in CES viewership utility, weighted by β_v, and the additional utility from predicted sports viewing, weighted by β_{sports}. We divide the resulting utility gain by household price sensitivity α_i to express WTP in dollar terms. The shapes of these distributions partly reflect the exponentially distributed consumer-specific preference shocks ζ_{ir}, motivated by the highly skewed viewership patterns observed in individual-level data. Differences across studios reflect the overall popularity of their content, with more widely viewed studios generally exhibiting higher WTP.

Figure 3: Distribution of Monthly WTP for Selected Major Studios



Notes: This figure plots the distribution across households of monthly willingness to pay (WTP) in 2023 for access to content produced by selected major studios. WTP is computed as the difference in viewership utility from having versus not having access to each studio's content, scaled by β_v/α_i to convert utility into dollar terms.

Table 3 reports the estimated own-price elasticities of demand for cable, satellite, telecommunications, vMVPD, and streaming services in 2023. Some streaming services face inelastic demand at observed prices, suggesting that their pricing decisions may reflect considerations beyond static profit maximization. One possible explanation is dynamic pricing incentives, such as setting lower prices to encourage adoption and build long-term subscriber bases.

Table 3: Own-Price Elasticity Estimates

Provider	Own-Price Elasticity
Cable	**-2.35**
Satellite	**-3.33**
Telco	**-3.21**
vMVPD	**-2.42**
Amazon	**-0.68**
Disney+	**-1.07**
HBO Max	**-1.17**
Hulu	**-0.83**
Netflix	**-0.70**
Paramount+	**-1.04**
Peacock	**-1.14**

Notes: This table reports the estimated own-price elasticities for cable, satellite, telecommunications, vMVPD, and streaming services in 2023. Each elasticity reflects the percentage change in a service's market share in response to a one-percent change in its own price, holding other prices fixed. Satellite and vMVPD elasticities are simple averages across Dish and DirecTV, and YouTube TV and Hulu Live, respectively.

4.2 Marginal Costs and Bargaining Parameters

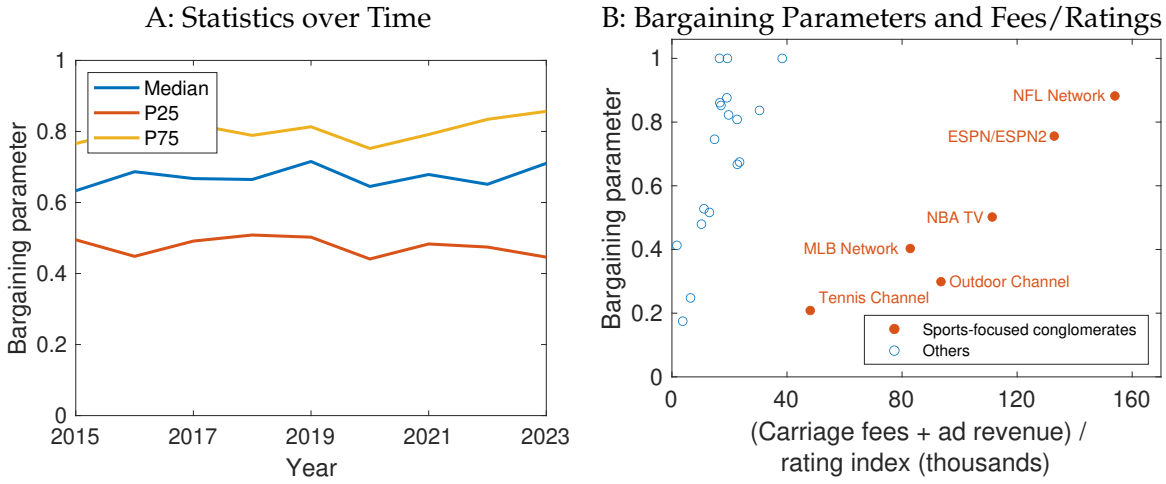
We observe carriage fees only at the conglomerate level, as weighted averages of fees negotiated with individual distributors. Because bilateral carriage fees and downstream marginal costs are unobserved, we estimate marginal costs and bargaining parameters jointly.

For a given set of carriage fees, we invert the Bertrand–Nash pricing first-order conditions at observed subscription prices to recover the marginal costs of distributors and streaming services, accounting for common ownership. Given these costs and a candidate set of bargaining parameters, we solve the Nash-in-Nash bargaining system for distributor-specific carriage fees. We estimate the bargaining parameters by minimizing the squared differences between model-implied and observed conglomerate-level carriage fees, where the model-implied fees are market-share-weighted averages of the negotiated distributor-specific fees. We constrain each bargaining-power parameter to lie between zero and one. When solving the bargaining system, we hold agreement prices fixed at their observed levels but recompute the downstream pricing equilibrium following each disagreement. We iterate between marginal-cost recovery and bargaining-parameter estima-

tion until the implied costs and carriage fees are mutually consistent.

Panel A of Figure 4 shows substantial variation in estimated bargaining parameters across channel conglomerates over 2015–2023. Panel B illustrates the relationship between bargaining power, carriage fees, and viewership in 2023. Conglomerates receiving higher carriage fees relative to viewing time generally have higher estimated bargaining weights. Sports-heavy conglomerates, however, earn higher carriage-fee and advertising revenue per unit of viewing even at similar bargaining weights. This pattern is consistent with the model's additional sports-utility term, which increases consumers' utility losses when sports channels are removed and thereby supports higher negotiated carriage fees for a given bargaining weight and viewing time.

