Exclusive Contracts in the Video Streaming Market*

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Abstract

I study who gains and who loses from exclusive contracts in the video streaming market, where studios grant streaming services exclusive rights to distribute their content. Streaming services can use these contracts to differentiate their content offerings and soften competition, while studios may leverage them to negotiate higher license fees from streaming services. I develop and estimate a structural model that incorporates bargaining between streaming services and studios, streaming services setting subscription prices, and consumer demand for subscriptions and titles. I find that streaming services that lack in-house content (like Hulu) gain from exclusive contracts, while those with extensive in-house content (like Netflix) see minimal or even negative effects. For studios, exclusive contracts benefit small studios with weak bargaining power but harm large ones with strong bargaining power. While exclusive contracts harm consumers due to reduced title distribution and higher subscription prices, they may benefit consumers in the long run by stimulating content production and streaming service entry.

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1 Introduction

Exclusive contracts are prevalent across markets, such as Apple's exclusive deal with AT&T for iPhone sales from 2007 to 2011, Costco's with Visa for credit card processing since 2015, and Spotify's with Joe Rogan for podcast distribution from 2020 to 2024. These agreements often result from competitive negotiations where firms offer favorable deals to counterparties to secure exclusive rights, consequently shaping product availability, competition, and consumer welfare.

In this paper, I examine who gains and who loses from exclusive contracts. I study this question in the context of the video streaming market, where consumers pay subscription fees to access content libraries from services like Netflix and Hulu.[1] This market accounts for over a quarter of U.S. television viewing time (Nielsen 2022). Exclusive contracts—agreements where content providers (studios) grant exclusive rights to streaming services for distributing their content—are common. For example, Netflix holds the exclusive licensing rights to *Friends* from Warner Bros., and Hulu to *Fargo* from FX Networks (Slate 2018, Variety 2014). As a result, 86.7% of titles—movies and shows—from third-party studios appeared on only one service as of 2022. While exclusive distribution can arise without exclusive contracts, such contracts are often used to enforce exclusive distribution.

The prevalence of exclusive contracts is often driven by two forces that are common to many other markets. The first is differentiation: streaming services can use them to license unique content, differentiate from competitors, and improve profitability. The second, formalized in this paper, is bargaining: studios can use exclusive contracts as a bargaining tool, committing to exclusive distribution to play services off against each other and negotiate favorable deals. This practice results in hefty license fees, such as Netflix's $100 million annual fee for the exclusive rights to *Friends* (Slate 2018).

The impact of exclusive contracts on studios and streaming services is theoretically ambiguous. The force of differentiation increases joint profits to be shared between them, while the force of bargaining shifts profits toward studios at the expense of services. This is further complicated by equilibrium effects: a contract between one studio and service can affect the payoffs of others (Segal 1999). The direction and

[1] In this paper, "video streaming" specifically refers to Subscription Video on Demand (SVOD), excluding services like YouTube and Amazon Rent or Buy. I discuss the market definition in detail in Section 2.

magnitude of equilibrium effects depend on the substitutability of both titles and subscriptions. The net impact of differentiation, bargaining, and equilibrium effects is uncertain and can vary across studios and services.

Exclusive contracts can harm consumers, as greater differentiation among streaming services forces consumers to subscribe to more services and pay higher prices to access desired content. However, if exclusive contracts enhance the profitability of studios and services, they may ultimately benefit consumers by inducing content production and service entry.

To quantify the net impact of exclusive contracts, I collect detailed data on viewership, subscription, and title distribution from various sources. I develop and estimate the structural model that captures both forces of differentiation and bargaining. The model incorporates bilateral contracting between streaming services and studios, subscription price setting by streaming services, and consumer demand for subscriptions and titles. Using the model and estimates, I quantify the impact of exclusive contracts by simulating a counterfactual where they are absent, as well as additional counterfactuals that account for potential adjustments in content production and streaming service entry.

To capture the effect of differentiation, I construct a model of demand for service subscriptions by households and titles by household members, with a pricing model in which streaming services maximize payoffs. The demand model allows for consumer multi-homing across streaming services, heterogeneous viewer preferences, and varying influences of household members on subscription decisions. It quantifies services' expected incremental subscriptions from licensing a title. Combined with profit margins recovered from the pricing model, this yields the expected profits that services can derive from potential licensing contracts, which are split with studios in negotiations.

I estimate the demand model using subscription and viewership data. The subscription data report monthly market shares of all combinations of service subscriptions at the DMA level. The viewership data provide weekly title-level viewing time, segmented by age, gender, and race. I identify the impact of title licensing on subscription demand from the relationship between services' market shares and viewership, with variation in the latter driven by changes in title distribution. The correlation between observed consumer multi-homing and changes in services' content libraries identifies substitutability across services (Gentzkow 2007). Variation in viewership across demographic groups identifies diverse streaming preferences. Lastly, I exploit geographical variation in tax rates on subscriptions to identify price elasticities, which inform streaming services' profit margins. I estimate that the mean own-price elasticity of service subscriptions is -1.45, and that the average household's annual willingness-to-pay for each title varies from less than \$0.01 to \$7.81.

To capture the effect of bargaining, I develop a bilateral bargaining model. In this model, streaming services negotiate with studios over two components: inclusion in a title's distribution network—defined as the set of services with licensing rights—and a lump-sum license fee. During negotiations, a studio can threaten to replace a streaming service with an excluded alternative service to improve its bargaining leverage, leading to license fees as in the Nash-in-Nash with Threat of Replacement (NNTR) bargaining solution (Ho and Lee 2019). This model highlights that studios with weaker bargaining power benefit more from improving their bargaining leverage through such threats of replacement, and therefore, have stronger exclusionary incentives. Data on title distribution support this relationship: the "Big Five" studios (NBCUniversal, Paramount, Warner Bros., Walt Disney, and Sony), generally perceived to have stronger bargaining power, exhibit a 3.7 percentage point lower likelihood of exclusive distribution compared to small studios.

Leveraging this negative relationship between bargaining power and exclusionary incentives, I estimate bargaining power by searching for parameters that best explain the observed distribution networks. This novel approach bypasses the need for data on privately contracted, lump-sum license fees. I find that small studios have significantly weaker bargaining power (0.53) than the "Big Five" (0.82).

I use the model and estimates to evaluate the impact of exclusive contracts by comparing the status quo to a counterfactual without such contracts. In this counterfactual, exclusive distribution may still arise but cannot be contractually enforced. This setup reflects regulations in other markets, such as the U.K.'s ban on exclusive employment contracts for low-paid workers, which previously prevented them from working for multiple employers.

On the streaming service side, I find that small streaming services benefit substantially from exclusive contracts, with Hulu's payoff increasing by 110.1%. In contrast, larger services see modest or negative effects—Netflix gains 1.6%, while Amazon Prime loses 5.3%. This disparity arises from their differences in in-house content portfolio. Small services, lacking in-house content, rely on exclusive third-party titles for differentiation and competitiveness. Large services, with already substantial in-house content, see limited benefit from additional differentiation. This benefit can be offset by a negative equilibrium effect from increased competition from small services, which use exclusive third-party content to attract subscribers away from these large services.

On the studio side, small studios experience an 8.1% gain, while the "Big Five" see a 5.7% loss. This contrast is driven by two countervailing effects. First, both groups face a negative equilibrium effect: exclusive contracts differentiate streaming services and reduce their substitutability, which lessens their loss of subscribers when dropping a title, and therefore, lowers their willingness to pay for titles. However, exclusive contracts also enable studios to more effectively exert the threat of replacement. This effect is especially pronounced as small streaming services become more profitable, making them credible outside options for studios in negotiations with larger platforms. Small studios, with weaker bargaining power, benefit substantially from this improved bargaining leverage and see an overall gain. In contrast, the "Big Five," with already strong bargaining power, benefit little from this improved leverage and see a net loss.

Finally, with fixed title production and streaming service entry, exclusive contracts reduce consumer surplus by $24 per household per year. This loss results from both reduced title distribution—the share of exclusively distributed titles rising by 26.6 percentage points—and increased subscription prices. However, the gains for small studios and streaming services may stimulate both content production and service entry in the long run. Analyzing additional counterfactuals that capture these margins, I find that they may mitigate or even reverse the short-run negative impacts of exclusive contracts on consumers.

Contribution and Related Literature This paper adds to the literature on exclusive contracts. Bork (1978) argues that such contracts must be efficient to be adopted, but subsequent research has identified both pro- and anti-competitive effects. On the positive side, exclusive contracts can mitigate contracting externalities (Segal 1999), encourage investment (Segal and Whinston 2000), and stimulate entry (Lee 2013, Le 2023). On the negative side, they can soften competition (Rey and Stiglitz 1995, Nurski and Verboven 2016, Sinkinson 2020), deter or foreclose entry (Bernheim and Whinston 1998, Asker 2016), and raise rivals' costs (Subramanian, Raju and Zhang 2013). Most papers use offer or bidding games, where either upstream or downstream firms make take-it-or-leave-it offers to firms on the other side. In contrast, this paper adapts a Rubinstein (1982)-style bargaining game while allowing firms to use excluded counterparties as bargaining threats, thereby highlighting the role of bargaining behind exclusive contracts. It aligns with theoretical insights from Chambolle and Molina (2023) and Abreu and Manea (2024), who study capacity restriction as bargaining leverage, but goes further by empirically investigating how bargaining power affects the formation of exclusive contracts and evaluating their welfare effects.

This paper contributes to the empirical literature on bargaining. Observing detailed contractual terms, Mortimer (2007, 2008) and Ho, Ho and Mortimer (2012) study price discrimination, revenue sharing, and full-line forcing in the video rental market. Most research in this area (e.g., Draganska, Klapper and Villas-Boas 2010, Crawford and Yurukoglu 2012, Gowrisankaran, Nevo and Town 2015, Ho and Lee 2017, Crawford et al. 2018) adopts the "Nash-in-Nash" bargaining model. However, "Nash-in-Nash" has two key limitations: (a) it excludes the role of network formation and outside options in bargaining by assuming a predetermined network of agreements, and (b) it requires negotiated prices as estimation inputs. These conditions are not suited for the video streaming market, where exclusive contracts are often strategically used as a bargaining tool, and license fees are confidential lump-sum payments that are neither observed nor inferable from optimal pricing conditions. Ho and Lee (2019) addresses limitation (a) with the NNTR bargaining solution, allowing firms to use excluded counterparties as threats in bargaining—a feature also incorporated by Hristakeva (2022a,b), Beckert, Smith and Takahashi (2025), among others. I build on NNTR to model endogenous network formation. Moreover, I address limitation (b) by identifying bargaining power using variation in title distribution, without relying on observed or imputed negotiated prices. Compared with alternative network formation models (e.g., Liebman 2018, Ghili 2022), my approach does not require negotiated prices and avoids assuming fixed bargaining costs to explain negotiation breakdowns, making it more widely applicable for studying vertical relations.

This paper adds to the literature on video streaming, which has examined topics such as their competition with cable TV (Malone et al. 2021, McManus et al. 2022). This paper complements Gentzkow, Yu and Yurukoglu (2025), which studies the impact of content bundling across streaming services and cable channels while treating content distribution as fixed. In contrast, my paper endogenizes content distribution and focuses on the impact of exclusivity.

2 The Video Streaming Market

I focus on the Subscription Video On Demand (SVOD) sector of the video streaming market, where users pay a subscription fee for unlimited access to a digital library of movies and shows. SVOD is a distinct market, differing in both content type and revenue model: ad-supported video on demand (AVOD) services like YouTube monetize on ads and primarily feature user-generated content; multichannel video programming distributors (MVPDs) such as Comcast and YouTube TV offer scheduled, channel-based programming; and transactional video on demand (TVOD) services like Amazon Rent or Buy charge users per title. More importantly, these services negotiate and operate under separate licensing agreements—even when operated by the same company, as with Amazon Rent or Buy and Prime Video. Throughout the paper, I use "video streaming" and "SVOD" interchangeably.

This paper focuses on four leading streaming services—Netflix, Amazon Prime Video, Hulu, and Disney Plus—from March 2021 to February 2022. Together, these services accounted for over 75% of the total SVOD expenditure and viewing time in the U.S. during the period (Wall Street Journal 2021, Nielsen 2022). They were also the only four streaming services tracked by Nielsen, the media measurement company that provides the data for this study. Other services were much smaller at the time, with HBO Max, the fifth largest, having about half the market share of Disney Plus, the fourth largest.

Streaming services offer both in-house and third-party content. In-house content, produced by services themselves, is almost always exclusive to the producing service. While in-house production has grown significantly, third-party content still makes up nearly 60% of the top 2,000 titles in my data. Notably, among these third-party titles, 86.7% are available on only one service. These exclusive content offerings drive widespread consumer multi-homing: in my data, the average U.S. household subscribed to 1.7 of the top four services during the study period.

Vertical Contracting Licensing negotiations between studios and streaming services only involve third-party content.[2] Negotiations typically occur on a per-title basis, with contracts outlining exclusive rights and *lump-sum* fees. Revenue sharing between studios and services is rare, even for advertising revenue.[3] Contracts typically last for a year, with rare opportunities for renegotiation. In most cases, only Netflix, Amazon Prime, and Hulu actively negotiate for third-party licensing rights; Disney Plus and smaller services not covered in the study generally rely on in-house content and do not engage in these negotiations.

Exclusive contracts have significantly affected the bargaining dynamic. Studios can commit to distributing specific tiles to only one service, often through exclusive contracts, so they can go back and forth between services, using offers from one as leverage to squeeze another to pay more. This threat of exclusion and replacement pressures services to outbid their rivals, often resulting in substantial license fees. For example, Netflix secured a $100 million annual exclusive agreement for *Friends* in 2019 (Slate 2018), while Amazon offered $90 million for *Crime 101* and made a multi-million dollar bid for *Sound of Freedom* in 2023 (Screen Rant 2023, Vulture 2023).

Capacity Constraint in Content Production During the study period, studios faced significant capacity constraints and lacked the capacity to produce additional content within a 2–3 year time frame. These constraints result primarily from a surge in demand and widespread studio shutdowns following COVID-19 (Deloitte 2023).

3 A Simple Model of Bilateral Contracting

In this section, I present a simple model of contract negotiations. With minimal setup, it illustrates the key forces behind the formation and efficiency implications of exclusive contracts, formalized later in the main model. Consider a market with one studio holding a single title and two streaming services, k_1 and k_2. The agents play a two-stage game:

[2]Streaming services also engage in production contracts with studios, compensating them for production costs plus a premium. However, the service retains full ownership of the content, so no licensing contracts are needed.

[3]Netflix provides additional references on licensing payments: `https://ir.netflix.net/ir-overview/top-investor-questions/default.aspx`. Amazon pays some independent titles based on viewership but mainly uses lump-sum payments for popular titles, which account for most of its license fees and are the focus of this paper.

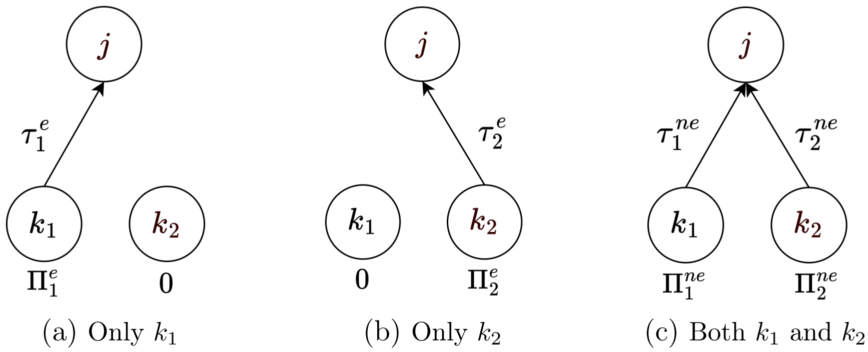


Figure 1: Market Outcomes Under All Possible Networks (Note: j refers to the studio)

- **Stage 1** (Bilateral Contracting): The studio chooses a set of streaming services to reach licensing agreements with. It can be k_1, k_2, or both. Each contract is negotiated bilaterally and simultaneously, includes a *lump-sum* license fee τ, and can specify if the licensing right is exclusive.
- **Stage 2** (Downstream Competition): k_1 and k_2 compete downstream and realize sales profits. These profits are denoted as Π_1^e and Π_2^e when the title is only on one of the services, and as Π_1^{ne} and Π_2^{ne} when it is on both services.

Figure 1 illustrates all possible outcomes of the game. This model incorporates two key features. First, the studio can commit to exclusive distribution—often ensured by exclusive contracts in practice—to create licensing scarcity. Second, it can induce streaming services to compete for this scarce right. In practice, the studio does so by going back and forth, using the potential deal it can reach with one service as a bargaining threat against the other. With these two features, the model captures the studio's ability to leverage distribution restrictions to negotiate higher license fees, as highlighted in Section 2. In Appendix B.1, I present the extensive-form game and derive the corresponding equilibrium outcomes.

License Fee Negotiations When the studio intends to only license to k_1, as in Figure 1a, the license fee is given by:

$$\tau_1^e = \arg\max_{\tau} (\tau)^b (\Pi_1^e - \tau)^{(1-b)} \text{ s.t. } \tau \geq \Pi_2^e, \tag{1}$$

where $b \in [0, 1]$ denotes the studio's bargaining power against both services. As in the "Nash-in-Nash" solution, τ_1^e maximizes the Nash product of gains from trade, with τ as the studio's gain and $\Pi_1^e - \tau$ as k_1's. The key difference is the constraint $\tau \geq \Pi_2^e$, which reflects the studio's ability to improve bargaining leverage by threatening to replace one service with the other. This threat is credible only if the studio can commit to exclusive distribution, thereby inducing k_1 and k_2 to compete for the scarce licensing right. In practice, the studio can leverage this threat by going back and forth between k_1 and k_2, using offers from one as leverage against the other. This practice can trigger a "bidding war," so that to ensure its licensing right, k_1 must pay no less than Π_2^e—the highest offer k_2 would make.[4] Since this constraint arises from the competition between streaming services, it is independent of the studio's bargaining power b. Equation (1) corresponds to the Nash-in-Nash with Threat of Replacement (NNTR) solution from Ho and Lee (2019).