Figure 4: Estimated Bargaining Parameters



Notes: Panel A reports the median and interquartile range of estimated bargaining parameters across channel bargaining groups from 2015 to 2023. Panel B plots the estimated bargaining parameters against the observed ratio of carriage fees plus advertising revenue to viewing time in 2023. Orange points denote sports-focused bargaining groups.

5 Counterfactual Analysis

5.1 Overview

In this section, we compare the status quo, in which traditional distributors and standalone streaming services coexist, with alternative arrangements for packaging and distributing video content. For computational tractability, we focus on a representative market in 2023 with six distributors: one cable provider (Charter), one telco provider (AT&T), two satellite providers (Dish and DirecTV), and two vMVPDs (YouTube TV and Hulu Live). Each distributor offers four packages that

differ in their inclusion of HBO and Showtime, and seven streaming services are available as standalone subscriptions. Across scenarios, we hold the set of content products fixed and vary how they are bundled and distributed. For our comparisons, we set negative estimates of streaming marginal costs to zero, retain positive estimates, and recompute equilibrium prices and carriage fees under the model's static profit-maximization and bargaining assumptions.

We consider two main scenarios. In streaming-only distribution, all paid distributor packages disappear and cable-channel content migrates to streaming services under common ownership. For example, Disney Channel content moves to Disney+, and CNN content moves to HBO Max. In full rebundling, all streaming services enter distributor packages and cease offering standalone subscriptions. They negotiate per-subscriber carriage fees through Nash bargaining, jointly with affiliated channels where applicable. We also examine partial rebundling, in which some services enter distributor packages while others remain standalone.

These scenarios change both packaging and vertical relationships. Streaming-only distribution integrates migrated channel content with its streaming distributor, whereas rebundling introduces linear carriage fees between streamers and distributors. Such fees can lead to double marginalization. We examine this mechanism through two additional counterfactuals that hold packaging fixed: partial vertical separation in streaming-only distribution and zero carriage fees for Netflix and Amazon under full rebundling. Other streamers and legacy channels continue to negotiate fees in the latter case. We describe these arrangements and their implications for prices, market shares, and welfare below.

The first column of Table 4 reports equilibrium prices and market shares under the status quo, while Table 5 presents additional market outcomes, including consumer surplus and firm profits. In this benchmark, 52% of households subscribe to a traditional distributor, implying a cord-cutting rate of 48%. Meanwhile, 68% subscribe to at least one streaming service, with an average of 1.9 streaming subscriptions per household. Households spend an average of $87.5 per month on traditional distributor packages and streaming services and watch 6.82 hours of video content per day. Monthly consumer surplus averages $143.6 per household, and monthly industry profits total $100.3 per household before deducting content production costs.

5.2 Streaming-Only Scenario

In the streaming-only scenario, all paid distributor bundles disappear and their cable programming, including live sports and news, migrates to the seven major streaming services. We as-

Table 4: Equilibrium Prices and Market Shares

A: Equilibrium Prices

	Status Quo	Streaming Only		Rebundled	
		Integrated	Separated	With Fees	Netflix/Amazon Fee-Free
A: Basic Distributor Package					
Dish	104.7			162.7	139.4
DirecTV	116.9			169.9	139.3
ATT Telco	112.2			170.9	142.6
Charter	107.5			168.0	137.1
HuluLive	78.9			140.4	104.2
YouTubeTV	74.7			147.6	112.9
B: Streaming Package					
Amazon	16.7	16.7	19.2		
Disney Plus	14.3	13.9	26.0		
HBO Max	18.4	15.5	20.1		
Hulu	14.9	28.9	41.2		
Netflix	23.7	27.1	32.4		
Paramount Plus	9.7	11.1	13.9		
Peacock	9.7	11.2	13.9		

B: Equilibrium Market Shares

	Status Quo	Streaming Only		Rebundled	
		Integrated	Separated	With Fees	Netflix/Amazon Fee-Free
A: Distributor Package					
Dish	0.046			0.083	0.079
DirecTV	0.067			0.098	0.111
ATT Telco	0.055			0.064	0.071
Charter	0.272			0.283	0.349
HuluLive	0.030			0.029	0.040
YouTubeTV	0.050			0.040	0.055
B: Streaming Package					
Amazon	0.286	0.317	0.295		
Disney Plus	0.300	0.316	0.126		
HBO Max	0.076	0.380	0.261		
Hulu	0.280	0.427	0.297		
Netflix	0.413	0.449	0.395		
Paramount Plus	0.244	0.313	0.221		
Peacock	0.250	0.307	0.229		

Notes: Columns report the status quo, integrated and separated streaming-only distribution, and full rebundling with negotiated fees or zero Netflix/Amazon fees. Prices are monthly dollars per subscriber; market shares are fractions of all households. Other streamers and legacy channels continue to negotiate fees in the zero Netflix/Amazon fee case.

Table 5: Equilibrium Market Outcomes and Welfare

	Status Quo	Streaming Only		Rebundled	
		Integrated	Separated	With Fees	Netflix/Amazon Fee-Free
A: Market Outcomes					
Any Pay-TV Distributor	52.0%	0.0%	0.0%	59.7%	70.5%
Any Streaming	68.0%	67.8%	62.2%	0.0%	0.0%
Streaming Only	29.0%	67.8%	62.2%	0.0%	0.0%
Broadcast Only	19.0%	32.2%	37.8%	40.3%	29.5%
Total Streaming Subscriptions	1.85	2.51	1.82	0.00	0.00
Daily Hours Watched	6.82	6.26	5.67	7.08	7.57
B: Consumer Surplus ($ Per Household-Month)					
Viewing Utility	159.2	151.2	139.4	164.7	173.5
Unobserved Utility	38.5	3.2	-0.5	60.7	68.4
Age Terms	32.1	21.0	22.4	13.7	14.1
Logit Term	1.2	0.7	0.5	0.5	0.6
Spending	-87.5	-47.0	-45.5	-106.1	-103.3
Consumer Surplus	143.6	129.0	116.3	133.6	153.3
C: Industry Profit ($ Per Household-Month)					
Subscription Revenues	87.5	47.0	45.5	106.1	103.3
Advertising	27.2	17.6	15.2	30.3	34.3
Distributor Marginal Costs (−)	-12.9	0.0	0.0	-17.2	-19.2
Streaming Marginal Costs (−)	-1.5	-1.6	-0.9	0.0	0.0
Carriage Fee (Transfer)	29.8	0.0	10.6	70.8	61.1
Industry Profits	100.3	63.0	59.7	119.2	118.4
D: Total Welfare ($ Per Household-Month)					
Total Welfare	243.9	192.0	176.1	252.8	271.7

Notes: Columns correspond to Table 4. Dollar amounts are per household per month. Viewing utility includes sports utility. Unobserved utility combines the bundle term and selected streaming and distributor tastes; age effects and logit shocks are reported separately. Spending enters consumer surplus negatively. Industry profits exclude content production costs. Carriage fees are transfers within the industry and are not added to aggregate profits.

sign content according to studio and channel ownership, supplemented by informed assumptions where necessary. For example, Cartoon Network content moves to HBO Max because both share the same parent company, Warner Bros. Discovery. We retain unobserved streaming utility and streaming-brand tastes but do not transfer distributor tastes or cable age effects to streamers. Cable-channel per-subscriber advertising revenues also move to streamers, allocated according to status quo viewing of the channels' content. Households choose which streaming services to sub-

scribe to, while free broadcast programming and its advertising remain available. This scenario extends the shift toward direct-to-consumer distribution illustrated in Figure 2.

The move to streaming creates several tradeoffs. Smaller bundles give households greater flexibility, but accessing programming spread across services may require multiple subscriptions. Expanded catalogs can make individual services more valuable, while fragmentation may leave households unwilling to pay for content they previously accessed through a broader bundle. Common ownership of the migrated programming and its streaming distributor avoids the additional markup that can arise from linear carriage fees between separate firms.

To isolate the role of vertical integration, we also consider partial vertical separation: each streamer's migrated cable programming is supplied by a separate upstream content provider at a negotiated per-subscriber licensing fee, with the bargaining weight set to 0.5. Streamers retain their original catalogs. Disney+ and Hulu remain jointly owned at the retail level, while their upstream suppliers are separately owned. This comparison holds each service's content fixed and allows us to assess how vertical separation affects prices, access, and welfare.

The second columns of Tables 4 and 5 report equilibrium outcomes under integrated streaming-only distribution. Prices generally rise despite the additional advertising revenue. Hulu experiences the largest increase, from \$14.9 to \$28.9 per month, reflecting the addition of ESPN and ESPN2 programming. All seven services gain market share. Overall, 67.8% of households subscribe to at least one streaming service, with an average of 2.51 subscriptions per household. Monthly spending falls from \$87.5 to \$47.0 per household, while average daily viewing declines from 6.82 to 6.26 hours. Measured per household per month, consumer surplus falls from \$143.6 to \$129.0, industry profits decline from \$100.3 to \$63.0, and total welfare decreases from \$243.9 to \$192.0.

The decline in consumer surplus reflects both content fragmentation and the loss of utility associated with distributor packages. Households may value programming spread across services but choose not to purchase all the subscriptions needed to access it. Eliminating distributor packages also removes the utility associated with distributor-specific tastes. Table 5 decomposes consumer surplus into its components to show how each contributes to the welfare comparison.

Vertical separation amplifies these losses. As shown in the third columns of Tables 4 and 5, negotiated licensing fees raise every service's subscription price relative to integrated streaming-only distribution. Streaming participation falls from 67.8% to 62.2%, and average daily viewing declines from 6.26 to 5.67 hours. Measured per household per month, consumer surplus falls

from $129.0 to $116.3, industry profits decline from $63.0 to $59.7, and total welfare decreases from $192.0 to $176.1. These outcomes illustrate double marginalization: per-subscriber licensing fees raise streamers' marginal costs and induce higher prices despite unchanged content offerings. Although the fees transfer revenue to upstream suppliers, the resulting contraction in subscriptions reduces aggregate industry profits. Vertical integration mitigates these losses by eliminating an additional markup on programming.