I assume $\Pi_1^e > \Pi_2^e$. Therefore, exclusive distribution to k_2—the outcome in Figure 1b—can be ruled out, since k_1 can always offer slightly more than k_2's maximum offer of Π_2^e while maintaining a positive payoff.

When the studio distributes to both k_1 and k_2, as in Figure 1c, it has no excluded service as leverage. Therefore, the NNTR solution defaults to the "Nash-in-Nash" solution:

$$\tau_k^{ne} = \arg\max_{\tau} \, (\tau)^b (\Pi_k^{ne} - \tau)^{(1-b)}, k \in \{1, 2\}. \tag{2}$$

Taken together, the total license fees for the studio under *distribution network* $\mathcal{K}_j$, or the set of streaming services licensing the title, can be specified as

$$\Pi_j(\mathcal{K}_j) = \begin{cases} \max\{b\Pi_1^e, \Pi_2^e\}, & \mathcal{K}_j = \{k_1\} \\ b \cdot \Pi_1^{ne} + b \cdot \Pi_2^{ne}, & \mathcal{K}_j = \{k_1, k_2\} \end{cases}. \tag{3}$$

Exclusionary Incentives of Studios As the title owner, the studio has the discretion to choose its distribution network. The studio opts for exclusive distribution if and only if it yields a higher payoff than non-exclusive distribution: $\max\{b\Pi_1^e, \Pi_2^e\} \geq b \cdot \Pi_1^{ne} + b \cdot \Pi_2^{ne}$.

This condition holds in two scenarios. The first is when the joint profit for the

[4]In the extensive-form game, the studio can induce competition between streaming services to extract higher license fees. It does so by adopting a mixed strategy over which service to bargain within an alternating offer game adapted from Rubinstein (1982). Notably, this is not a game in which the studio can deviate to make take-it-or-leave-it offers to excluded services at any time. As the agents' discount factor approaches 1, both services would propose and accept license fees for exclusive rights whose lower bounds converge to Π_2^e, and the studio selects a distribution network with a probability approaching 1. This limit outcome yields the equilibrium discussed in this section and in the main model. See Appendix B.1 for details.

bargaining parties is higher if the title is distributed only to k_1,

$$\Pi_1^e \geq \Pi_1^{ne} + \Pi_2^{ne}. \tag{4}$$

This implies that exclusive contracts can improve contracting efficiency by enabling the studio to commit to a distribution network that maximizes the sum of bilateral surpluses from contracts—equal to joint profits in this example—between itself and the contracting services (Segal 1999). This occurs when the exclusive title can differentiate k_1 enough to encourage k_2 subscribers to either switch to k_1 or multi-home on both services. The profitability of this approach depends on multiple factors, including consumers' willingness to multi-home. The easier it is to induce multi-homing, the more profitable it is for the studio to distribute only to k_1.

The other scenario arises when the studio holds weak bargaining power, making it more profitable to commit to exclusive distribution and use k_2 as a bargaining threat. This tactic improves its bargaining leverage and shifts the surplus division with k_1 in its favor:

$$\underbrace{\Pi_2^e - b \cdot \Pi_1^{ne}}_{\substack{\text{Gain from Improved} \\ \text{Bargaining Leverage}}} \geq \underbrace{b \cdot \Pi_2^{ne}}_{\substack{\text{Loss from} \\ \text{Exclusion}}} \implies b \leq \frac{\Pi_2^e}{\Pi_1^{ne} + \Pi_2^{ne}}. \tag{5}$$

This condition highlights the role of bargaining in the formation of exclusive contracts: studios with weaker bargaining power are more likely to opt for exclusive distribution. Intuitively, the studio's gain from improved leverage, $\Pi_2^e - b \cdot \Pi_1^{ne}$, decreases with its bargaining power b, while its loss from excluding k_2, $b \cdot \Pi_2^{ne}$, increases with b. In Appendix B.2, I show that this intuition holds when b varies across streaming services.

Finally, in practice, there are multiple studios licensing various titles. This creates equilibrium effects not captured in this simple model: a title contract between one pair of studio and streaming service affects the profitability of other firms. Such effects, known as "contracting externalities" (Segal 1999), shape the profits generated by different contracts and, in turn, affect which contracts are formed and who gains from exclusivity. In Section 5, I capture these equilibrium effects by incorporating all titles in the bargaining model, alongside consumer demand and platform pricing models that capture how each contract affects the profitability of others.

4 Data and Descriptive Evidence

4.1 Data

This paper uses novel data that fall into three main categories: (a) title viewership and characteristics, (b) title distribution and production, and (c) quantities and prices of service subscriptions. The data cover the top four streaming services—Netflix, Amazon Prime Video, Hulu, and Disney Plus—from March 2021 to February 2022. I discuss each in turn.

Title Viewership and Characteristics I draw on two data sources for title viewership and characteristics. The primary source is Nielsen's title rating data, which reports weekly viewing time for each title by individuals aged two and above in the U.S., with demographic breakdowns by age, gender, and race. Appendix C.1 provides more details on Nielsen's rating data. I supplement it with data from Reelgood, which details title characteristics such as release dates and the most related genre. Genres are aggregated into six categories: action, comedy, horror and thriller, kids, drama, and others.

The final sample consists of 2,028 titles, selected as those with either maximum or average weekly viewership in the top quintile on at least one service. These titles account for 91% of total viewership across platforms. Figure A.1 shows the demographic breakdown of their viewership by genre.

Title Distribution and Production Reelgood provides data on title distribution across the top four streaming services, as well as information on titles' production studios. Of the sampled titles, 1,145 (59.0%) are third-party, which involves licensing contract negotiations between streaming services and studios.[5]

Data highlight the prevalence of exclusive distribution: 993 third-party titles (86.7%) are on only one service.[6] In contrast, only 125 (10.9%) and 27 (2.4%) are on two and three services, respectively. Exclusive third-party titles exhibit lower weekly

[5]Titles produced by a streaming service or with a single service as its only global distributor are classified as in-house; all others are considered third-party. In the final sample, 88 titles have no production studio information.

[6]The raw data provide daily-level title distribution details. 222 sampled third-party titles (21.2%) in the final sample migrated across streaming services at least once during the study period. For simplification, a title's distribution network is defined by the unique combination of services where it has the longest period of distribution.

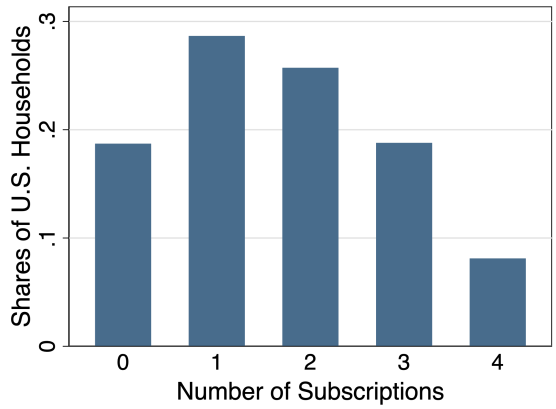


Figure 2: Distribution of the Number of Subscribed Services

Notes. This figure presents the monthly average share of households that subscribe to varying numbers of the top four streaming services within the study period and the top 30 DMAs, weighted by the population in each DMA.

viewing hours—0.47 million versus 0.73 for non-exclusive ones. However, this gap may not indicate lower quality, as exclusive titles are available on fewer services, and therefore, to fewer viewers.

Quantities and Prices of Service Subscriptions Service subscription quantities are sourced from the Nielsen Household Universe Estimates dataset, which provides monthly market shares of services at the DMA level for the 30 most populous DMAs. These DMAs account for 55% of U.S. households, and Figure A.2 provides a map of their locations.

A key advantage of this dataset is its reporting of market shares for each bundle, or unique combination, of streaming services. For example, it details the share of households in the Atlanta DMA subscribed to Netflix and Hulu but not to Amazon Prime and Disney Plus in June 2021. This unique feature enables analysis of consumers' prevalent multi-homing behavior: more than half of U.S. households subscribe to at least two of the top four streaming services, as described by Figure 2.

Subscription prices are sourced from streaming services' websites. In addition, consumers pay taxes for subscriptions, which vary significantly nationwide. Most states impose sales taxes on streaming subscriptions, but others, such as California and Utah, exempt them. In addition, certain states and cities levy unique taxes, such as Florida's communications services tax of up to 15% in some counties and

Chicago's 9% amusement tax. The tax rates are compiled from multiple sources: Bloomberg Tax identifies applicable tax categories by state and city; ZIP-code and month-level tax rates come from Thomson Reuters' Tax Data System; and state and local government websites cover special cases like Florida.

4.2 Descriptive Evidence on Title Distribution

Bargaining as an Exclusionary Incentive The contracting model predicts that studios with weaker bargaining power are more inclined to use exclusive distribution. To test this prediction, I compare the distribution strategies of the "Big Five" studios to smaller studios. The "Big Five," producing 46.1% of the sampled third-party titles, are expected to have stronger bargaining power due to their extensive bargaining experience and a century-long dominance in content production, which compels streaming services to make concessions to maintain long-term relationships and secure future licensing deals.

I find that 15.2% of titles from the "Big Five" are distributed to multiple services, compared to only 11.5% for smaller studios. This difference holds after controlling for title characteristics, estimated using the following regression:

$$E_j = \beta_0 + \beta_1 \cdot \text{BigFive}_j + \beta_2 \mathbf{X}_j + \varepsilon_j, \tag{6}$$

where E_j represents exclusive distribution, BigFive_j represents production by a "Big Five" studio, and $\mathbf{X}_j$ is a matrix of title characteristics including release years, type (movie or TV show), and genres. The results, presented in Column (1) of Table 1, confirm the difference in the contracting strategies of the "Big Five" and small studios. This regression is used as an indirect inference moment when estimating the structural model.

Differential Reliance on Third-Party Titles by Streaming Services Streaming services differ in their reliance on third-party content. Figure 3a shows that third-party titles account for about two-thirds of the libraries of Netflix and Amazon, while Hulu depends almost entirely on licensing from external studios. In contrast, Disney Plus almost only offers in-house content from Disney-operated studios like Pixar and Marvel, as in practice, they rarely negotiate with external studios for licensing deals. This variation suggests that these services have different levels of vulnerability to the

Table 1: Distribution Networks of Titles

	(1) Exclusive Distribution		(2) Title-Service Distribution	
	Estimate	SE	Estimate	SE
"Big Five"	-0.038	0.019		
Disney's Studio			-0.236	0.034
Disney's Studio × Hulu			0.709	0.056
Other Controls	Title Characteristics		Streaming Service FE	
Observations	1,145		3,435	

Notes. The dependent variables in Column (1) and (2) are whether a title is distributed to only one service, and whether a title is distributed to a specific service, respectively. Title characteristics variables include release year, type (movie or show), and genre.

availability and exclusivity of third-party content, which can be affected by exclusive contracts.

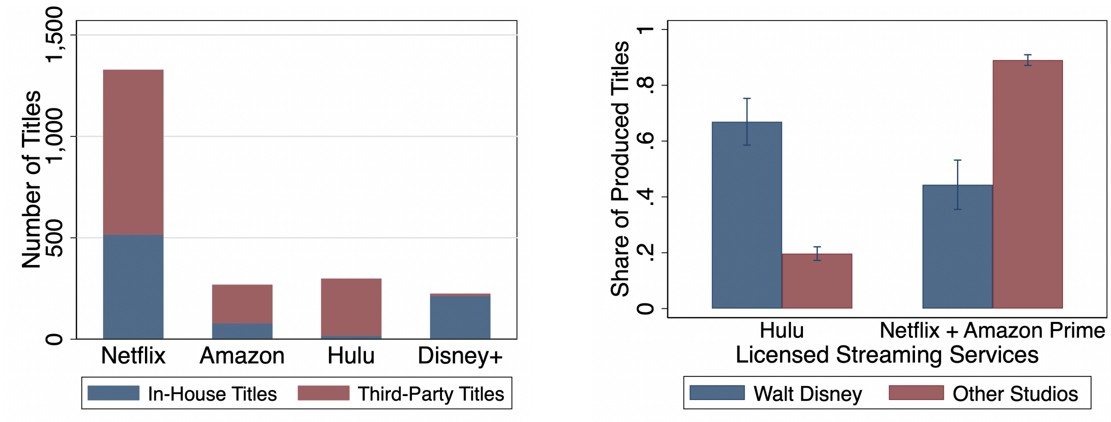
Effect of Vertical Integration Studios often consider the benefits of their vertically integrated streaming services when licensing titles. As a result, a studio may prefer contracting with its integrated service while withholding from its competing services, as licensing to the latter can create negative externalities on its integrated service.[7] During the study period, Hulu—under Disney's control—was the only top-four service vertically integrated with non-in-house studios. Figure 3b shows that compared with other studios, Disney-affiliated studios are more likely to license titles to Hulu and less likely to license to Hulu's competitors, Netflix and Amazon Prime. This finding is confirmed by the following regression:

$$L_{jk} = \beta_0 + \beta_1 \cdot \text{WaltDisney}_j + \beta_2 \cdot \text{WaltDisney}_j \cdot \mathbf{1}(k = \text{Hulu}) + \delta_k + \varepsilon_{jk}, \quad (7)$$

where L_{jk} indicates if title j is licensed to service k, WaltDisney_j denotes Walt Disney-produced titles, and δ_k refers to service fixed effects. I present the results in Column (2) of Table 1, which are also used as an indirect inference moment in structural estimation. A significantly positive β_2 reflects the impact of vertical integration on bargaining outcomes.[8]

[7]Vertically integrated streaming services must pay for titles from studios they control but do not directly operate. For example, Hulu pays for ABC's titles, though both are controlled by The Walt Disney Company.

[8]This distribution pattern is unlikely to result from services internalizing the payoffs of their integrated studios. As long as a service is only willing to pay up to its incremental variable profits



(a) Services' Reliance on Third-Party Titles (b) Licensee Choices: Walt Disney vs. Others

Figure 3: Descriptive Evidence on Title Distribution

Notes. Figure (a) displays the numbers of in-house and third-party titles on each streaming service within the sample. Figure (b) displays the likelihood of distributing to Hulu and its competitors, Netflix and Amazon Prime, by Walt Disney and all other studios. The vertical segments delimit the 95% confidence intervals.

5 Model

This section introduces a model that generalizes the simple framework from Section 3. The model has three stages. In stage 1, streaming services bilaterally bargain with studios over title distribution and license fees, while setting subscription prices simultaneously. In stage 2, households subscribe to bundles of streaming services, followed by household members choosing titles to watch in stage 3. I present the model in reverse order of timing and discuss the key assumptions.

5.1 Demand

The demand model analyzes how title distribution and subscription prices affect subscription demand. However, due to limited variation and high dimensionality of title distribution, it is hard to quantify each title's contribution to subscription demand—a key object of the model—by directly connecting title distribution to subscription demand. Instead, I observe each title's contribution to viewership. To bridge this gap, I develop a viewership model to capture how title distribution affects viewership, with a subscription model to link expected viewership to subscription demand. Details

from a contract, it cannot outbid more efficient rivals which can generate higher incremental profits, or induce studios to switch contracting partners, as suggested by the simple model from Sectin 3.

follow.

5.1.1 Stage 3: Title Viewership

Each individual i can stream up to 50 hours per week. In each 30-minute period t during week w, she can watch a title j offered by her subscribed services. She derives the same utility from streaming a title, regardless of the service it is streamed on. Her utility from watching title j during period t is specified as

$$u_{ijt}^T = \mathbf{w}_{jw(t)}\boldsymbol{\beta}_i^{\mathrm{w}} + \beta_i^0 + \zeta_{jw(t)} + \epsilon_{ijt}, \tag{8}$$

where $\mathbf{w}_{jw}$ represents title-week characteristics, including genre, time since release, title fixed effects, seasonality (summer and holidays), and a binge-release dummy for shows defined as simultaneous releases of at least four episodes. The preferences for $\mathbf{w}_{jw}$, denoted as β^{w}, vary across individuals and differ between shows and movies. ζ_{jw} represents characteristics observed by consumers (in both stages 2 and 3) but not econometricians, and ϵ_{ijt} denotes i.i.d. T1EV preference shocks. The utility of choosing the outside option is normalized as $u_{i0t}^T = \epsilon_{i0t}$. The random coefficients are specified as $\beta_i^0 = \bar{\beta}^0 + \beta_d^0 d_i + \beta_v^0 v_i^0$ and $\boldsymbol{\beta}_i^{\mathrm{w}} = \bar{\boldsymbol{\beta}}^{\mathrm{w}} + \boldsymbol{\beta}_d^{\mathrm{w}} d_i$, where d_i denotes demographics, including age, gender, and race. v_i represents unobserved demographics that follow a standard normal distribution $N(0,1)$.

With subscriptions to service bundle c, individual i can access the set of titles available on all services within the bundle, denoted as $\mathcal{J}_{cw} = \cup_{k \in c} \mathcal{J}_{kw}$. The share of her time spent on title j at week w can be specified as

$$s_{ijw|c}^T = \frac{\exp\left(\mathbf{w}_{jw}\boldsymbol{\beta}_i^{\mathrm{w}} + \beta_i^0 + \zeta_{jw}\right)}{1 + \sum_{j' \in \mathcal{J}_{cw}} \exp\left(\mathbf{w}_{j'w}\boldsymbol{\beta}_i^{\mathrm{w}} + \beta_i^0 + \zeta_{j'w}\right)}. \tag{9}$$

5.1.2 Stage 2: Streaming Service Subscriptions

At the beginning of each month, household h decides which bundle of streaming services to subscribe to. The utility derived by household h in market m, defined as a combination of DMA and month, from subscribing to bundle c is specified as:

$$u_{hcm}^S = V_{hcm}\alpha^V - p_{cm}(1 + \iota_h)\alpha_h^p + \mathbf{x}_c\boldsymbol{\alpha}^{\mathrm{x}} + \xi_{cm} + \varepsilon_{hcm}. \tag{10}$$

The first component, $V_{hcm}\alpha^V$, represents utility derived from content offered by services in bundle c. Here, content utility V_{hcm} is defined as

$$V_{hcm} = \sum_{i \in h} \kappa_i \sum_{t \in m} \mathbf{E}_\epsilon \left[\max_{j \in \{0\} \cup \mathcal{J}_{ct}} u^T_{ijt} \right], \tag{11}$$

which aggregates the expected utility derived by each household member from the outside option and viewing content on subscribed services, $\mathcal{J}_{ct}$, during all time periods t within the month. Since subscriptions are shared among household members, V_{hcm} accounts for all members' expected utilities, with a weight κ_i that reflects the decision-making power of i within the household. I assume κ_i varies across three age-gender groups: male adults, female adults, and children.