5.3 Rebundled Scenario

In the fully rebundled scenario, all seven streaming services enter packages offered by competing intermediaries and cease offering standalone subscriptions. This arrangement resembles traditional cable but incorporates streaming content, and the intermediaries need not own physical distribution infrastructure. Music streaming provides a useful analogy: platforms such as Spotify and Apple Music aggregate content from multiple major labels. We retain the status quo distributors' names when reporting results, although new entrants could also act as bundlers. Streamers negotiate per-subscriber carriage fees with distributors, jointly with affiliated channels where applicable. Streaming-brand tastes enter the utility of packages carrying each service.

Rebundling combines content for which households have different valuations, giving subscribers access to programming they might not purchase separately. However, broader bundles can command higher prices, and households lose the option of subscribing to only a few services. Linear carriage fees also raise distributors' marginal costs and can lead to double marginalization. To assess this mechanism, we set Netflix's and Amazon's per-subscriber fees to zero while allowing all other streaming and traditional channel fees and retail prices to adjust in equilibrium. This counterfactual holds content and ownership fixed. Netflix and Amazon could instead be compensated through alternative arrangements, such as lump-sum transfers that do not enter distributors' marginal costs.

Tables 4 and 5 report the results. With negotiated streaming carriage fees, basic bundle prices range from $140 to $171 per month, compared with $75 to $117 under the status quo. Distributor participation rises from 52.0% to 59.7%. At the same time, the share relying solely on free broadcast programming increases from 19.0% to 40.3%, as standalone streaming subscriptions disappear. Average monthly spending rises from $87.5 to $106.1 per household, while average daily viewing increases from 6.82 to 7.08 hours.

Despite the increase in viewing, monthly consumer surplus falls by $10.0 per household, from

$143.6 to $133.6. Monthly industry profits rise by $18.9 per household, from $100.3 to $119.2, yielding a net welfare gain of $8.9. These outcomes reflect the tradeoff between broader access for bundle subscribers and the higher prices and loss of smaller subscription options facing other households. Firms earn more from the combined catalog, but some households forgo paid programming altogether.

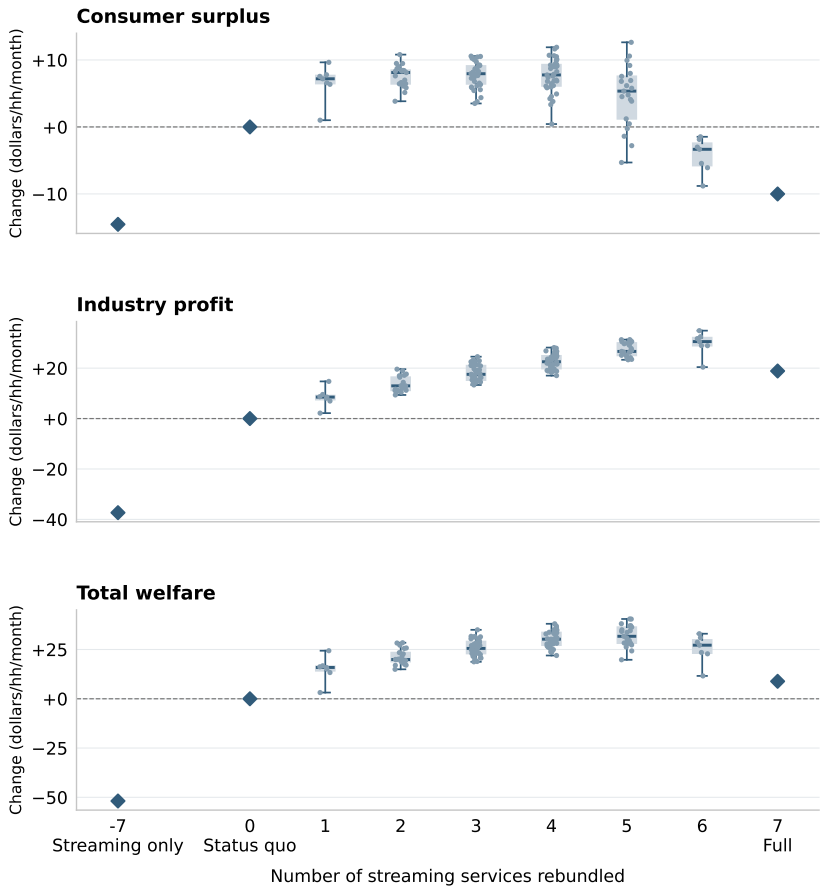
Setting Netflix and Amazon's carriage fees to zero substantially changes these outcomes. Basic bundle prices fall to between $104 and $143 per month, distributor participation rises to 70.5%, and average daily viewing reaches 7.57 hours. Monthly consumer surplus rises to $153.3 per household, $19.8 above rebundling with negotiated fees and $9.7 above the status quo. Monthly industry profits decline slightly to $118.4 per household, while total welfare increases to $271.7. The consumer benefits of rebundling therefore depend strongly on the terms under which distributors obtain content. Although carriage fees are transfers within the industry, they enter distributors' marginal costs and affect retail prices, access, and total surplus.