The second component, $p_{cm}(1 + \iota_h)\alpha^p_h$, corresponds to the disutility from prices p_h and taxes $p_h\iota_h$ on service subscriptions. Tax rates ι_h vary across households based on their residential locations. The price coefficient is defined as $\alpha^p_h = \bar{\alpha}^p + \alpha^p_{inc} \cdot inc_h$, where inc_h denotes household income.

Additional elements in u^S_{hcm} include $\mathbf{x}_c$, which contains three bundle-specific dummies. The first two, for Amazon Prime and Hulu, account for add-on channel benefits, with the Amazon dummy also reflecting broader Prime benefits. The third dummy, for bundles that include both Hulu and Disney Plus, captures benefits from Walt Disney's Hulu-Disney Plus bundle promotions, such as free ESPN Plus access. ξ_{cm} represents demand shocks observed by households but not by econometricians. ε_{hcm} is i.i.d. T1EV distributed household preference shocks. The value of the outside option is normalized to $u_{h0m} = \varepsilon_{h0m}$.

The probability for household h in market m to subscribe to service bundle c is

$$s^S_{hcm} = \frac{\exp\left(V_{hcm}\alpha^V - p_{cm}(1 + \iota_h)\alpha^p_h + \mathbf{x}_c\boldsymbol{\alpha}^{\mathrm{x}} + \xi_{cm}\right)}{1 + \sum_{g \in \mathbf{C}} \exp\left(V_{hgm}\alpha^V - p_{gm}(1 + \iota_h)\alpha^p_g + \mathbf{x}_{gm}\boldsymbol{\alpha}^{\mathrm{x}} + \xi_{gm}\right)}, \tag{12}$$

where $\mathbf{C}$ is the set of all service bundles. Let $H_m(h)$ be the distribution of household preferences in market m. The market share of bundle c in market m is $s^S_{cm} = \int s^S_{hcm} dH_m(h)$. Combined with (9), title j's market share is $s^T_{jw} = \int \sum_{c \in \{c: j \in \mathcal{J}_{ct}\}} s^S_{h(i)cm(w)} \cdot s^T_{ijw|c} dF(i)$, where $F(\cdot)$ is the nationwide distribution of preferences across individuals and households.

Substitutability between Service Subscriptions The substitutability or complementarity between service subscriptions depends on the added utility of consuming them together, compared to each individually (Gentzkow 2007). A larger positive added utility implies stronger complementarity, while a larger negative value suggests stronger substitutability.

Three model components affect this added utility. First, decreasing marginal utility from accessing more content, driven by title substitutions, is captured by random coefficients in the viewership model (8). Second, bundle-specific dummy parameters in the subscription model (10) capture the additional benefits of bundle subscriptions, such as free ESPN Plus access with the Hulu and Disney Plus bundle. They reflect potential complementarity between services. Finally, unobserved demand shocks ξ_{cm} also affect the added utility.

5.2 Supply

In stage 1, studios and streaming services negotiate bilateral contracts, while streaming services set subscription prices simultaneously. I now discuss the equilibrium conditions for subscription price setting (given bilateral contracts) and bilateral contracting (given subscription prices), in that order.

5.2.1 Stage 1b: Subscription Price Setting

Over the 12-month study period, streaming service owners simultaneously set monthly subscription prices to maximize their payoffs, specified as

$$\Pi_K = \sum_{k \in O_k} \sum_{m} M_m \cdot (p_{km} + r_k) \cdot \mathbf{E}_{\zeta,\xi}[s^S_{km}(p_{km}, \mathcal{J}_k)] - \sum_{k \in O_k} \sum_{j \in \mathcal{J}_k} \tau_{jk}. \tag{13}$$

The first component accounts for the expected benefits from consumer subscriptions, and the second for lump-sum license fees, τ_{jk}, paid for all licensed titles $j \in \mathcal{J}_k$. O_k represents the three owners of the top four streaming services, including the Walt Disney Company that controls both Hulu and Disney Plus.[9] M_m is the number of households, and p_{km} is the subscription revenue per subscriber. r_k captures net profit beyond subscriptions, including: (1) marginal costs (e.g., data transfer costs and distribution fees paid to digital media players),[10] (2) advertising revenue, and (3)

[9]Though Comcast owned 33% stake in Hulu during the study period, it relinquished its control in Hulu to Disney effective on May 14, 2019.

[10]Streaming services pay digital media players like Apple TV when users subscribe via these players.

managerial heuristics to prioritize market shares and growth over short-term profitability.[11] The sign of r_k is ambiguous: it could be negative due to marginal costs or positive due to advertising and growth incentives. r_k is assumed to be constant across all markets for each service.

I assume that streaming services consider the expected market shares $\mathbf{E}_{\zeta,\xi}[s^S_{km}(p_{km}, \mathcal{J}_k)]$, rather than the realized market shares, as commonly assumed in the literature. The rationale is that price changes are usually determined and pre-announced long before implementation. Consequently, at the time of pricing, streaming services do not know the exact values of the unobserved demand shocks, ζ and ξ, but only their distributions.

In practice, subscription prices are uniform nationwide and rarely adjusted: during the study period, Amazon Prime Video's price remained at \$8.99, while the other three services each raised prices once. Therefore, I assume that streaming services choose optimal uniform prices: none can improve its payoff by changing its subscription prices uniformly across all months and markets. This implies the following first-order conditions:

$$\sum_m M_m \cdot \mathbf{E}_{\zeta,\xi} s^S_{km} + \sum_m \sum_{k' \in O_k} M_m \cdot (p_{k'm} + r_{k'}) \frac{\partial \mathbf{E}_{\zeta,\xi} s^S_{k'm}}{\partial p_{km}} = 0. \tag{14}$$

5.2.2 Stage 1a: Bilateral Contracting

In the bilateral contracting stage, the studio for each title j negotiates licensing contracts with a set of streaming services. The contract with a specific service k specifies the license fees τ_{jk} and whether the licensing right is exclusive. The set of services that reach agreements with the studio forms the title's distribution network, $\mathcal{K}_j$. Appendix B.1 describes the extensive-form game of this stage. Below, I present the equilibrium conditions for license fees and distribution networks, in that order.

Building on industry norms, I make two assumptions. First, license fees are negotiated on a per-title basis and paid as lump sums, consistent with practices discussed in Section 2.[12] Second, when licensing content, Walt Disney considers the payoffs of

[11] This prioritization reflects the interests of investors and managers. Similar adjustments are used in platform studies, such as ride-hailing (Castillo 2024, Rosaia 2025), to capture long-term platform incentives.

[12] Unlike Ho, Ho and Mortimer (2012), studios do not enact full-line forcing in the video streaming market, as titles—even produced by the same studio—often involve different stakeholders (e.g., investors). Each title requires a separately negotiated license fee, which is then divided among

both Hulu and Disney Plus but allocates licensed content only to Hulu, as Figure 3a shows that Disney Plus rarely offers third-party content.

Having described the payoff to streaming services, I now specify the payoff considered by the studio of title j. Both payoff functions are needed to define the bargaining game:

$$\Pi_j = \underbrace{\sum\nolimits_{k \in \mathcal{K}_j} \tau_{jk}}_{\text{License Fees}} + \underbrace{\gamma \cdot \log\left(V_j(\mathcal{K}_j)\right)}_{\text{Logged Viewership}} + \underbrace{\sum\nolimits_{k \in \mathcal{K}_j} \nu_k(\mathcal{K}_j)}_{\text{Unobserved Preferences}} + \underbrace{\mu \cdot \sum\nolimits_{k \in O_j} \Pi_k}_{\text{Effects of VI}}. \tag{15}$$

In addition to license fees collected from streaming services, studios consider three factors. First, they value the title's *expected* viewership under network $\mathcal{K}_j$, $V_j(\mathcal{K}_j)$, as it generates buzz to attract investors for sequel production.[13] I use the logarithms of viewership as this advantage diminishes for highly popular titles that are already well-funded.

Second, studios may have preferences for specific services based on their long-term relationships. For example, Sony licenses its titles more often to Netflix due to their long-time cooperation. These preferences are captured by $\nu_k(\mathcal{K}_j)$, which vary at the network-service level and are observed by studios but not econometricians. They are assumed to be i.i.d. and follow a normal distribution $N(0, \sigma_\nu^2)$.

Finally, studios factor in the payoffs of their vertically integrated services, O_j. This explains studios' tendency to license to these services, as shown in Figure 3b. The internalization parameter μ measures the extent to which studios incorporate these payoffs, with $\mu = 1$ implying complete internalization (Crawford et al. 2018).[14] However, intra-firm frictions, common in conglomerates like Walt Disney, may limit coordination between vertically integrated studios and streaming services, yielding

stakeholders. The data also reject full-line forcing: each of the "Big Five" studios distributes at least 10% of its titles to all three of Netflix, Amazon Prime, and Hulu.

[13] This is supported by anecdotal evidences, for example, Netflix considers its large and engaged subscriber base as an advantage compared to its competing services in contract negotiations with studios.

[14] Unlike Crawford et al. (2018), I assume streaming services do not internalize the payoffs of their vertically integrated studios in their objective functions (13). Otherwise, the model would imply that a streaming service is willing to accept high lump-sum license fees—even exceeding its incremental variable profit from licensing agreements—to outbid its competing services. This behavior is difficult to rationalize, as it would drive streaming services into accounting losses, and more importantly, it contradicts industry practices. For example, Disney significantly lowered its license fees for some titles after moving them from other platforms to its own services, including Hulu—so much so that it reportedly gave up $1 billion licensing revenue in 2022 (Deadline 2022).

$\mu < 1$. Such frictions are documented across various industries (e.g., Crawford et al. 2018, Cuesta, Noton and Vatter 2019, Chen, Yi and Yu 2024, Hortaçsu et al. 2024). Therefore, I estimate μ to assess the extent of internalization.

License Fee Negotiations To determine negotiated license fees, I adopt the Nash-in-Nash with Threat of Replacement (NNTR) bargaining solution from Ho and Lee (2019), where studios can use streaming services excluded from bargaining as "threats of replacement" when bargaining with included services. However, I assume that streaming services cannot use this strategy, a modeling choice I justify in detail in Section 5.3.

The studio of title j and service k negotiates license fee τ_{jk} conditional on the contracting outcomes of all other title-service pairs, including no agreements. For simplicity, these outcomes are omitted in the notation below. Under the NNTR solution, τ_{jk} is given by:

$$\tau_{jk} = \arg\max_{\tau} \underbrace{\left[\Delta_{jk}\Pi_j(\mathcal{K}_j, \{\tau, \boldsymbol{\tau}_{-jk}\})\right]}_{\text{Studio's gain from trade}}^{b_j} \underbrace{\left[\Delta_{jk}\Pi_k(\mathcal{K}_j, \{\tau, \boldsymbol{\tau}_{-jk}\})\right]}_{\text{Service's gain from trade}}^{1-b_j}, \tag{16}$$

$$\text{s.t.} \quad \underbrace{\Pi_j(\mathcal{K}_j, \{\tau_{jk}, \boldsymbol{\tau}_{-jk}\})}_{\text{Studio's payoff under } \mathcal{K}_j} \geq \max_{k' \notin \mathcal{K}_j} \underbrace{\left[\Pi_j\big((\mathcal{K}_j \setminus k) \cup k', \{\tau^{res}_{jk'}, \boldsymbol{\tau}_{-jk}\}\big)\right]}_{\text{Studio's payoff when replacing } k \text{ with } k'}. \tag{17}$$

Equation (16) represents the standard "Nash-in-Nash" bargaining solution, where $b_j \in [0, 1]$ is the bargaining parameter. A higher b_j indicates greater bargaining power for the studio to command higher fees. In the main specification, b_j varies only between two groups, the "Big Five" and small studios, and remains constant across all streaming services for each group. In Appendix E.2, I explore alternative bargaining parameter specifications with richer variation, and the results align closely with the main specification. The gains from trade for title j's studio and service k are

$$\Delta_{jk}\Pi_f(\mathcal{K}_j, \{\tau, \boldsymbol{\tau}_{-jk}\}) = \Pi_f(\mathcal{K}_j, \{\tau, \boldsymbol{\tau}_{-jk}\}) - \Pi_f(\mathcal{K}_j \setminus k, \boldsymbol{\tau}_{-jk}), f \in \{j, k\} \tag{18}$$

where $\mathcal{K}_j \setminus k$ represents bargaining breakdowns that lead to the exclusion of service k from title j's distribution network, and equivalently, the exclusion of j from k's content library. $\boldsymbol{\tau}_{-jk}$ is the vector of license fees negotiated by other services for title j.

The NNTR solution differs from the Nash-in-Nash solution by introducing an additional constraint (17). This constraint illustrates how exclusive distribution can improve a studio's bargaining leverage. By committing to distributing to a limited set of services, a studio can threaten an included service to license to an excluded service instead. Therefore, the negotiated fee paid by included service k, τ_{jk}, must ensure that the studio's profit is at least equivalent to the profit it would obtain from an excluded service k' at the latter's reservation fee. This reservation fee, $\tau^{res}_{jk'}$, is the minimum amount that k' would accept to replace k in $\mathcal{K}_j$ rather than remain excluded:

$$\Pi_{k'}\big((\mathcal{K}_j \setminus k) \cup k', \{\tau^{res}_{jk'}, \boldsymbol{\tau}_{-jk}\}\big) = \Pi_{k'}\left(\mathcal{K}_j \setminus k, \boldsymbol{\tau}_{-jk}\right). \tag{19}$$

To illustrate the NNTR solution, I focus on the case where the studio of title j and service k are not vertically integrated, which accounts for nearly all cases in the market. Under the NNTR solution $\boldsymbol{\tau}^*$, the studio's gain from trade is

$$\Delta_{jk}\Pi_j(\mathcal{K}_j, \boldsymbol{\tau}^*) = \max\Bigg\{ \underbrace{b_j \cdot \Delta_{jk}\Pi_{jk}(\mathcal{K}_j)}_{\text{Nash Bargaining Outcome}}, \underbrace{\max_{k' \notin \mathcal{K}_j}\left[\Delta_{jk'}\Pi_{jk'}\left((\mathcal{K}_j \setminus k) \cup k'\right)\right]}_{\text{Threat of Replacement Outcome}} \Bigg\}. \tag{20}$$

Here, $\Delta_{jk}\Pi_{jk}(\mathcal{K}_j) = \Delta_{jk}\Pi_j(\mathcal{K}_j, \cdot) + \Delta_{jk}\Pi_k(\mathcal{K}_j, \cdot)$ represents the bilateral surplus generated by a licensing agreement between the studio and service k, which they divide in the contract. This bilateral surplus is not a function of license fees because these fees are lump-sum transfers and therefore cancel out. I derive equation (20) and discuss the solution to the vertically integrated case in Appendix B.3.

Equation (20) reflects the studio's two bargaining strategies, as discussed in the simple model: the studio can either secure a b_j share of the bilateral surplus through Nash bargaining, or extract an amount that equals its best outside option via the threat of replacement. By allowing for the latter, the NNTR solution reflects observed studio practices—namely, the use of exclusive contracts to create licensing scarcity, induce competition among services, and negotiate higher fees. In contrast, the standard "Nash-in-Nash" solution, considering only the first term on the right-hand side of (20), rules out the impact of excluded services on bargaining outcomes, conditional on bilateral surpluses.

Distribution Network Formation I now explain how the distribution network $\mathcal{K}_j$ is determined in equilibrium. As a title owner, each studio can choose which streaming services to reach agreements with, forming $\mathcal{K}_j$. The equilibrium network

$\mathcal{K}_j$ must satisfy two necessary conditions: stability and optimality. I detail each in turn.

The stability condition requires that no streaming service within the network would benefit from unilaterally terminating its contract at the NNTR license fees $\boldsymbol{\tau}$: $\Delta_{jk}\Pi_k(\mathcal{K}_j, \boldsymbol{\tau}) \geq 0$. For non-vertically integrated studios, this is equivalent to:

$$\Delta_{jk}\Pi_{jk}\left(\mathcal{K}_j\right) \geq \Delta_{jk'}\Pi_{jk'}\left(\left(\mathcal{K}_j \setminus k\right) \cup k'\right), \forall j, k \in \mathcal{K}_j, k' \notin \mathcal{K}_j, \tag{21}$$

where $\Delta_{jk}\Pi_{jk}\left(\mathcal{K}_j\right)$ is the bilateral surplus. This condition can be expressed solely in terms of bilateral surpluses, since they determine the maximum benefits that can be allocated to studios without leaving services in losses. This implies that an included service must generate a higher bilateral surplus than any excluded service. Otherwise, the included service would incur a negative payoff to outbid a more efficient excluded rival, so it would prefer to terminate the contract. This condition resembles Proposition 2 in Ho and Lee (2019). In Appendix B.4, I derive condition (21) and the implications of the stability condition for vertically integrated studio-streaming service pairs.

The optimality condition requires that no alternative, stable distribution network is more profitable for the studio of any title in equilibrium:

$$\Pi_j\left(\mathcal{K}_j, \boldsymbol{\tau}(\mathcal{K}_j, b_j)\right) \geq \Pi_j(\mathcal{K}_j', \boldsymbol{\tau}(\mathcal{K}_j', b_j)), \forall j, \forall \mathcal{K}_j' \text{ that is stable}, \tag{22}$$

where $\boldsymbol{\tau}(\mathcal{K}_j, b_j)$ is the vector of license fees under network $\mathcal{K}_j$ and bargaining parameter b_j. Here, b_j determines which networks are optimal. As shown in (20), a studio's payoff is the maximum of its Nash bargaining outcome—which increases with b_j—and its threat of replacement outcome, which depends only on outside options. Therefore, the payoffs of studios with strong bargaining power (large b_j) are more likely to reflect Nash bargaining outcomes. To improve Nash bargaining outcomes, these studios tend to prefer networks that maximize bilateral surpluses. In contrast, studios with weak bargaining power rely more often on the threat of replacement, and therefore, may prefer narrower networks to improve outside options, even if this reduces total bilateral surpluses. This mirrors the intuition from the simple model.

5.3 Discussion of Modeling Assumptions

Static Demand I assume that subscription demand is static. A reasonable concern is that consumers may be inertial and fail to cancel subscriptions on time (Einav, Klopack and Mahoney 2023, Miller, Sahni and Strulov-Shlain 2023); ignoring this could bias the estimated price coefficient α^p. However, the extent of inertia may be limited in practice: streaming services often cite the lack of demand stickiness as a profitability challenge (e.g., Wall Street Journal 2022, 2024). Moreover, as detailed in the next section, I identify α^p primarily from variation across geographic markets—rather than over time—making it more robust to potential consumer inertia.

Simultaneous Pricing and Contracting In the model, all contracts between studios and streaming services, as well as service subscription prices, are determined simultaneously. In practice, these decisions are made months before execution and are not often adjusted over time, even when the services acquire or lose major titles. Therefore, in my setting, this timing assumption is more realistic than the alternative of sequential decision-making and is consistent with prior studies, including Ho and Lee (2017) and Crawford et al. (2018).

No Threat of Replacement by Streaming Services I assume that studios, but not streaming services, can use the threat of replacement in bargaining. Studios make this threat credible by committing to limit licensing partners, often through exclusive contracts, so they can exploit licensing scarcity to enhance bargaining leverage against services (Abreu and Manea 2024). In contrast, streaming services face high-dimensional licensing choices, making it infeasible to contractually restrict partners. Their "shelf space" is also effectively unlimited and not naturally scarce. Both factors prevent streaming services from credibly creating scarcity and exerting the threat of replacement.

Outside Option Values in Bargaining The equilibrium outcome of the bargaining model suggests that any excluded service is willing to surrender the entire bilateral surplus to a studio as its outside option. This value may be overstated if fixed bargaining costs exist, as such costs could make full concessions unprofitable, or even lead services to opt out of negotiations entirely. However, this concern is likely minimal, as my sample only includes popular third-party titles with estimated annual license fees exceeding $1 million, making it unlikely that fixed bargaining costs would meaningfully affect the outcome.

Exogenous Title Production The model assumes that title production is exogenous. This is consistent with the capacity constraints studios faced during the study period (see Section 2). However, I explore how exclusive contracts affect studio profits and analyze counterfactuals in Section 8.2 to study the potential welfare impact if studios adjust production in response to profitability changes.

Impact of Omitting the Cable Market Licensing negotiations for cable channels typically occur separately from—and prior to—those for video streaming. Therefore, for most studios, the bargaining model reflects equilibrium outcomes conditional on their cable distribution. However, many "Big Five" studios control cable channels (e.g., Disney with ABC). If streaming and cable are strong substitutes, these studios may limit streaming distribution to protect cable profits. In this case, their true bargaining power may be stronger than estimated: the model may interpret their exclusive distribution as a tactic to overcome weak bargaining power, when it actually reflects unmodeled incentives to preserve cable profits. As a result, the impact of exclusive contracts on the "Big Five" studios—quantified in Section 8—should be interpreted as an upper bound.

6 Demand Estimation and Results

6.1 Estimation and Identification

I jointly estimate demand for titles and subscriptions. The estimation uses the generalized method of moments approach from Berry, Levinsohn and Pakes (1995), combined with the adapted nested fixed point algorithm from Lee (2013). Appendix D provides computational details. The estimating moment conditions include $\mathbf{E}[\mathbf{Z}^T_{jw}\zeta_{jw}] = 0$ and $\mathbf{E}[\mathbf{Z}^S_{cm}\xi_{cm}] = 0$, where ζ_{jw} and ξ_{cm} are unobserved title and subscription demand shocks, and $\mathbf{Z}^T_{jw}$ and $\mathbf{Z}^S_{cm}$ are instrumental variables discussed below. I also construct micro moments that match model predictions to observed data by demographic groups, following Petrin (2002). I now describe the data variation that identifies each parameter and how the moment conditions capture it.

Title Demand The identification of β_d^0 and $\boldsymbol{\beta}_d^{\mathrm{w}}$—parameters governing the heterogeneity in streaming preferences by demographic group—relies on the covariance between demographics and title viewership. I observe these covariances in the viewership data, which report viewership breakdown by age, gender, and race. To capture them, I construct micro moments that match model-predicted and observed demographic-specific title viewership across genres and seasons.

Unobserved title preference heterogeneity, β_v^0, is identified by the degree of substitutability between titles and the outside option. A large β_v^0 suggests that titles are close substitutes, so the release of an additional title minimally increases total viewing time. To capture this correlation between title availability and viewership, I include the following instrumental variables in $\mathbf{Z}_{jw}^T$: for each title and service bundle, the number of available titles on that bundle, interacted with a dummy indicating whether the title itself is available on the bundle. These variables are exogenous to ζ_{jw}, as title release and licensing typically occur long before demand shocks ζ_{jw} are realized.

Subscription Demand The identification of the mean price coefficient $\bar{\alpha}^p$ relies on variation in subscription tax rates across DMAs. As shown in the left panel of Figure 4, higher tax rates raise subscription costs and reduce demand. These rates are exogenous to unobserved demand shocks ξ_{cm}, since streaming services set uniform national prices and do not adjust to local tax differences. In addition, tax applicability to service subscriptions is determined by state courts and applies broadly across industries, not specifically to video streaming.[15] Variation in bundle size—the number of services within a subscription bundle—also aids identification, as larger bundles imply higher overall subscription spending. This variation is exogenous, since services do not adjust prices based on subscribers' bundle choices. The only exception is the Hulu and Disney Plus bundle, which offers a discount. I control for this using a specific indicator in $\mathbf{x}_c$. To capture variation from both tax rates and bundle size, I construct an instrument for p, denoted z^p, as the interaction between DMA-level mean tax rates—computed as ZIP code-level rates weighted by household counts—and bundle size, and include it in $\mathbf{Z}_{cm}^S$. An advantage of this instrument is that it does not rely on cross-time variation, making identification of $\bar{\alpha}^p$ robust to

[15] Special taxes like Florida's communication services tax and Chicago's amusement tax should also be exogenous, as they also apply to other businesses like broadband and event tickets.

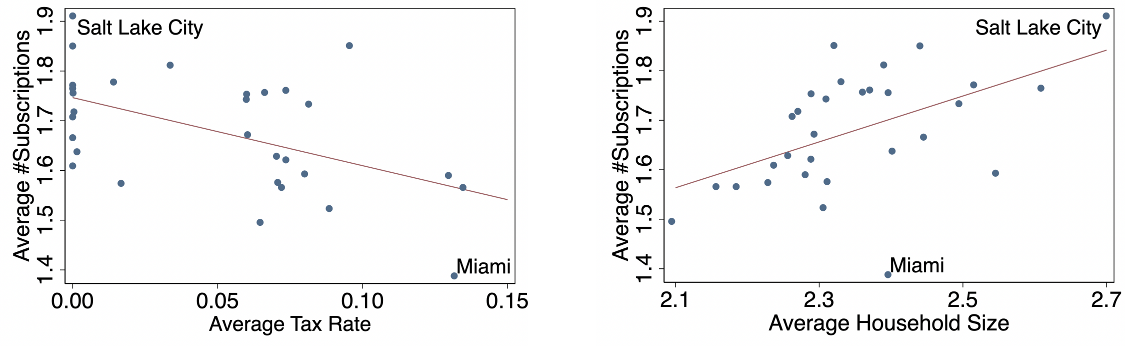


Figure 4: Demand for Streaming Service Subscriptions

Notes. This figure reports the correlation between the average number of subscribed top four services per household and two factors: tax rates and household size. Each dot corresponds to the average values of the variables in each of the top 30 DMAs during the study period. The red lines depict the linear fits between the variables.

potential state dependence in demand, which, as discussed in Section 5.3, is likely limited.

The heterogeneity in the price coefficient, governed by α^p_{inc}, is identified by the correlation between household income and subscription demand across DMAs. To capture this variation, I follow Miller and Weinberg (2017) and interact z^p with DMA-level average household income to construct an additional instrument in $\mathbf{Z}^S_{cm}$.

The content utility coefficient α^V is primarily identified by the covariance between household size and subscription demand across DMAs. As shown in the right panel of Figure 4, DMAs with larger household sizes exhibit stronger subscription demand, since larger households derive greater content utility V_{hcm} from sharing subscriptions across household members. Subscription demand responses to content library expansions also help identify α^V, with a larger response implying a larger α^V. I include the bundle-level V_{hcm} for the average household in $\mathbf{Z}^S_{cm}$, which is exogenous because content libraries are typically determined prior to the realization of demand shocks ξ_{cm}.

Decision-making weights κ are identified from two sources. First, I exploit cross-DMA variation in demographic shares and subscription demand. For example, if DMAs with more kids exhibit stronger subscription demand, it implies that kids have stronger decision-making power over households' subscription decisions. This variation is captured using DMA-level gender-age population shares as instruments in $\mathbf{Z}^S_{cm}$. Second, I use the covariance between subscription demand and demographic-specific viewership. For instance, if kids' viewership increases in summer without affect-

Table 2: Demand Estimates

	Estimates	SE		Estimates	SE
Panel A: Heterogeneous Title Preferences					
Intercept: Standard Deviation	0.820	0.048	Genre: Thriller × Age: 45+	0.346	0.306
Intercept × Age: 2-17	−0.405	0.350	Genre: Thriller × Gender: Female	−0.073	0.019
Intercept × Age: 45+	−0.382	0.057	Genre: Kids × Age: 2-17	1.017	0.236
Intercept × Gender: Female	0.259	0.068	Genre: Kids × Gender: Female	0.058	0.054
Intercept × Race: Black	0.054	0.019	Genre: Drama × Age: 2-17	0.793	0.258
Intercept × Race: Others	−0.197	0.005	Genre: Drama × Age: 45+	−0.197	0.037
Genre: Action × Race: Black	0.045	0.237	Genre: Drama × Race: Black	−0.080	0.068
Genre: Comedy × Age: 45+	0.349	0.764	Season: Summer × Age: 2-17	0.206	0.160
Panel B: Other Title Demand Shifters					
Shows: Weeks Since Release	−0.116	0.006	Movies: Weeks Since Release	−0.190	0.020
Shows: Weeks Since Release^2	0.002	0.000	Movies: Weeks Since Release^2	0.002	0.000
Shows: Old (≥51 weeks)	−2.168	0.038	Movies: Old (≥51 weeks)	−3.937	0.117
Shows: Binge Release	0.573	0.144	Christmas and Thanksgiving	0.253	0.094
Panel C: Service Subscription Demand					
Price ($\bar{\alpha}^p$)	0.455	0.013	Amazon	1.970	0.070
Price × HH income (α^p_{inc})	−0.061	0.005	Hulu	0.655	0.093
Content Value (α^V)	0.846	0.286	Hulu Disney Plus Bundle	0.448	0.056
Decision Weight (κ): Female Adults	1.064	0.475	Intercept	0.817	0.117
Decision Weight (κ): Kids	0.160	0.180			

Notes. The model specification includes title fixed effects. Reference group is Age: 18-44, Gender: Male, and Race: White. Household income is in \$100,000 units and normalized to a mean of zero. κ for male adults is standardized to one.

ing subscription demand, it suggests that they have limited decision-making power. This second source is captured through a set of micro moments. They match the covariances between subscription demand and gender-age-specific viewership, where subscription demand is measured by both the average number of subscriptions per household and the share of households without subscriptions.

6.2 Estimation Results

I report the estimated demand parameters in Table 2. The specification includes only demographic–genre interactions where the demographic's share of viewing time for the genre differs significantly from the baseline group (age: 18–44, gender: male, race: white). The title demand estimates imply substantial heterogeneity in streaming preferences. On average, males, individuals over 45 years old, and non-white non-African Americans show less interest in streaming compared to their respective counterparts. Kids show strong preferences for kids and drama genres. In addition, the scale of β_v^0 implies considerable preference heterogeneity in streaming that cannot be explained by observed demographics. The estimates also imply that viewers' interest in a title decays over time since its release (Einav 2007), though this decay effect diminishes over time. Viewers prefer streaming during holidays and binge-released shows.

Table 3: Demand Elasticities for Service Subscriptions

	Netflix	Amazon	Hulu	Disney
Netflix	-0.945	0.218	0.286	0.349
Amazon	0.117	-1.705	0.110	0.144
Hulu	0.111	0.080	-1.601	-0.178
Disney	0.107	0.083	-0.140	-1.568

Notes. The table presents elasticity of the demand for the column with respect to the price of the row.

The subscription demand estimates imply downward-sloping demand, with price sensitivity decreasing with household income. The estimated decision-making weights, κ_i, vary significantly across household members.[16] While female adults have similar decision-making weights to male adults, kids' weights are substantially lower and not significantly different from zero, implying they have a small impact on household subscription decisions.

I report own- and cross-price elasticities of subscription demand in Table 3. The average own-price elasticity is -1.45, while Netflix's is notably lower at -0.94, likely because with high subscription prices, Netflix tends to attract less price-sensitive subscribers. Most pairs of streaming services are substitutes, since viewers perceive diminishing marginal utility from accessing more content through additional subscriptions. However, Hulu and Disney Plus are complements, as Walt Disney's promotion of their bundle creates demand synergy, increasing utility from subscribing to both.

The key output of the demand model is households' WTP for each title, measured in dollars per household per year (March 2021 to February 2022). This WTP determines how subscription demand responds to the addition or removal of this title from a service's content library.[17] Figure 5 presents histograms of the WTPs for three selected popular titles, showing significant variation across households for the same title. This variation is largely driven by demographics: larger, higher-income households tend to have higher WTPs due to greater content utility (V_{hcm}) and lower price sensitivity.

The variance across titles is also significant: *Criminal Minds*, the most-viewed title

[16] Because the average value of κ is not separately identifiable from α^V, I standardize κ to 1 for male adults.

[17] To derive each title's WTP, I compute its contribution to content utility V_{hcm} for each household, holding access to other titles fixed. I then convert it to a dollar amount by multiplying it with the estimated α^V/α^p_h.

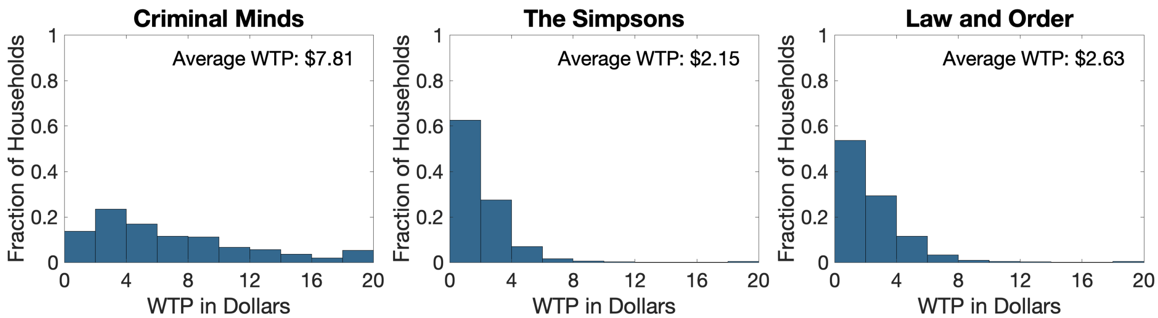


Figure 5: Household Willingness-to-Pay for Selected Titles

Notes. This figure displays the histograms of households' WTP for selected titles over March 2021 to February 2022, conditional on their access to all other titles. They have bins with a width of \$2 and are right-censored at \$20.

in the sample, has an average WTP of \$7.81, while 57.2% (655) of sampled third-party titles have average WTPs below \$0.10. This variance results from differences in both quality and the audience groups to which they appeal. For example, the average WTP for *Law and Order* (a crime thriller) is 22% higher than that for *The Simpsons* (a kids' show), despite their similar expected viewership conditional on distributions. This discrepancy arises because most viewers of *The Simpsons* are kids, who, despite their strong preferences, have limited decision-making power in their households.

7 Supply Estimation and Results

7.1 Estimation and Identification

On the supply side, I estimate three sets of parameters: (a) streaming services' per-subscriber profit beyond subscriptions, r_k, (b) bargaining parameters, $\boldsymbol{b}$, and (c) studio payoffs parameters, $(\gamma, \sigma_\nu, \mu)$. I take consumer demand for subscriptions and titles as primitive and use title distribution data as estimation inputs. Unlike most of the literature (e.g., Crawford and Yurukoglu 2012, Ho and Lee 2017), I do not observe negotiated license fees τ; instead, they are recovered in estimation. The estimation proceeds in two steps, with demand parameters taken as primitives. First, I estimate r_k using streaming services' first-order conditions (14). Second, I estimate $\boldsymbol{b}$ and $(\gamma, \sigma_\nu, \mu)$ using simulated methods of moments, whose identification relies on the variation in distribution networks of titles. I discuss the identification and estimation of $\boldsymbol{b}$ and $(\gamma, \sigma_\nu, \mu)$ below, with computational details in Appendix E.1.

Identification The difference between a studio's observed distribution networks and those that maximize the total bilateral surplus with its contracting services identifies the studio's bargaining parameter b, with a larger difference indicating a smaller b. This is because studios with strong bargaining power choose networks that maximize the bilateral surplus in negotiations, as they can extract most of this surplus. Conversely, studios with weaker bargaining power may narrow their networks and opt for exclusive distribution to improve their outside options.