5.4 Partial Rebundling Scenarios

Full rebundling removes all standalone streaming options. We next consider arrangements in which some services enter distributor bundles while others continue to sell directly to consumers. We simulate all 126 ways to rebundle between one and six of the seven services, recomputing prices and carriage fees for each arrangement. Services entering distributor bundles cease offering standalone subscriptions. These comparisons hold content fixed and vary which services are distributed together.

Figure 5 summarizes the results. Of all the partial arrangements, many increase consumer surplus relative to the status quo, and all increase industry profits and total welfare. Consumer gains do not rise monotonically with the number of rebundled services: average gains are largest with three services and turn negative with six, while average industry profits continue to rise. Partial rebundling expands access within distributor packages while preserving smaller standalone options. As more services enter the bundle, these alternatives become less attractive and carriage fees for the expanded catalog can push up bundle prices.

Figure 5: Welfare Effects of Partial Rebundling



Notes: Outcomes are changes from the status quo, in dollars per household per month. Points show the 126 partial arrangements; boxes show the interquartile range and median, and whiskers span the minimum and maximum. Diamonds mark streaming only, the status quo, and full rebundling. The streaming-only benchmark is placed separately at the left; its horizontal spacing is categorical. All rebundling arrangements shown use negotiated streaming carriage fees.

To describe variation across arrangements, Table 6 reports regressions of changes in consumer surplus, industry profits, and total surplus on characteristics of the rebundled services. Regressors include average marginal cost, total content, average bargaining weight, and average streaming taste scale, along with fixed effects for the number of rebundled services. These regressions summarize associations across simulated arrangements rather than identify separate causal effects.

The bargaining results are consistent with the pricing mechanism in the full-rebundling comparison. A 0.1 increase in the average bargaining weight of rebundled services is associated with $1.37 less monthly consumer surplus per household. Stronger suppliers can negotiate higher carriage fees, which affect distributors' pricing incentives. The corresponding association with ag-

gregate industry profits is weaker: greater bargaining power can redistribute revenue within the industry without increasing total profits.

Rebundling services with more content is associated with larger consumer and industry gains. The average streaming taste scale is also positively associated with industry profits: services that consumers value more can make the bundle more attractive and support higher revenues. Together, the simulations show that the benefits of partial rebundling depend on which catalogs are combined, the standalone options that remain, and the fees negotiated for carrying the content.

Table 6: Partial Rebundling: Changes in Surplus and Profits

	Δ Consumer surplus	Δ Industry profits	Δ Total surplus
Mean marginal cost ($)	1.247	1.579	2.826
	(0.389)	(0.455)	(0.618)
Total content ($\sum \gamma$)	1.363	2.151	3.514
	(0.442)	(0.404)	(0.612)
Mean bargaining weight (0.1)	-1.373	0.573	-0.800
	(0.581)	(0.375)	(0.820)
Mean streamer RC	0.366	0.979	1.345
	(0.191)	(0.353)	(0.441)
Rebundled-count FE	Yes	Yes	Yes
Observations	126	126	126
R^2	0.678	0.901	0.804

Notes: Equally weighted OLS across the 126 partial arrangements. Dependent variables are changes from the status quo in dollars per household per month; total surplus is consumer surplus plus aggregate industry profits. All columns include fixed effects for the number of rebundled services. Marginal cost is the unweighted average floored monthly cost per subscriber of the selected services. Total content sums their baseline content-quality parameters, including content already available through pay TV. Bargaining weight is the unweighted mean carriage bargaining parameter, scaled so a unit is an increase of 0.1. Mean streamer RC is the average estimated exponential taste scale, in utility-index units. HC3 standard errors are in parentheses. These regressions do not incorporate uncertainty in the estimated structural parameters.

5.5 Merger

Finally, we simulate acquisitions of Warner Bros. Discovery (WBD) by Netflix or Paramount, either retaining separate streaming subscriptions or combining HBO Max with the partner's service. Using the same 2023 benchmark, we hold programming fixed, allow subscription prices and carriage fees to adjust, and impose no additional cost efficiencies.

Tables 7 and 8 show that common ownership alone has small consumer welfare effects. With separate services, Netflix–WBD reduces monthly consumer surplus by about $0.1 per household, while Paramount–WBD leaves it essentially unchanged. Pricing responses differ: Netflix–WBD

raises HBO Max's price from $18.4 to $20.3, whereas Paramount–WBD lowers Paramount+ from $9.7 to $8.3 and HBO Max to $18.2. These differences reflect how common ownership changes pricing incentives across streaming and cable businesses.

Combining services generates larger consumer gains. The combined Netflix–HBO Max subscription costs $33.7 per month, compared with $42.1 for both subscriptions in the benchmark; Paramount+–HBO Max costs $19.0, compared with $28.1. Lower joint prices expand access and viewing, raising monthly consumer surplus by $2.5 per household under Netflix–WBD and $2.1 under Paramount–WBD.

6 Conclusion

The shift toward streaming has changed both how video content is packaged and the relationships between content suppliers and distributors. Using U.S. data from 2015 to 2023, we estimate a model of household subscriptions and viewing, retail pricing, and channel-distributor bargaining. The model allows us to evaluate alternative arrangements for distributing a fixed stock of programming while accounting for competition and common ownership across streaming, channels, and distribution.

Our results show that neither smaller subscriptions nor broader bundles necessarily benefit consumers. Streaming-only distribution lowers spending but reduces viewing, consumer surplus, and industry profits. Full rebundling broadens content access for subscribers and raises industry profits, but higher prices and the loss of smaller subscription options leave more households relying solely on free broadcast programming. Partial rebundling can increase both consumer surplus and industry profits by combining valuable catalogs while preserving standalone alternatives. Bundle composition matters alongside size, and the arrangement that maximizes industry profits need not maximize consumer surplus.

The terms of distribution are central to these outcomes. Per-subscriber carriage fees enter downstream marginal costs and can absorb the consumer gains from broader catalogs. Licensing migrated cable programming from separate suppliers raises streaming prices and further reduces consumer welfare. Under full rebundling, eliminating Netflix's and Amazon's per-subscriber fees turns the consumer-surplus loss into a gain, even as other suppliers continue to negotiate fees. These comparisons show how contractual terms affect retail pricing and access despite leaving content and ownership unchanged.

Table 7: Merger Prices and Market Shares

A: Equilibrium Prices

	Scenarios				
	Status Quo	Netflix–WBD Separate	Netflix–WBD Combined	Paramount–WBD Separate	Paramount–WBD Combined
A: Basic Distributor Package					
Dish	104.7	104.5	102.9	107.1	104.4
DirecTV	116.9	116.5	115.9	117.9	117.6
ATT Telco	112.2	112.2	110.7	113.4	111.6
Charter	107.5	107.4	106.5	109.2	108.0
HuluLive	78.9	78.8	79.0	81.7	78.4
YouTubeTV	74.7	74.6	75.5	76.3	76.1
B: Streaming Package					
Amazon	16.7	16.7	17.3	16.7	15.7
Disney Plus	14.3	14.3	13.9	14.3	13.8
HBO Max	18.4	20.3		18.2	
Hulu	14.9	14.8	14.7	14.6	14.9
Netflix	23.7	23.8	33.7	23.7	23.6
Paramount Plus	9.7	9.7	9.2	8.3	19.0
Peacock	9.7	9.7	9.5	9.7	9.7

B: Equilibrium Market Shares

	Scenarios				
	Status Quo	Netflix–WBD Separate	Netflix–WBD Combined	Paramount–WBD Separate	Paramount–WBD Combined
A: Distributor Package					
Dish	0.046	0.046	0.047	0.046	0.047
DirecTV	0.067	0.068	0.066	0.067	0.066
ATT Telco	0.055	0.055	0.055	0.055	0.057
Charter	0.272	0.273	0.271	0.269	0.267
HuluLive	0.030	0.029	0.028	0.027	0.030
YouTubeTV	0.050	0.051	0.047	0.050	0.047
B: Streaming Package					
Amazon	0.286	0.287	0.281	0.284	0.302
Disney Plus	0.300	0.300	0.293	0.306	0.303
HBO Max	0.076	0.068		0.078	
Hulu	0.280	0.280	0.281	0.287	0.282
Netflix	0.413	0.413	0.467	0.412	0.412
Paramount Plus	0.244	0.244	0.231	0.289	0.353
Peacock	0.250	0.249	0.232	0.256	0.251

Notes: The first column is the status quo; the next four columns impose common ownership of Netflix–WBD or Paramount–WBD, with separate or combined streaming services. Prices are monthly dollars per subscriber, and shares are fractions of all households. In the combined columns, the Netflix or Paramount Plus row represents the combined service; HBO Max is no longer offered separately.

Table 8: Merger Market Outcomes and Welfare

	Scenarios				
	Status Quo	Netflix–WBD Separate	Netflix–WBD Combined	Paramount–WBD Separate	Paramount–WBD Combined
A: Market Outcomes					
Any Pay-TV Distributor	52.0%	52.2%	51.5%	51.5%	51.5%
Any Standalone Streaming	68.0%	68.0%	68.5%	68.3%	68.8%
Streaming Only	29.0%	28.8%	29.8%	29.3%	29.8%
Broadcast Only	19.0%	19.0%	18.7%	19.2%	18.8%
Mean Standalone Subscriptions	1.85	1.84	1.78	1.91	1.90
Daily Hours Watched	6.82	6.82	6.93	6.82	6.91
# of Choices	1536	1536	1472	1536	1472
Viewership Utility from Broadcast ($)	44.1	44.1	44.1	44.1	44.1
Viewership Utility from All Content ($)	191.1	191.1	191.1	191.1	191.1
B: Consumer Surplus ($ Per Household-Month)					
Viewing Utility (Content + Sports)	159.2	159.2	161.0	159.1	161.0
Unobserved Bundle Term	-44.7	-44.7	-44.1	-43.7	-45.1
Streaming Taste Draws	34.5	34.4	35.9	35.5	36.3
Distributor Taste Draws	48.7	48.9	48.2	48.4	48.5
Age Terms	32.1	32.1	31.9	31.8	31.8
Logit Term	1.2	1.2	1.0	1.3	1.1
Distributor Spending (−)	-58.2	-58.4	-54.7	-59.4	-55.9
Streamer Spending (−)	-29.2	-29.2	-33.1	-29.4	-32.0
Consumer Surplus	143.6	143.5	146.1	143.6	145.7
C: Industry Profit ($ Per Household-Month)					
Subscription Revenues	87.5	87.6	87.8	88.7	87.9
Distributor Advertising	6.4	6.4	6.0	6.5	6.1
Channel Advertising	20.8	20.8	20.7	20.7	20.7
Distributor Marginal Costs (−)	-12.9	-12.9	-11.6	-13.7	-12.1
Streaming Marginal Costs (−)	-1.5	-1.5	-1.4	-1.5	-1.5
Carriage Fee (Transfer)	29.8	29.9	27.5	30.5	28.2
Industry Profits	100.3	100.5	101.5	100.7	101.1
D: Total Welfare ($ Per Household-Month)					
Total Welfare	243.9	244.0	247.7	244.3	246.7