Studio payoff parameters are identified as follows. Studios' preference for title viewership, γ, is identified by their tendency to license to Netflix, which has the largest and most engaged subscriber base, over other services. The internalization parameter for vertically integrated studios, μ, is identified by the tendency of Disney-affiliated studios to license to Hulu while foreclosing its competitors. The standard deviation of unobserved preferences, σ_ν, is primarily identified by the stability condition (21). A low σ_ν implies a strong correlation between a service's inclusion in a title's network and its ability to generate high incremental variable payoffs by licensing the title, relative to competitors.

Moment Conditions I use two sets of moment conditions. The first set is instrumental variable moments applied on the discrepancy between simulated likelihoods and observed choices of distribution networks for each title (Pakes and Pollard 1989):

$$\mathbf{E}[(\hat{P}_{j\mathcal{K}} - D_{j\mathcal{K}})\mathbf{Z}_{j\mathcal{K}}] = 0, \forall j, \mathcal{K}. \tag{23}$$

Here, $\hat{P}_{j\mathcal{K}}$ and $D_{j\mathcal{K}}$ are the simulated probability and observed binary indicator, respectively, for title j to be distributed to network $\mathcal{K}$. $\mathbf{Z}_{j\mathcal{K}}$ is a vector of instrumental variables. It includes network-specific dummies and the logarithm of expected title viewership under different networks, which identify $\boldsymbol{b}$ and γ. To identify σ_ν, $\mathbf{Z}_{j\mathcal{K}}$ also includes differences in the incremental variable payoffs from licensing each title j across services under each network $\mathcal{K}_j$:

$$\sum_{k\in\mathcal{K}}\sum_{k'\notin\mathcal{K}} \left(\mathbf{E}_\nu\left[\Delta_{jk}\Pi_k(\mathcal{K}_j)\right] - \mathbf{E}_\nu\left[\Delta_{jk}\Pi_{jk'}\left((\mathcal{K}_j\backslash k)\cup k'\right)\right]\right). \tag{24}$$

The second set includes indirect inference moments that match regression results using simulated and observed data (Gourieroux, Monfort and Renault 1993). I con-

Table 4: Estimation Results: Supply

	Estimates	SE
Bargaining Parameters $\boldsymbol{b}$		
"Big Five"	0.819	0.035
Small studios	0.534	0.192
Studio Payoff Parameters		
Viewership preference γ	0.775	0.184
STD of unobserved preferences σ_ν	0.147	0.025
Internalization μ	0.627	0.137

Notes. Studios' payoffs are measured in millions of dollars. Standard errors are computed using 100 bootstrap samples.

sider two linear probability regressions: (a) whether a title is exclusively distributed, based on production by the "Big Five" or smaller studios, to identify the disparity in $\boldsymbol{b}$ between these groups; and (b) the probability of licensing to Hulu versus Netflix and Amazon Prime for Disney-affiliated versus other studios, to identify the internalization parameter μ. Regression results using observed data are in Table 1.

7.2 Estimation Results

In Table 4, I present the estimated supply parameters. Studios value high title viewership, as doubling a title's viewership is valued at \$0.77 million by its production studio. This emphasis on viewership offers Netflix a competitive edge in licensing titles due to its larger and more engaged subscriber base. The estimated internalization parameter μ suggests that for every dollar earned by a streaming service, its vertically integrated studios perceive only \$0.63. This incomplete internalization may be attributed to internal frictions between the content production and streaming service divisions within conglomerates.

I recover annual license fees using the estimates and simulated draws of unobserved preferences ν. On average, studios receive \$9.22 million per title per year, representing 90.3% of the incremental variable payoff generated by streaming services from licensing the title. These substantial fees are driven by studios' large bargaining parameters (above 0.5) and their ability to use excluded streaming services as bargaining leverage. The magnitude of the fees also suggests that the variance in studios' unobserved contracting preferences (σ_ν) is not economically significant.

Furthermore, the estimation highlights that the "Big Five" studios have significantly stronger bargaining power than small studios. This stronger power of the "Big Five" likely comes from their long histories and extensive content libraries. These factors offer the "Big Five" negotiation expertise—better ability to assess their content's value and set appropriate license fees—as well as leverage that leads streaming services to make concessions to preserve long-term relationships and avoid being foreclosed in future licensing deals.

Robustness Check: Amazon Prime Video Pricing I assume users pay \$8.99 per month for Amazon Prime Video, and that Amazon sets this price to maximize its payoff (15). In practice, some users subscribe to full Prime membership at \$12.99, which also includes free shipping. As a result, I may underestimate Amazon's per-user profit from Prime Video if many full Prime members would cancel without sufficient streaming content, or overestimate it if they would retain Prime regardless of content. To address this concern, I validate the estimated profit margin using title distribution variation in Appendix E.2. If Prime Video's profitability were overestimated, the model would predict that Prime Video would be licensed more titles than observed. I find that the model's predictions closely match the observed distribution patterns, supporting the validity of the pricing assumptions.

Additional Robustness Checks In Appendix E.2, I conduct additional robustness checks as follows. To ensure that the main bargaining parameter specification captures most of its variation, I examine alternative specifications, including different studio categorizations and varying bargaining parameters across streaming services. In addition, to rule out the impact of any potential costs for titles to switch across services, I re-estimate the supply model using only newly released titles. Results from all robustness checks closely align with those in Table 4, supporting the validity of the supply-side model and estimates.

Model Fit To assess out-of-sample fit, I compare the estimated and reported annual license fees for Netflix and Hulu. The model predicts Netflix's fees at \$5.9 billion and Hulu's at \$3.5 billion, which closely align with their reported expenses of \$5.0 billion and \$3.3 billion, respectively, even though these reported numbers are not used in estimation.[18] In Appendix E.3, I also examine in-sample model fit, which shows

[18]Netflix only reports global license fees. I approximate its U.S. fees by multiplying the share of U.S. revenue with its global fees. While Hulu operates only in the U.S., it last disclosed its content

a close alignment between the model's predictions and actual data on subscription prices, consumer demand, and title distributions. Together, these close alignments suggest good model fit.

8 Counterfactuals: The Impact of Exclusive Contracts

In this section, I apply the estimates to evaluate the impact of exclusive contracts on studios, streaming services, and consumers. First, I investigate the short-run effects by simulating a counterfactual without exclusive contracts, holding the sets of streaming services and produced titles fixed as observed. Next, I explore the potential long-term effects of such contracts, as they may affect content production and streaming service entry.

8.1 The Short-Term Impact of Exclusive Contracts

I examine a counterfactual without exclusive contracts, in which the set of streaming services and available titles is fixed as observed. In this scenario, studios lose the ability to contractually commit to a distribution network. That is, a studio cannot credibly maintain a distribution arrangement if it can profitably deviate to contract with some excluded streaming services. However, studios can still (a) choose among distribution networks to which they can credibly commit without contracts, and (b) exert the threat of replacement when such commitments are credible.[19]

To reflect studios' loss of contractual commitment ability, I impose an equilibrium refinement condition alongside the stability and optimality conditions from the bargaining model in Section 5. This condition requires that, under an equilibrium distribution network $\mathcal{K}_j$, no mutually profitable contracts exist between the studio and any services outside $\mathcal{K}_j$.[20] Specifically, for any set of excluded services K'_j with $K'_j \cap \mathcal{K}_j = \varnothing$, and any bilateral contracts between the studio and K'_j with license fees τ', at least one of the following must hold: the studio does not benefit from deviating

spending in 2020, which is used for comparison. Amazon Prime only reports its license fees for music and video streaming businesses together, so a comparison is not possible.

[19]A more extreme case assumes studios must license to all services—i.e., complete networks without any exclusion. Such counterfactuals are studied in Lee (2013) and Ho and Lee (2019), among others. I explore this alternative in Appendix F.1 and find qualitatively similar results.

[20]This refinement condition is weaker than the "pairwise stability" condition in Jackson and Wolinsky (1996) and Ghili (2022), which only allows a studio to deviate to contract with one excluded streaming service. This condition is also better aligned with the supply model, where a studio can reach agreement with any set of services.

to accept these contracts:

$$\Pi_j(\mathcal{K}_j, \tau) \geq \Pi_j(\mathcal{F}(\mathcal{K}_j \cup K'_j), \{\tau, \tau'\}), \tag{25}$$

or at least one streaming service in K'_j does not benefit:

$$\exists k' \in K'_j, \text{s.t. } \Pi_{k'}(\mathcal{K}_j, \tau) \geq \Pi_{k'}(\mathcal{F}(\mathcal{K}_j \cup K'_j), \{\tau, \tau'\}). \tag{26}$$

Here, the function $\mathcal{F}$ adjusts the distribution network after the studio's deviation. This adjustment captures a service's ability to unilaterally terminate its contract if its profit falls below zero—consistent with the stability condition (21) in the main model. Any service opting for termination will not be part of the adjusted network, $\mathcal{F}(\mathcal{K}_j \cup K'_j)$.

This refinement condition highlights the trade-off in exclusive contracts: on one hand, studios lose the ability to contractually commit to networks that maximize total bilateral surpluses with contracting services, reducing contracting efficiency (Bernheim and Whinston 1998, Segal 1999). On the other hand, the reduced stability of exclusive networks helps mitigate inefficient exclusions, which arise due to studios seeking to improve their outside options for bargaining.

Simulating counterfactuals requires solving for the title distribution networks and their implied license fees, along with subscription prices, that are optimal against each other. With a large number of titles, there is an extensive action space, making direct enumeration of all equilibria computationally infeasible. To address this, I apply the algorithm from Lee and Pakes (2009), where studios sequentially select the payoff-maximizing network for each third-party title, conditional on others' distributions, while streaming services adjust subscription prices in response. This procedure repeats until there are no further adjustments in networks or subscription prices for a given draw of unobserved contracting preferences ν. I perform this algorithm for 30 draws of ν and average results across them.

I present the counterfactual outcomes in Column (1) of Table 5. Comparing the status quo to the counterfactual, exclusive contracts increase the share of titles distributed to only one service by 26.6 percentage points, indicating many currently exclusive distribution networks rely on contractual commitment for sustainability. The results suggest that the impact of exclusive contracts varies significantly among services and studios.

Table 5: Short-Term Impact of Exclusive Contracts

		(1) Simulated Status Quo	(2) No Excl. Contracts	%Change from (2) to (1)
Distribution Networks	Netflix	0.755	0.866	−12.9%
(%Third-Party Titles on)	Amazon Prime	0.229	0.441	−47.9%
	Hulu	0.222	0.440	−49.6%
	Only One Service	0.829	0.563	47.4%
Subscription Prices	Netflix	14.678	15.854	−7.4%
(Average $ Per Month)	Amazon Prime	9.546	9.420	1.3%
	Hulu	8.204	6.174	32.9%
	Disney Plus	7.829	7.868	−0.5%
Market Shares	Netflix	0.556	0.556	0.0%
(Average Per Month)	Amazon Prime	0.443	0.450	−1.7%
	Hulu	0.289	0.209	38.2%
	Disney Plus	0.299	0.302	−1.1%
	Multi-Homing	0.414	0.364	13.6%
Service Payoffs	Netflix	5.940	5.844	1.6%
($Bn Per Year)	Amazon Prime	2.416	2.552	−5.3%
	Hulu	0.331	0.158	110.1%
	Disney Plus	2.056	2.095	−1.9%
	Total Service Payoff	10.744	10.649	0.9%
Studio Payoffs	Big Five	8.470	8.981	−5.7%
($Bn Per Year)	Remaining	4.361	4.036	8.1%
	Total Studio Payoff	12.831	13.017	−1.4%
Consumer Surplus ($ Per HH-Year)		204.476	228.682	−10.6%
Avg. Weekly Streaming Hours		2.537	2.715	−6.6%

Notes. Specification (1) simulates the status quo, while (2) removes exclusive contracts while keeping titles and streaming services unchanged. The last column reports percentage changes from specification (2) to (1). The share of multi-homing households includes those with at least two subscriptions to Netflix, Amazon Prime, or Hulu (excluding Disney Plus).

Impact on Streaming Services Small streaming services, which typically lack in-house content, benefit significantly from exclusive contracts—for example, Hulu's payoff substantially increases by 110.1%. This is due to their reliance on exclusive third-party content to differentiate themselves from competitors, attract subscribers, and enhance pricing power. The increased profitability from exclusive contracts also strengthens small services' positions in licensing negotiations, as they can now potentially "outbid" streaming giants for exclusive rights. This increased competitiveness in licensing unique content further strengthens small services' appeal to consumers.

In contrast, larger streaming services see minimal gains or even losses. Netflix gains a modest 1.6%, while Amazon Prime sees a 5.3% loss. This is because they already have substantial unique, in-house content that differentiates themselves from competitors. As a result, their incremental benefit from further differentiation through exclusive third-party content is limited. Instead, exclusive contracts lead to negative equilibrium effects for these streaming giants, as small services like Hulu use exclusive third-party content to attract subscribers away from them. This increased competition offsets their modest gains from increased differentiation, resulting in Netflix's minimal gain and Amazon Prime's loss.

Impact on Studios Small studios see an 8.1% increase in payoffs, while the "Big Five" studios experience a 5.7% loss. Both groups are subject to two countervailing effects. The first is a negative equilibrium effect, or "contracting externalities": when a streaming service secures an exclusive contract for one title, its willingness-to-pay for other titles diminishes. This is because unique content increases differentiation and reduces substitutability across services, making subscription demand less responsive to content changes. As a result, a streaming service sees smaller subscriber losses when dropping a title. This effect reduces the service's willingness-to-pay for the title, and consequently, the bilateral surplus associated with its contract.

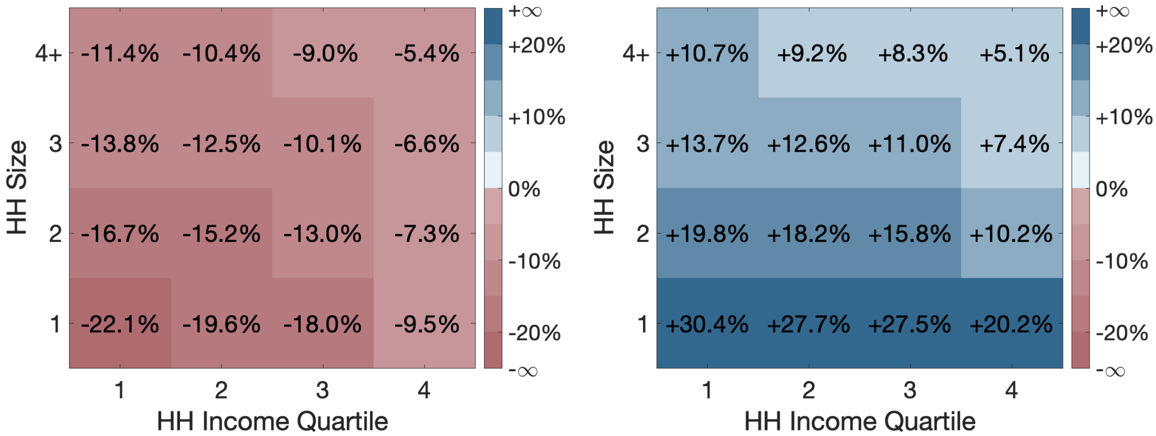
On the other hand, exclusive contracts strengthen studios' bargaining leverage. By enabling exclusive distribution, they allow studios to use excluded services as credible threats in negotiations. In addition, the improved profitability of small services makes them credible threats in negotiations against Netflix and Amazon Prime. Small studios, with weaker bargaining power (0.53 compared to 0.82 for the "Big Five"), benefit substantially from this improved leverage—more than offsetting the negative equilibrium effect. However, the "Big Five" already hold substantial bargaining power and can extract most of these bilateral surpluses in bargaining, regardless of exclusivity. Therefore, the overall decrease in bilateral surpluses lowers the license fees they can demand, reducing their profitability.

Impact on Consumers Exclusive contracts reduce consumer surplus by \$24.2 per household per year, equivalent to a 10.6% decline. This loss results from two sources. First, reduced title distribution forces households to subscribe to more services to access their content of interest, as exclusive contracts increase the share of households that multi-home across Netflix, Amazon Prime, and Hulu by 5.0 percentage points. Second, softened competition leads to higher subscription prices. Even holding title distribution fixed at the status quo, price increases alone reduce consumer surplus by \$10.8 per household per year.

The negative impact of exclusive contracts, when measured as a percentage of household surplus, is highly regressive. As Figure 6a shows, smaller and poorer households face disproportionately greater losses. Larger households, despite valuing content more, lose less because they are more likely to subscribe to multiple services concurrently, so they can access most titles regardless of whether their distributions are exclusive or not. Poorer households lose more due to greater price sensitivity, making them vulnerable to subscription price increases, especially by the lowest-price service, Hulu. In Figure A.3, I depict the distributional effect in dollar amounts. When measured in absolute terms, the direction of these patterns reverses: larger and wealthier households generally lose more because they value content more, and therefore, lose more from reduced title distribution.

8.2 The Potential Long-Term Impact of Exclusive Contracts

The results so far show that exclusive contracts harm consumers when the set of streaming services and titles is held fixed. However, by improving the profitability of small studios and small streaming services, exclusive contracts may encourage content production and service entry in the long run, which can benefit consumers. I explore these two possibilities through additional counterfactuals and discuss their implications below.



(a) Short-Term (b) Long-Term: Increased Service Entry

Figure 6: The Distributional Impact of Exclusive Contracts on Consumers

Notes. This figure shows the distributional impact of exclusive contracts on households measured in percentage points, comparing the status quo with a scenario without these contracts. All counterfactuals remove exclusive contracts while: (a) keeping titles and streaming services the same as in the status quo, and (b) assuming Hulu's exit. Households are categorized by sizes (1, 2, 3, and 4 or more) and income quartiles (1: less than \$52,000; 2: \$52,000–\$89,599; 3: \$89,600–\$150,259; 4: \$150,260 and above).