Notes: Columns correspond to the same status quo and four merger cases as Table 7. Spending, consumer surplus, profits, and total welfare are monthly dollars per household. Consumer surplus is reported with and without logit taste shocks. Industry profits sum distributor, standalone streaming, and channel profits; total welfare adds consumer surplus including logit shocks. Demand parameters and content quality remain fixed, prices and affiliation fees are solved again, and no additional cost efficiencies are imposed.

The merger exercises reinforce the distinction between common ownership and product integration. Acquisitions of Warner Bros. Discovery by Netflix or Paramount have small aggregate consumer welfare effects when streaming subscriptions remain separate. Combining the services into a single subscription lowers their combined price and generates larger consumer gains.

The transition to streaming has opened new possibilities for distributing content, but the benefits depend on how markets organize and price access. Our findings suggest that bringing catalogs together can benefit both consumers and producers when households retain affordable subscription choices and licensing arrangements limit markups along the distribution chain. As digital media markets continue to evolve, the challenge is to translate the flexibility of digital distribution into broader access and economic gains shared by consumers and producers.

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Appendix

A Data Construction

From the raw data, we do the following steps to construct two primary data sets. The first is a market-year level data set of market shares and prices of cable, satellite, telco, and streaming packages. The second is a yearly data set of viewership by channel and studio.

A.1 Market Shares and Prices Data Set

We first define geographic boundaries of downstream markets for each year. Specifically, in each year, we partition the US into territories by the combination of operating wire-based distributors using the zip codes served by each system provided in the Nielsen FOCUS data. For the beginning of the data set, this is simply which single cable provider operates. For example, the Comcast market in 1998 consists of all geographies in the US served by a Comcast cable system and a no cable available territory. We create markets for the largest distributors and aggregate small distributors into a single "Other Cable" market. In later years, we further divide markets into those served by combinations of cable and telco. For example, in 2015, there are separate "Comcast" and "Comcast + Verizon" markets for geographies where the only wire-based provider is Comcast and where Comcast and Verizon compete, respectively. We assume both satellite providers are available in all markets in all years. We further add the streaming options of Netflix, Hulu, and Amazon in all markets for the years 2015 to 2017. The number of households in each market is the sum of the number of households in the zip codes that make up the market according to US Census data.

We assume households can choose any single cable or satellite distributor together with any combination of premium or streaming packages that are available in that year. For example, a household in 2017 living in the "Comcast + Verizon" market could choose no distributor, Comcast, Verizon, DirecTV, or Dish Network and any combination of Netflix, Hulu, or Amazon. If they choose a distributor (Comcast, Verizon, DirecTV, or Dish Network), they can also opt to add any combination of premium services HBO or Showtime.

The MRI data provide household level observations on combinations of choices with the households zip code.[11] Therefore, we observe the relevant market shares up to finite sampling error.

[11] MRI only starts reporting satellite shares in the year 2000. We backfill the satellite market shares by scaling down

Given the number of combinations, some of which are likely to have very low shares (for example, households rarely subscribe to Showtime but no HBO), this sampling error can be significant in this data set. We impute market shares for choice-market combinations with no household level observations by a linear regression of log(marketShare) on distributor cross year dummy variables, market dummy variables, streaming service cross year dummy variables, and an interaction of dummy variables for whether the choice includes HBO or Showtime. We then recompute market shares as the ratio of the imputed or observed value to the sum of the imputed or observed values in the market.

For distributor prices, we observe telco, DirecTV, and Dish prices at the yearly level for their most common packages. For cable providers, we use the average price of expanded basic packages across all their systems in the year using the FCC cable price survey when available, Warren's Cable Factbook data, and a hand collected data set of rate cards and references to cable prices in newspaper articles. For markets where cable competes with telco, we reduce the price by 15% to reflect competitive pressure from the telco as documented in Office (2003). For premium channel prices (HBO and Showtime in all years and Disney Channel until the year 2001), we randomly sampled prices from the Warren's Cable Factbook and various rate cards, and used the following prices for premium services: \$10 for the years 1994 to 1997, \$11 for 1998 to 2001, \$12 for 2002 to 2005, \$13 for 2006 to 2010, \$14 for 2011 to 2014, and \$15 for 2015 to 2017. .