8.2.1 Increased Title Production

I begin by quantifying the potential impact of exclusive contracts if they stimulate content production by small studios. To do so, I simulate counterfactuals without exclusive contracts, assuming that only a fraction of titles produced by small studios under the status quo would have been produced otherwise. I simulate 150 counterfactuals, each corresponding to a production share drawn from an equally spaced grid over $(0, 1)$. In each simulation, I randomly (a) select which small studios' titles are produced according to that share, and (b) draw studios' unobserved contracting preferences ν.

To quantify the effect of increased title production, I regress simulated consumer surplus on small studio production shares. Column (1) of Table 6 and Figure 7 show that a 10% increase in small studio production—equivalent to 61 titles—raises consumer surplus by \$4.0 per household per year. This implies consumers are better off without exclusive contracts as long as small studios retain about 30% of their current output. As a caveat, this threshold should be interpreted as an upper bound: in practice, studios likely prioritize the production of higher-quality titles when con-

Table 6: Consumer Surplus Without Exclusive Contracts: Impact of Small Studio Production

	(1) No Price Control		(2) With Price Control	
	Estimate	SE	Estimate	SE
Share of Small Studio Title Produced	40.448	10.000	66.216	1.072
Mean Subscription Prices			−40.051	0.347
Intercept	192.513	5.751	556.114	3.209
Observations	150		150	

Notes. Each observation corresponds to a counterfactual simulation. The dependent variable is consumer surplus, measured in dollars per household per year. Average subscription prices are measured across all months and services for each simulation.

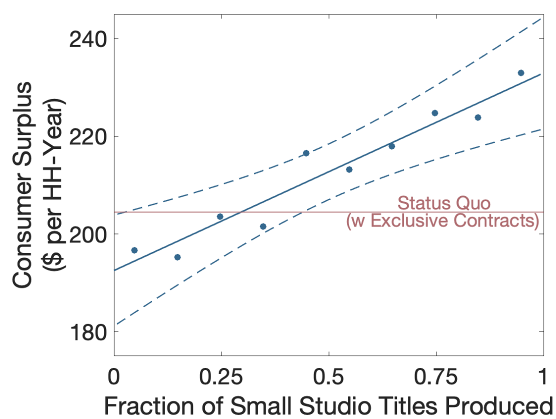


Figure 7: Welfare Impact of Exclusive Contracts and Small Studio Title Production
Notes. This figure is a binscatter plot of consumer surplus (in dollars per household-year) across 150 counterfactual simulations where exclusive contracts are removed and small studios produce varying shares of their status-quo titles. The blue solid line shows the fitted relationship between consumer surplus and production share; the dashed lines represent the 95% confidence interval.

strained, so the reduced set of titles produced in the counterfactuals likely has higher average quality than assumed in simulations (Aguiar and Waldfogel 2018). In other words, exclusive contracts would need to at least triple small studio production to be welfare-enhancing for consumers—an implausibly large impact. I further investigate the distributional effect of increased title production in Appendix F.2.

Why is the consumer benefit from added content so limited? One explanation is that new content allows streaming services to further differentiate and raise subscription prices, offsetting much of its value. To test this, I rerun the regression while controlling for average simulated subscription prices. Column (2) of Table 6 shows

Table 7: Long-Term Impact of Exclusive Contracts: Increased Service Entry

	(1) Simulated Status Quo	(2) No EC & Fixed Services	(3) No EC & No Hulu Entry	%Change from (3) to (1)
Share of Third-Party Titles on Only One Service	0.829	0.563	0.890	−6.9%
Total Service Payoff ($Bn Per Year)	10.744	10.649	11.210	−4.2%
Total Studio Payoff ($Bn Per Year)	12.831	13.017	12.495	2.7%
Consumer Surplus ($ Per HH-Year)	204.476	228.682	183.302	11.6%
Avg. Weekly Streaming Hours	2.537	2.715	2.482	2.2%

Notes. Specification (1) simulates the status quo, (2) removes exclusive contracts but keeps the set of services fixed as in the status quo, and (3) removes both exclusive contracts and Hulu. The last column reports percentage changes from (3) to (1).

that, after controlling for prices, the estimated consumer-surplus gain of a 10% increase in small studios' title production nearly doubles to $6.6 per household per year. This suggests that 39% of the potential gains from added content are offset by higher subscription prices, as services use new content to differentiate.

8.2.2 Increased Service Entry

The large positive impact of exclusive contracts on small services like Hulu suggests they may benefit consumers by enabling the entry of small services that might otherwise be unprofitable. While I do not model service entry decisions explicitly, I assess the potential impact of such entry by simulating a counterfactual in which Hulu is removed along with exclusive contracts, and compare the outcome to the status quo. Column (3) of Table 7 presents key counterfactual outcomes, with full results in Table A.3.

Interestingly, when exclusive contracts encourage small service entry, the share of exclusively distributed titles falls by 6.1 percentage points compared to the status quo. This is because studios must forgo revenue from more potential licensing partners to maintain exclusivity, thereby weakening the incentive to exclude.

The entry of small services intensifies streaming services' competition for consumers, driving down subscription prices and lowering the total service payoff by 4.2%. At the same time, this heightened competition induces services to compete for licensing rights, as they seek to attract and retain subscribers, resulting in a 2.7% increase in studios' payoffs.

Less restrictive title distribution and lower subscription prices increase consumer surplus by $21.2 per household per year, an 11.6% gain.[21] Figure 6b shows that

[21] Hulu's entry and exit should have minimal impact on the value of possibly available content for consumers, as it has only 16 in-house titles, none with an average household WTP exceeding $0.5

lower-income, smaller households—those most harmed by exclusive contracts under a fixed set of streaming services—benefit the most from small service entry, since new entrants provide smaller, more affordable content libraries tailored to the low streaming needs and high price sensitivity of these consumers.

This counterfactual suggests that a key benefit of exclusive contracts may be to encourage service entry, thereby intensifying competition among streaming services. Compared to the limited gains from increased title production, these results imply that downstream (service) competition has a more substantial impact on consumers than upstream (studio) competition. This finding aligns with insights from Rey and Tirole (2007, Section 2.1.4): the social benefits of increased downstream competition are more likely to pass through to consumers, while those of increased upstream competition tend to be absorbed by downstream firms, limiting the gains perceived by consumers.

9 Conclusions

In this paper, I study the welfare implications of exclusive contracts in the video streaming market. I develop a model that combines demand for titles and subscriptions, subscription price setting by streaming services, and contract negotiations between studios and services. In particular, I identify studios' bargaining power without data on negotiated license fees, instead using the insight that studios with weaker bargaining power are more inclined to opt for exclusive distribution to improve their bargaining leverage.

To quantify the effect of exclusive contracts, I apply estimates to simulate a counterfactual without these contracts. I find that the effects vary significantly among services and studios. Small streaming services, such as Hulu, benefit substantially due to reliance on exclusive third-party titles for differentiation, whereas Netflix and Amazon Prime see minimal or negative impacts. Though the "Big Five" studios lose from exclusive contracts because of contracting externalities, small studios gain due to the increased bargaining leverage. Consumers lose in the short run, but this loss may be mitigated or reversed in the long run due to stimulated content production and streaming service entries.

per year. All of Hulu's third-party titles in the status quo are licensed to Netflix or Amazon Prime Video in the counterfactual.

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Appendix A Additional Figures and Tables

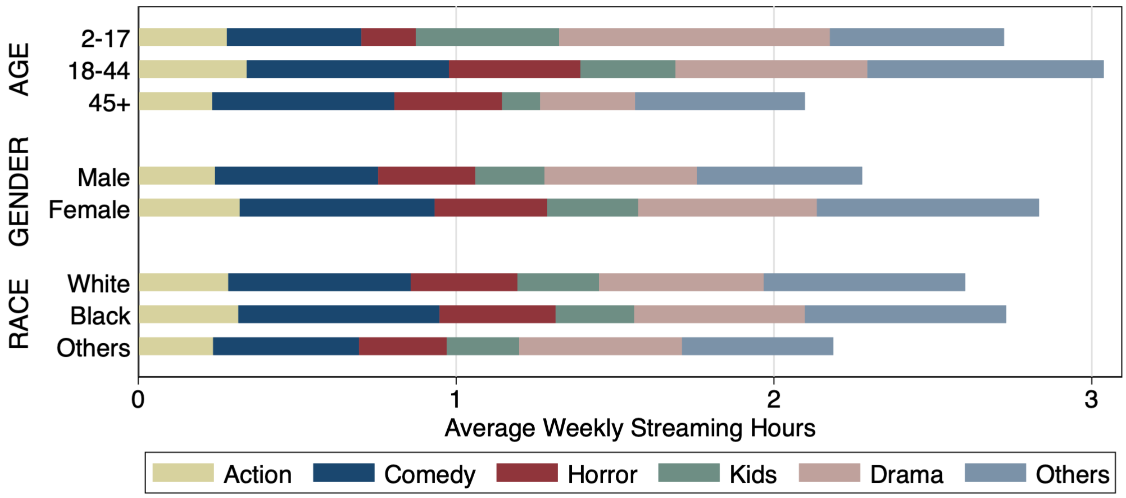


Figure A.1: Average Weekly Streaming Hours by All Genres and Demographic Groups
Notes. This figure displays the average weekly streaming hours across six different genres for U.S. individuals, categorized by their age, gender, and race.

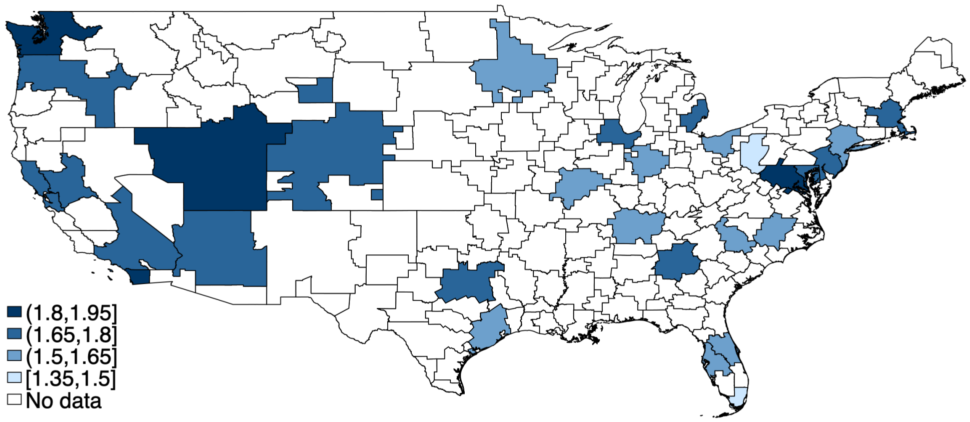
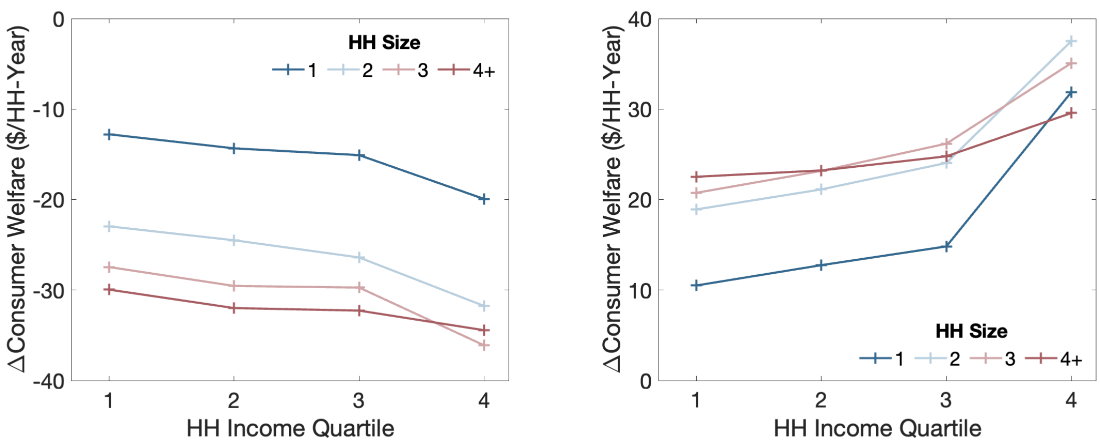


Figure A.2: Subscription Demand in Top 30 DMAs

Notes. This map shows the average number of top four streaming services subscribed to by households for the 30 most populous DMAs from March 2021 to February 2022.



(a) Short-Term

(b) Long-Term: Increased Service Entry

Figure A.3: The Distributional Impact of Exclusive Contracts on Consumers in Dollar Amounts

Notes. This figure displays the percentage points change in household surplus across income levels and household sizes from each of the three counterfactual scenarios to the status quo. All counterfactuals remove exclusive contracts while: (a) keeping titles and streaming services the same as in the status quo, (b) assuming a one-third reduction in content production by small studios, and (c) assuming Hulu's exit. Households are grouped by sizes (1, 2, 3, and 4 or more) and income quartiles (1: less than $52,000; 2: $52,000–$89,599; 3: $89,600–$150,259; 4: $150,260 and above).

Table A.1: Summary Statistics: Titles

	N. Obs.	Mean	Std. Dev.	Median	5th Pctile.	95th Pctile.
Among All Titles						
Viewership (million hours)	2,028	20.356	40.569	8.086	1.642	77.136
Genre: Action	2,028	0.169	0.375	0.000	0.000	1.000
Genre: Comedy	2,028	0.176	0.381	0.000	0.000	1.000
Genre: Horror/Thriller	2,028	0.148	0.356	0.000	0.000	1.000
Genre: Kids	2,028	0.078	0.269	0.000	0.000	1.000
Genre: Drama	2,028	0.223	0.417	0.000	0.000	1.000
Among Third-Party Titles						
Viewership (million hours)	1,145	21.684	45.238	7.970	1.863	83.580
"Big Five"	1,145	0.470	0.499	0.000	0.000	1.000
Available on One Service	1,145	0.867	0.339	1.000	0.000	1.000
Available on Two Services	1,145	0.109	0.312	0.000	0.000	1.000
Title-Week Level Statistics						
Viewership (million hours)	82,693	0.499	1.426	0.162	0.009	1.875
Viewership: Netflix Titles	54,267	0.496	1.506	0.151	0.008	1.867
Viewership: Amazon Titles	12,024	0.503	1.253	0.156	0.008	2.133
Viewership: Hulu Titles	14,146	0.579	1.365	0.202	0.014	2.310
Viewership: Disney Plus Titles	9,883	0.583	1.417	0.263	0.022	1.904
TV Shows: Binge Release	48,504	0.428	0.495	0.000	0.000	1.000

Notes. The table reports summary statistics for the period between March 2021 and February 2022. It covers 2,028 titles, including 1,145 third-party titles. 88 titles are missing production data to determine if they are third-party titles. Binge release is defined as simultaneous releases of at least four episodes.

Table A.2: Descriptive Evidence: Demand for Streaming Service Subscriptions

	(1) #Subscribed Services		(2) Spending: Pre-Tax	
	Estimate	SE	Estimate	SE
Tax rate	−1.069	0.522	−9.486	4.526
Household size	0.345	0.124	3.552	1.101
Constant	0.923	0.304	9.258	2.703
Observations	360		360	

Notes. Observations are at DMA-month level. Standard errors are clustered at DMA level. The two dependent variables are the average number of subscriptions and the total pre-tax subscription spending per household.

Table A.3: Long-Term Impact of Exclusive Contracts: Increased Service Entry (Complete Results)

		(1) Simulated Status Quo	(2) No EC & No Hulu Entry	%Change from (2) to (1)
Distribution Networks	Netflix	0.755	0.811	−7.0%
(%Third-Party Titles on)	Amazon Prime	0.229	0.299	−23.2%
	Hulu	0.222		
	Only One Service	0.829	0.890	−6.9%
Subscription Prices	Netflix	14.678	19.894	−26.2%
(Average $ Per Month)	Amazon Prime	9.546	9.945	−4.0%
	Hulu	8.204		
	Disney Plus	7.829	8.341	−6.1%
Market Shares	Netflix	0.556	0.502	10.6%
(Average Per Month)	Amazon Prime	0.443	0.454	−2.4%
	Hulu	0.289		
	Disney Plus	0.299	0.252	18.4%
	Multi-Homing	0.414	0.279	48.5%
Service Payoffs	Netflix	5.940	6.709	−11.5%
($Bn Per Year)	Amazon Prime	2.416	2.575	−6.2%
	Hulu	0.331		
	Disney Plus	2.056	1.926	6.8%
	Total Service Payoff	10.744	11.210	−4.2%
Studio Payoffs	Big Five	8.470	8.254	2.6%
($Bn Per Year)	Remaining	4.361	4.240	2.9%
	Total Studio Payoff	12.831	12.495	2.7%
Consumer Surplus ($ Per HH-Year)		204.476	183.302	11.6%
Avg. Weekly Streaming Hours		2.537	2.482	2.2%

Notes. Specification (1) simulates the status quo, while (2) removes exclusive contracts and Hulu. The last column reports percentage changes from specification (2) to (1). The share of multi-homing households includes those with at least two subscriptions to Netflix, Amazon Prime, or Hulu (excluding Disney Plus).

Appendix B Details on the Bilateral Contracting Model

B.1 Microfoundation of the Bilateral Contracting Model

Extensive Form Game The extensive form game that yields the bilateral contracting model follows Ho and Lee (2019, page 498). This extensive form game applies to both the simple model in Section 3 and the full empirical model in Section 5. I summarize it and discuss its key intuitions below. Throughout the bargaining process for the licensing right of title j, the participating studio and streaming services assume that all other titles will be distributed as in equilibrium.

In period 0, the studio publicly announces its intended distribution network $\mathcal{K}_j$. For each service $k \in \mathcal{K}_j$, the studio assigns a delegate to negotiate a contract. Each delegate commits to negotiating only with her assigned service k or an excluded service $k' \notin \mathcal{K}_j$. These delegates do not share information about the offers made or received in the subsequent periods.