Finally for the streaming services Netflix, Hulu, and Amazon, we use the following two sources: https://decider.com/2019/03/27/hulu-lower-prices-netflix-disney/ and https://www.engadget.com/2016-04-18-amazon-prime-video-is-now-a-standalone-monthly-service.html for prices in 2015 to 2017. For the full set of streaming services in 2023, we use prices from S&P Global and market shares from Antenna.[12] We construct the blended average price for each streaming service by weighting prices for ad supported and ad free tiers by their relative shares of subscribers.

We use the BLS Consumer Price Index to convert all nominal prices into 2012 dollars.

This procedure produces, for each year, a set of markets and within each market, a set of choices for consumer subscriptions with an associated market share and price.

the year 2001 market shares in each market by the growth in each satellite distributor's total subscribers from 1994 to 2000. In other words, if we know that the 1M households subscribed to DirecTV in the "Comcast" market in 2001, that the total number of DirecTV subscribers in 10M in 2001 and 4M in 1997, then we assign 400,000 households to DirecTV in 1997 in the "Comcast" market.

[12] https://www.antenna.live/post/checking-in-on-avod

A.2 Content and Viewership Data Set

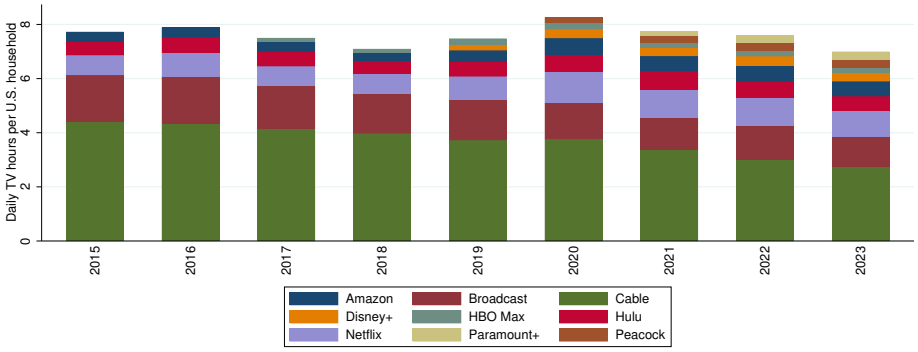
The first step in constructing the content and viewership data set was to collect, for each channel or streaming service in each year, the titles of content that one could access from that service. For cable and broadcast channels and syndicated programming, we took a convenience sample of several weeks per year from several local TV guide program grids using newspapers.com. We transcribed the program titles, then manually searched for them using mostly Wikipedia and IMDB and supplementing with deeper Google searches as necessary. We merged this data with the Nielsen NNTV database on show level ratings by a combination of automated and manual string matching. For shows that appeared in NNTV but not in TV guides, we separately searched for these shows. We were able to match the programs for over 90% of the time viewed so far. For each program, we recorded up to three studios as content producers.[13] We also recorded whether the program was new or a rerun based on the original network and year in which the program was aired. If a studio was not listed, we assigned the channel airing the programming to be the studio. For all new (that is, non-rerun) programming, we include the channel airing the programming as an additional studio involved in production. For example, for live NFL telecasts on CBS, we assign this program to 50% produced by the NFL and 50% produced by CBS. For Netflix, Hulu, and Amazon, we recorded programs using databases from S&P Global and Plum Research. For movies, we aggregate individual titles to the major studio that produced the movie, the recency of the movie, and the movie rating category on IMDB. For example, on HBO in a given year, an example movie observation would be "Movies released in the previous three years with an IMDB rating above 4 and produced by Paramount." We aggregate studio names up to the ultimate parent conglomerate level. This series of steps produces a data set at the title-channel/service-year level which records the parent company of studios involved in producing the title and whether the title is new or a rerun in that year on that channel.

NNTV provides the total minutes watched aggregated across all US households per show per year.

Finally, we split the hours assigned to each title evenly among the studios involved in its production to create the data set of viewership at the channel/streaming service - studio - year level.

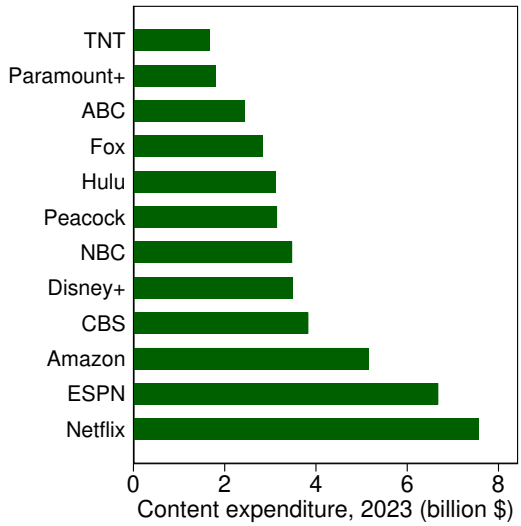
[13] Some programs list more than three studios listed, most of which are small studios that do not appear in the data much elsewhere. In these cases, we made sure to include any major studio that was listed as one of the three.

Figure A.1: Daily Hours Spent Watching TV per U.S. Household



Notes: This figure shows daily hours spent watching TV of an average household, separately for cable content, broadcast content, and each streaming service.

Figure A.2: Content Spending by Top Channels and Streaming Services



Notes: This figure shows content spending for channels and streaming services in 2021.