In periods 1 to T, with T sufficiently large, each studio delegate can choose to engage with its assigned service k or an excluded service k'. This delegate is selected by nature with probability b to make a take-it-or-leave-it (TIOLI) offer to her engaged service, while the engaged service is selected with probability $1-b$ to propose a TIOLI offer to the delegate. The party that receives the offer can either accept or reject the offer. Once a studio delegate finalizes a contract with a streaming service, she is removed from the game. In period $T+1$, the payoffs for all parties are realized at the same time.

This framework captures how studios use excluded services as bargaining leverage with two important deviations from the "Nash-in-Nash" solution. First, studios can create licensing right scarcity by credibly excluding some streaming services from distribution. This is achieved by limiting the number of delegates, with each delegate committing to contracting with only one service. In practice, exclusive contracts ensure such commitments. Second, studios can induce competition by allowing delegates to walk away from assigned services and negotiate with excluded ones, forcing streaming platforms to compete for scarce licensing rights.

Equilibrium Outcome In the weak perfect Bayesian equilibrium, the studio selects the most profitable intended network in period 0. If the network is non-exclusive, the outcome corresponds to the standard Nash-in-Nash solution, as microfounded in

Collard-Wexler, Gowrisankaran and Lee (2019). I focus here on deriving the equilibrium license fees when the intended network is exclusive.

I restrict attention to stationary strategies, so that licensing agreements are reached in period 1 in equilibrium. The studio may adopt a mixed strategy to randomize between services k_1 and k_2 with probabilities β_1 and β_2, respectively. All parties share a common discount factor δ. Let Π_1^e and Π_2^e denote joint profits under exclusive contracts with k_1 and k_2, respectively, and assume $\Pi_1^e > \Pi_2^e$ without loss of generality. Let π_j, π_1, and π_2 denote the payoffs to the studio and services k_1 and k_2.

Proposition 1. *When the studio commits to exclusive distribution, its payoff converges to* $\max\{b\Pi_1^e, \Pi_2^e\}$ *as* $\delta \to 1$*, and the probability of contracting with* k_1 *converges to 1.*

Proof. This proof builds on and simplifies the proof for Proposition 1 from Manea (2018). For any $k \in \{k_1, k_2\}$ with $\beta_k > 0$, the payoffs under the equilibrium contract are

$$\pi_j = b(\Pi_k^e - \delta\pi_k) + (1-b)\delta\pi_j, \tag{B.1}$$

$$\pi_k = \beta_k \cdot \left[b\delta\pi_k + (1-b)(\Pi_k^e - \delta\pi_j)\right]. \tag{B.2}$$

These payoff equations follow Rubinstein (1982): each player is indifferent between accepting and rejecting, with rejection leading to renegotiation next period. The key difference is that due to the studio's mixed strategy, service k only has probability β_k of being selected in the next round.

Rewrite (π_k, β_k) to be functions of π_j:

$$\pi_k = \frac{\Pi_k^e}{\delta} - \frac{1-\delta+\delta b}{\delta b}\pi_j, \tag{B.3}$$

$$\beta_k = \frac{1-\delta+\delta b}{\delta b} - \frac{(1-\delta)(1-b)\Pi_k^e}{\delta b(\Pi_k^e - \pi_j)}. \tag{B.4}$$

In equilibrium, $\pi_k \geq 0$, otherwise service k is better off by always rejecting any offer from the studio. Therefore, equation (B.3) implies that $\beta_k > 0$ must lead to $\pi_j \leq \frac{b\Pi_k^e}{1-\delta+\delta b}$. In addition, $\beta_k = 0$ must imply $\pi_j > \frac{b\Pi_k^e}{1-\delta+\delta b}$, since with $\beta_k = 0$, there is $u_k = 0$. Therefore, the studio does not negotiate with k at all ($\beta_k = 0$) if it cannot possibly benefit from the negotiations: $\pi_j \geq b\Pi_k^e + (1-b)\delta\pi_j$, or equivalently, $\pi_j > \frac{b\Pi_k^e}{1-\delta+\delta b}$.

Therefore, the studio's equilibrium mixed strategy is:

$$\tilde{\beta}_k(\pi_j) = \begin{cases} \frac{1-\delta+\delta b}{\delta b} - \frac{(1-\delta)(1-b)\Pi_k^e}{\delta b\left(\Pi_k^e - \pi_j\right)} & \text{if } \pi_j < \frac{b\Pi_k^e}{1-\delta+\delta b} \\ 0 & \text{if } \pi_j \geqslant \frac{b\Pi_k^e}{1-\delta+\delta b} \end{cases}. \tag{B.5}$$

I will now discuss the negotiated license fees under the following two scenarios.

Scenario 1: $b\Pi_1^e \geq \Pi_2^e$

Below, I show that $\beta_1 = 1$ for all $\delta \in (0,1)$ if and only if $b\Pi_1^e \geq \Pi_2^e$, with $\pi_j = b\Pi_1^e$. If $\forall\delta \in (0,1)$, $\beta_1 = 1$, equations (B.1) and (B.2) imply that

$$\pi_j = b(\Pi_1^e - \pi_1) + (1-p)\delta\pi_1, \quad \pi_1 = b\delta\pi_1 + (1-b)(\Pi_1^e - \delta\pi_j), \quad \pi_2 = 0. \tag{B.6}$$

Solving this system of equations yields $\pi_j = b\Pi_1^e$ and $\pi_1 = (1-b)\Pi_1^e$ for all $\delta \in (0,1)$. To ensure $\beta_2 = 0$, the mixed strategy function (B.5) implies $\pi_j = b\Pi_1^e \geq \frac{b\Pi_2^e}{1-\delta+\delta b}$ for any $\delta \in (0,1)$. Taking $\delta \to 1$, it implies $b\Pi_1^e \geq \Pi_2^e$.

When $b\Pi_1^e \geq \Pi_2^e$, assuming that $\exists\delta' \in (0,1)$, under which $\beta_1 < 1$ and $\beta_2 > 0$. Equation (B.5) implies that to have $\beta_2 > 0$, the studio's payoff must satisfy $\pi_j \leq \frac{b\Pi_2^e}{1-\delta'+\delta' b} < b\Pi_1^e$, where the last inequality comes from $b\Pi_1^e \geq \Pi_2^e$. However, this strategy is not rational for the studio: it could have achieved $b\Pi_1^e$ by only negotiating with k_1: $\beta_1 = 1$. This contradiction suggests that there must be $\beta_1 = 1$, where the studio earns $b\Pi_1^e$.

Scenario 2: $b\Pi_1^e < \Pi_2^e$

Below, I prove that when $b\Pi_1^e < \Pi_2^e$, there are (a) $\exists\bar{\delta} \in (0,1)$ that under any $\delta > \bar{\delta}$, there is $\beta_2 > 0$; and (b) $\lim_{\delta\to 1}\beta_2 = 0$.

I prove both results by contradiction. (a) Suppose not. Then there exists $\delta' > \delta_0$ such that $\beta_2 = 0$, where δ_0 solves $\frac{b\Pi_2^e}{1-\delta_0+\delta_0 b} = b\Pi_1^e$. With $\beta_2 = 0$, there is $\pi_j = b\Pi_1^e$ under δ'. However, from (B.5), $\pi_j = \frac{b\Pi_2^e}{1-\bar{\delta}+\bar{\delta}b} < \frac{b\Pi_2^e}{1-\delta'+\delta' b}$ implies $\beta_2 > 0$, contradicting the assumption. Therefore, (a) holds.

(b) Suppose $\lim_{\delta\to 1}\beta_2 \neq 0$. Since $\beta_1+\beta_2 = 1$ always holds, $\lim_{\delta\to 1}\beta_2 = \lim_{\delta\to 1}\frac{(1-\delta)(1-b)\Pi_1^e}{\delta b(\Pi_1^e-\pi_j)}$. If $\lim_{\delta\to 1}\beta_2 \neq 0$, there must be $\lim_{\delta\to 1}\pi_j = \Pi_1^e$. However, since $\Pi_1^e > \Pi_2^e$, it means that $\exists\delta_0 \in (0,1)$, such that $\forall\delta \in (\delta_0, 1)$, there is π_j that satisfies $\Pi_1^e \geq \pi_j > \Pi_2^e > \frac{b\Pi_2^e}{1-\delta+\delta b}$, which implies that $\beta_2 = 0$ according to (B.5), a contradiction. Therefore, (b) holds.

Together, (a) and (b) imply that the likelihood for the studio to negotiate with

k_2, β_2, is positive but converges to zero with $\delta \to 1$. Combining with (B.5), there is

$$\lim_{\delta \to 1} \pi_j = \lim_{\delta \to 1} \frac{b\Pi_2^e}{1 - \delta + \delta b} = \Pi_2^e. \tag{B.7}$$

Summarizing both scenarios, as $\delta \to 1$, the studio's payoff converges to $\max\{b\Pi_1^e, \Pi_2^e\}$, and the probability of contracting with k_1 approaches 1. $\square$

Key Intuition When $b\Pi_1^e < \Pi_2^e$, the studio benefits from using k_2 as a credible threat to extract better terms from k_1. To make this threat effective, it must assign a non-trivial probability β_2 to bargaining with k_2, especially when δ is low and any bargaining breakdown is costly. Otherwise, if β_2 is too small, k_2 is not an effective threat against k_1, as the studio will have to wait for many periods to select k_2 for bargaining, while this delay is costly for the studio. As δ increases, bargaining breakdowns become less costly, allowing the studio to reduce β_2 while maintaining credibility.

This dynamic also affects k_2's willingness to pay. When δ is small and β_2 remains non-trivial, k_2 knows the studio incurs costs from bargaining breakdowns. As a result, k_2 can retain a small "premium" and pass the rest of Π_2^e to the studio, so that the studio will opt to reach an agreement with k_2 to avoid a breakdown. However, as $\delta \to 1$ and $\beta_2 \to 0$, k_2 realizes it will almost surely not be chosen for bargaining again if its current bargaining with the studio fails. Anticipating zero continuation value, it is willing to surrender nearly all of Π_2^e to secure the deal when selected for bargaining in the current period.

B.2 Simple Model Extension: Heterogeneous Bargaining Power

Below, I extend the simple model from Section 3 to accommodate differential bargaining power among streaming services and show that the core insights from the simple model persist. Moreover, it illustrates how variations in distribution networks can also identify differences in streaming services' bargaining power.

Consider a scenario with one studio, j, and two streaming services, k_1 and k_2, as depicted in Figure 1. Denote the sales profits for k_1 and k_2 under non-exclusive (ne) and exclusive (e) distribution scenarios as Π_1^{ne}, Π_2^{ne} and Π_1^e, Π_2^e, respectively. Without loss of generality, assume $\Pi_1^e > \Pi_2^e$. The respective bargaining powers of the studio with each streaming service are represented by b_1 and b_2. The analysis follows the game timeline and equilibrium concept outlined in Section 3.

The NNTR bargaining solution implies the payoffs for the studio under exclusive ($\mathcal{K}_j = \{k_1\}$) and non-exclusive ($\mathcal{K}_j = \{k_1, k_2\}$) networks as follows:

$$\Pi_j(\mathcal{K}_j) = \sum_{k \in \mathcal{K}_j} \tau_{jk}(\mathcal{K}_j) = \begin{cases} \max\{b_1 \Pi_1^e, \Pi_2^e\}, & \mathcal{K}_j = \{k_1\} \\ b_1 \Pi_1^{ne} + b_2 \Pi_2^{ne}, & \mathcal{K}_j = \{k_1, k_2\} \end{cases}. \tag{B.8}$$

The studio will opt for a non-exclusive distribution strategy if and only if it yields a higher payoff, which requires the satisfaction of the following conditions:

$$b_2 \Pi_2^{ne} \geq \Pi_2^e - b_1 \Pi_1^{ne}, \tag{B.9}$$

$$(\Pi_1^{ne} + \Pi_2^{ne}) + \left(\frac{b_2}{b_1} - 1\right) \Pi_2^{ne} \geq \Pi_1^e. \tag{B.10}$$

Condition (B.9) mirrors (5), reflecting the studio's preference for using exclusive contracts as leverage. If the extra surplus from k_2 when including it in a non-exclusive network (left-hand side of the inequality), exceeds the reduction in surplus from k_1 (right-hand side), the studio will choose a non-exclusive distribution network.

Condition (B.10) is different from (4) due to varying bargaining powers of the streaming services, encapsulated in the term $\left(\frac{b_2}{b_1} - 1\right) \Pi_2^{ne}$. This term reflects how differential bargaining powers influence the studio's preferences: a higher b_2 compared to b_1 suggests that the studio is able to extract more surplus from k_2, thereby valuing k_2's sales profit more. Conversely, when b_1 surpasses b_2, the studio prioritizes k_1's sales profit. Thus, this term reflects the studio's steering incentive based on the relative bargaining power of the streaming services.

In addition, condition (B.10) affirms the significance of network efficiency, which is also suggested by (4). The efficiency of a non-exclusive network (measured by $\Pi_1^{ne}+\Pi_2^{ne}$) over an exclusive one (Π_1^e) increases the likelihood of the studio choosing the former. In sum, (B.9) and (B.10) highlight the balance between leveraging bargaining power and optimizing network efficiency in the studio's distribution strategy.

Identification of Differential Bargaining Powers of Streaming Services The necessary and sufficient condition for the studio to opt for a non-exclusive network, $\Pi_j(\{k_1\}) \leq \Pi_j(\{k_1, k_2\})$, can be rewritten as

$$b_2 \leq \frac{\max\{b_1 \Pi_1^e, \Pi_2^e\} - b_1 \Pi_1^{ne}}{\Pi_2^{ne}}. \tag{B.11}$$

This condition illustrates that, all else being equal, a studio is more inclined to exclude service k_2 from the network when k_2 has stronger bargaining power (indicated by a smaller b_2). Intuitively, the studio prefers to add k_2 into the network when it can extract substantial surplus from it.

The interaction between distribution and k_1's bargaining power, b_1, involves two countervailing forces. A larger b_1 implies the studio has strong bargaining power against k_1, reducing the need to exclude k_2 as leverage when bargaining with k_1. However, a larger b_1 also means the studio can extract more surplus from k_1, motivating the studio to enhance k_1's profitability by providing exclusive rights to k_1. Therefore, the effect of b_1 on exclusive distribution depends on the difference between k_1's subscription profits under exclusive and non-exclusive distributions: $\Pi_1^e - \Pi_1^{ne}$. When this difference is small, a large b_1 implies a reduced likelihood of exclusive distribution and using k_2 as a threat against k_1. In contrast, when such difference is large, a large b_1 implies a strong likelihood of excluding k_2 to guard the profit of k_1 that the studio can attract from licensing contracts. In short, the covariance between $\Pi_1^e - \Pi_1^{ne}$ and exclusive distribution can identify b_1.

This analysis shows that differences in bargaining powers among streaming services can be identified through variation in title distribution. While the main specification assumes uniform bargaining power across streaming services for simplicity, I explore additional specifications in Appendix E.2, where bargaining power varies across streaming services.

B.3 NNTR Solution with Lump-sum License Fees

Non-Integrated Bargaining I start by discussing the scenario where the studio and streaming service are not vertically integrated with each other. When the "threat of replacement" constraint (17) is not binding, the first-order condition of Nash product maximization (16) implies that

$$(1 - b_{jk}) \cdot \Delta_{jk}\Pi_j(\mathcal{K}_j, \{\tau_{jk}^{NN}, \boldsymbol{\tau}_{-jk}\}) = b_{jk} \cdot \Delta_{jk}\Pi_k(\mathcal{K}_j, \{\tau_{jk}^{NN}, \boldsymbol{\tau}_{-jk}\}). \tag{B.12}$$

Given that license fees are lump-sum payments and do not impact consumer demand or streaming service pricing conditional on distribution networks, the gains-from-trade can be expressed as

$$\begin{aligned}\Delta_{jk}\Pi_j(\mathcal{K}_j,\{\tau_{jk}^{NN},\boldsymbol{\tau}_{-jk}\}) &= \Delta_{jk}\Pi_j(\mathcal{K}_j,\{0,\boldsymbol{\tau}_{-jk}\}) + \tau_{jk}^{NN},\\ \Delta_{jk}\Pi_k(\mathcal{K}_j,\{\tau_{jk}^{NN},\boldsymbol{\tau}_{-jk}\}) &= \Delta_{jk}\Pi_k(\mathcal{K}_j,\{0,\boldsymbol{\tau}_{-jk}\}) - \tau_{jk}^{NN}.\end{aligned} \tag{B.13}$$

Consequently, the first-order condition above can be reconstructed as

$$\tau_{jk}^{NN} = b_{jk}\cdot\Delta_{jk}\Pi_k(\mathcal{K}_j,\{0,\boldsymbol{\tau}_{-jk}\}) - (1-b_{jk})\cdot\Delta_{jk}\Pi_j(\mathcal{K}_j,\{0,\boldsymbol{\tau}_{-jk}\}). \tag{B.14}$$

Under this solution, the studio's gain-from-trade with service k is:

$$\Delta_{jk}\Pi_j(\mathcal{K}_j,\{\tau_{jk}^{NN},\boldsymbol{\tau}_{-jk}\}) = b_{jk}\cdot\Delta_{jk}\Pi_{jk}(\mathcal{K}_j), \tag{B.15}$$

where $\Delta_{jk}\Pi_{jk}(\mathcal{K}_j) = \Delta_{jk}\Pi_j(\mathcal{K}_j,\cdot)+\Delta_{jk}\Pi_k(\mathcal{K}_j,\cdot)$ represents the bilateral surplus from the licensing agreement between the two firms. Notably, this bilateral surplus is not a function of the negotiated license fees because they are lump sums.

When constraint (17) is binding, the reservation license fee of excluded service k' is defined to satisfy

$$\tau_{jk'}^{res} = \Delta_{jk'}\Pi_{k'}((\mathcal{K}_j\setminus k)\cup k',\{0,\boldsymbol{\tau}_{-jk}\}), \tag{B.16}$$

which implies that k' is willing to surrender all bilateral surplus to the studio if the latter chooses to switch from k to k'. Therefore, the "threat of replacement" constraint implies that the negotiated license fee must satisfy the following condition:

$$\Delta_{jk}\Pi_j(\mathcal{K}_j,\{\tau_{jk}^{TR},\boldsymbol{\tau}_{-jk}\}) = \max_{k'\notin\mathcal{K}_j}\left\{\Delta_{jk'}\Pi_{jk'}((\mathcal{K}_j\setminus k)\cup k',\{0,\boldsymbol{\tau}_{-jk}\})\right\}. \tag{B.17}$$

Combining (B.15) and (B.17), under the NNTR solution $\tau_{jk}^{*} = \max\{\tau_{jk}^{NN},\tau_{jk}^{TR}\}$, the studio's gain-from-trade with a contracting partner $k\in\mathcal{K}_j$ corresponds to equation (20):

$$\Delta_{jk}\Pi_j(\mathcal{K}_j,\boldsymbol{\tau}^{*}) = \max\left\{b_{jk}\cdot\Delta_{jk}\Pi_{jk}(\mathcal{K}_j), \max_{k'\notin\mathcal{K}_j}\left[\Delta_{jk'}\Pi_{jk'}\left((\mathcal{K}_j\setminus k)\cup k'\right)\right]\right\}. \tag{20}$$

License Fees Between Vertically Integrated Firms I then discuss the scenario where a studio bargains with its vertically integrated streaming service. For simplicity, this analysis assumes $\mu<1$, indicating incomplete vertical integration. The validity of the assumption is further explored at the end of this section. When the "threat of replacement" constraint is not binding, the first-order condition of Nash-in-Nash bargaining leads to

$$\begin{aligned}&(1-b_{jk})\cdot\left[\Delta_{jk}\pi_j(\mathcal{K}_j,\{0,\boldsymbol{\tau}_{-jk}\})+\tau_{jk}^{NN}+\mu\cdot\left(\Delta_{jk}\Pi_k(\mathcal{K}_j,\{0,\boldsymbol{\tau}_{-jk}\})-\tau_{jk}^{NN}\right)\right]\\=&b_{jk}\cdot\left[\Delta_{jk}\Pi_k(\mathcal{K}_j,\{0,\boldsymbol{\tau}_{-jk}\})-\tau_{jk}^{NN}\right],\end{aligned}\tag{B.18}$$

where π_j represents the studio's payoff, excluding effects from its vertically integrated counterparts, and is defined as $\pi_j=\sum_{k\in\mathcal{K}_j}[\tau_{jk}+\nu_{jk}(\mathcal{K}_j)]+\gamma\cdot V_j(\mathcal{K}_j)$. This equation determines the license fee under non-binding constraints as

$$\tau_{jk}^{NN}=-\frac{(1-b)\cdot\Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j,\cdot)}{1-\mu(1-b)}+\Delta_{jk}\Pi_k(\mathcal{K}_j,\{0,\boldsymbol{\tau}_{-jk}\}),\tag{B.19}$$

where $\Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j)=\Delta_{jk}\pi_j(\mathcal{K}_j,\cdot)+\Delta_{jk}\Pi_k(\mathcal{K}_j,\cdot)$ is the maximum gain-from-trade the studio could secure when licensing to its vertically integrated streaming service, given that the service surrenders all its surplus to the studio. It is also not a function of τ.

When the "threat of replacement" constraint is binding, the studio's gain-from-trade with service $k\in\mathcal{K}_j$ must equal or surpass the bilateral surplus from licensing to any excluded service $k'\notin\mathcal{K}_j$:

$$\begin{aligned}&\Delta_{jk}\Pi_k(\mathcal{K}_j,\{\tau_{jk}^{TR},\boldsymbol{\tau}_{-jk}\})=\Delta_{jk}\pi_j(\mathcal{K}_j,\{\tau_{jk}^{TR},\boldsymbol{\tau}_{-jk}\})+\mu\cdot\Delta_{jk}\Pi_k(\mathcal{K}_j,\{\tau_{jk}^{TR},\boldsymbol{\tau}_{-jk}\})\\=&\max_{k'\notin\mathcal{K}_j}\left[\Delta_{jk'}\tilde{\Pi}_{jk'}\left((\mathcal{K}_j\setminus k)\cup k'\right)+\mu\cdot\Delta_{jk'}\Pi_k\left((\mathcal{K}_j\setminus k)\cup k',\cdot\}\right)\right].\end{aligned}\tag{B.20}$$

Notably, $\Pi_k(\mathcal{K}_j\setminus k\cup k',\cdot)$ remains constant irrespective of lump-sum transfers between service k' and the studio because any lump-sum transfer between competing service k' and the studio does not affect the pricing nor consumer demand of k, conditional on the distribution network. The negotiated license fee under a binding constraint becomes:

$$\begin{aligned}\tau_{jk}^{TR}=&\frac{1}{1-\mu}\left(\max_{k'\notin\mathcal{K}_j}\left[\Delta_{jk'}\tilde{\Pi}_{jk'}\left((\mathcal{K}_j\setminus k)\cup k'\right)+\mu\cdot\Delta_{jk'}\Pi_k\left((\mathcal{K}_j\setminus k)\cup k',\cdot\right)\right]-\Delta_{jk}\tilde{\Pi}_{jk}\left(\mathcal{K}_j\right)\right)\\&+\Delta_{jk}\Pi_k(\mathcal{K}_j,\{0,\boldsymbol{\tau}_{-jk}\}).\end{aligned}\tag{B.21}$$

The term in the first line must be non-positive following the stability condition 21, which mandates that the bilateral surplus between the studio and any excluded service

k' (denoted within the brackets) must not exceed the maximum possible gain-from-trade that the studio can obtain from service k, $\Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j, \cdot)$.

Under the NNTR solution, the negotiated license fee between two vertically integrated firms can be represented as $\tau_{jk} = \max\{\tau_{jk}^{NN}, \tau_{jk}^{TR}\}$. Notably, τ_{jk} decreases with μ when $\mu < 1$, as both τ_{jk}^{NN} and τ_{jk}^{TR} do. Subsequently, the gain-from-trade perceived by the studio from contracting with its vertically-integrated service k is:

$$\Delta_{jk}\Pi_j(\mathcal{K}_j, \boldsymbol{\tau}^*) = \max\Bigg\{\frac{b}{1-(1-b)\mu} \cdot \Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j, \{0, \boldsymbol{\tau}_{-jk}\}),$$
$$\max_{k'\notin\mathcal{K}_j}\Big[\Delta_{jk'}\tilde{\Pi}_{jk'}((\mathcal{K}_j \setminus k) \cup k', \cdot) + \mu \cdot \Delta_{jk'}\Pi_k((\mathcal{K}_j \setminus k) \cup k', \cdot)\Big]\Bigg\} \tag{B.22}$$

Discussion: Assumption of $\mu < 1$ The above analysis adopts the assumption that $\mu < 1$. By contrast, $\mu \geq 1$ implies that a studio prioritizes the payoff to its vertically integrated service over its own, so it would accept a license fee approaching negative infinity. This scenario is not consistent with actual market behaviors, where Hulu pays license fees to studios affiliated with Walt Disney. Moreover, the assumed $\mu < 1$ aligns with documented internal frictions within conglomerates (e.g., Crawford et al. 2018, Hortaçsu et al. 2024).

B.4 Distribution Network Formation: The Stability Condition

In this section, I derive the sufficient and necessary condition of the stability condition, denoted as $\Delta_{jk}\Pi_k(\mathcal{K}_j, \{\tau_{jk}, \boldsymbol{\tau}_{-jk}\}) \geq 0$, for non-integrated and vertically integrated firms in Proposition 2 and 3, respectively.

Proposition 2. *The stability condition for two non-integrated firms, j and k, is equivalent to*

$$\Delta_{jk}\Pi_{jk}(\mathcal{K}_j) \geq \Delta_{jk'}\Pi_{jk'}\left((\mathcal{K}_j \setminus k) \cup k'\right), \forall k' \notin \mathcal{K}_j, \tag{21}$$

where $\Delta_{jk}\Pi_{jk}(\mathcal{K}_j)$ represents the bilateral surplus generated by j and k reaching an agreement with each other.

Proof. This proposition resembles Proposition 2 from Ho and Lee (2019). Under distribution network $\mathcal{K}_j$ and NNTR solution $\boldsymbol{\tau}^*$, the gain-from-trade for non-integrated service k from licensing title j is

$$\begin{aligned} &\Delta_{jk}\Pi_k(\mathcal{K}_j, \boldsymbol{\tau}^*) = \Delta_{jk}\Pi_{jk}(\mathcal{K}_j) - \Delta_{jk}\Pi_j(\mathcal{K}_j, \{\tau_{jk}, \boldsymbol{\tau}_{-jk}\}) \\ =& \min\left\{(1-b_{jk}) \cdot \Delta_{jk}\Pi_{jk}(\mathcal{K}_j), \Delta_{jk}\Pi_{jk}(\mathcal{K}_j) - \max_{k' \notin \mathcal{K}_j}\left[\Delta_{jk'}\Pi_{jk'}\left((\mathcal{K}_j \setminus k) \cup k'\right)\right]\right\} \end{aligned} \tag{B.23}$$

Here, the first equality is derived from the definition of bilateral surplus and its independence from negotiated lump-sum license fees, while the second equality is obtained by substituting the studio's gain-from-trade $\Delta_{jk}\Pi_j(\mathcal{K}_j, \tau_{jk}, \boldsymbol{\tau}_{-jk})$ with equation (20). Considering that the bilateral surplus is always positive in this study, the stability condition can be reformulated as (21). □

Proposition 3. *Assuming the internalization parameter $\mu < 1$, the stability condition for two vertically integrated firms, j and k, is equivalent to*

$$\Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j) \geq \Delta_{jk'}\tilde{\Pi}_{jk'}\left((\mathcal{K}_j \setminus k) \cup k'\right) + \mu \cdot \Delta_{jk'}\Pi_k\left((\mathcal{K}_j \setminus k) \cup k'\right), \forall k' \notin \mathcal{K}_j, \tag{B.24}$$

where $\Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j, \cdot) = \Delta_{jk}\pi_j(\mathcal{K}_j, \cdot) + \Delta_{jk}\Pi_k(\mathcal{K}_j, \cdot)$.

Proof. For service k licensing title j from its vertically integrated studio, its gain-from-trade, denoted as $\Delta_{jk}\Pi_k(\mathcal{K}_j, \{\tau_{jk}, \boldsymbol{\tau}_{-jk}\})$, has the following property:

$$\begin{aligned} &(1-\mu) \cdot \Delta_{jk}\Pi_k(\mathcal{K}_j, \{\tau_{jk}, \boldsymbol{\tau}_{-jk}\}) = \Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j, \cdot) - \Delta_{jk}\Pi_j(\mathcal{K}_j, \{\tau_{jk}, \boldsymbol{\tau}_{-jk}\}) \\ =& \min\left\{\frac{(1-b)(1-\mu)}{1-(1-b)\mu} \cdot \Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j, \{0, \boldsymbol{\tau}_{-jk}\}),\right. \\ &\left.\Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j, \cdot) - \max_{k' \notin \mathcal{K}_j}\left[\Delta_{jk'}\tilde{\Pi}_{jk'}((\mathcal{K}_j \setminus k) \cup k', \cdot) + \mu \cdot \Delta_{jk'}\Pi_k((\mathcal{K}_j \setminus k) \cup k', \cdot)\right]\right\}, \end{aligned} \tag{B.25}$$

where the first equality is derived from the definition of $\tilde{\Pi}_{jk}(\mathcal{K}_j, \cdot)$, while the second is derived from substituting the term in the bracket with its equivalence from (B.22).

Because $\mu < 1$ and $\Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j, \{0, \boldsymbol{\tau}_{-jk}\}) > 0$, $\frac{(1-b)(1-\mu)}{1-(1-b)\mu} \cdot \Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j, \{0, \boldsymbol{\tau}_{-jk}\}) > 0$ always holds. Consequently, the stability condition can be translated to

$$\Delta_{jk}\tilde{\Pi}_{jk}(\mathcal{K}_j) - \max_{k' \notin \mathcal{K}_j}\left[\Delta_{jk'}\tilde{\Pi}_{jk'}((\mathcal{K}_j \setminus k) \cup k') + \mu \cdot \Delta_{jk'}\Pi_k((\mathcal{K}_j \setminus k) \cup k')\right] \geq 0. \tag{B.26}$$

which is equivalent to condition (B.24). □

Proposition 3 shows that vertical integration increases the likelihood that a studio finds distribution to its vertically integrated streaming service stable. While vertical integration does not increase the maximum gain-from-trade the studio can extract from a streaming service, $\Delta\tilde{\Pi}_{jk}(\mathcal{K}_j)$, as this term is independent of μ, it reduces the perceived benefit of licensing to competitors. This is because such contracts harm the vertically integrated service's payoff, which the studio considers when distributing titles.

Appendix C Details on Data

C.1 Details on Nielsen Ratings Data

I use Nielsen ratings data from March 2021 to February 2022 in this paper. The data are at the weekly level and also offer ratings by demographic breakdowns, including age groups (2–17, 18–44, and 45+ years old), gender (male and female), and race (white, African American, and others).

Nielsen measures title viewership by monitoring and surveying households within their panel. Two types of information are collected. The first type concerns which titles are watched by each household on any of their screens. This information is collected using Automatic Content Recognition (ACR), a pattern-matching technology. ACR collects short audio and visual clips of media played on screens, which are then cross-referenced with a library of signals from shows and movies to identify the watched content. Viewership of a title by an individual is accounted only if they meet specific criteria, such as a minimum continuous viewing of fifteen minutes.

The second type of data is the demographics of the viewers. Nielsen conducts in-house surveys to collect demographic information and validate the subscription choices of surveyed households simultaneously. These surveys are conducted regularly, typically every six months. In addition, Nielsen installs meters in the households within their survey panel to identify the viewer every time a screen is on. Household members are required to report their unique survey ID upon turning on a screen to confirm their identity.

C.2 Sample and Variable Construction

In this section, I outline the methodology for constructing variables on market shares, subscription prices, and title characteristics. I also detail the criteria for selecting titles in the final sample and discuss their implications.

Prices Netflix and Hulu offer multiple subscription tiers. To calculate average consumer prices, I interviewed experts at both companies and data analysts from YipitData, a data vendor that aggregates SVOD subscription receipts from millions of U.S. users' inboxes. Both sources provided tier-level subscriber distributions, which were closely aligned. I computed the average prices by weighting each tier's price by its share of subscribers. To validate the estimates, I compared the derived average prices for Netflix with those reported in its financial statements. The differences were minimal, with discrepancies consistently under $0.5 across all quarters.

Market Shares Market shares for each bundle of streaming services, defined as a unique combination of the top four services, are sourced from Nielsen Household Universe Estimates. However, the Nielsen data may overestimate subscriber counts. For example, Nielsen reports 77 million U.S. subscribers for Netflix in March 2021, while Netflix's fiscal report lists only 74 million subscribers across both the U.S. and Canada. This discrepancy may result from two factors. First, subscription accounts may be shared across households. Nielsen identifies a household's subscription if any member can browse titles on a service using installed meters. To mitigate the impact of between-household account sharing, Nielsen supplements metering with in-home surveys. Nonetheless, some password sharing may go undetected, leading to potential overcounts. Second, Nielsen and fiscal reports differ in how they define a subscriber. Streaming services report the number of active subscribers on a specific date, whereas Nielsen considers a household a subscriber if it had access to the service at any point during the month.

To rectify this, I first compute the ratio of national subscribers reported by Nielsen to those in fiscal documents for each of the top four services across 12 months. Because Netflix reports a combined U.S. and Canada subscription figure, I assume the two countries split the market equally. I then apply these ratios to adjust subscriber counts for all service *bundles* that include the corresponding services across DMAs and months. This correction ensures that total subscription numbers in the final sample more closely align with those reported in company filings.

Title Sample Selection The original dataset from Nielsen ratings consists of 8,835 titles, which Nielsen can detect viewership from their sampled households. In the paper, the final sample is narrowed down to the top 2,028 titles. They are selected based on their maximum or average weekly rating, which must fall within the top 20% for at least one of the streaming services to which they are distributed.

A limitation of this selection criterion is its potential bias towards including non-exclusive titles in the final sample. This problem arises because Nielsen ratings do not provide separate viewership data for non-exclusive titles by the services that viewers are from. Consequently, non-exclusive titles are more likely to have higher ratings than exclusive ones. This discrepancy leads to a challenge to the identification of bargaining parameters, which relies on the likelihood of studios opting for exclusive distribution.

While I cannot entirely eliminate this concern, the composition of the final sample offers reassurance. 86.7% of the sampled third-party titles opt for exclusive distribution, closely aligning with 86.1% observed among all titles available on the top four services, according to Reelgood data. This similarity supports the representativeness of the selected sample.

Title Characteristics Variables The age of a title is constructed based on the number of weeks elapsed since its most recent release or update. This means that the age of a title resets to one week whenever a new episode is released. Titles that have not been released or updated in the last 50 weeks are categorized as "old," and their age is marked as zero in the dataset. In addition, a show is classified as binge-released if, during its latest release or update, it debuts at least four episodes.

The production of most titles involves multiple studios. For these titles, the studio holding the most market power is often in charge of their distributions. Therefore, if a title's production includes any of the "Big Five" studios, I assume that studio leads the contract negotiations with streaming services, and the title is assigned as a "Big Five" title.

Appendix D Details on Demand Estimation

The parameters to estimate are $\theta_1 = \{\boldsymbol{\alpha}^{\mathrm{x}}, \bar{\beta}^0, \bar{\boldsymbol{\beta}}^{\mathrm{w}}\}$ and $\theta_2 = \{\alpha^V, \bar{\alpha}^p, \alpha^p_{inc}, \beta^0_d, \boldsymbol{\beta}^{\mathrm{w}}_d, \beta^0_v, \kappa\}$. θ_2 includes all nonlinear parameters in the utility functions, as well as α^V and $\bar{\alpha}^p$ since content utilities and prices vary across households within the same market. θ_1 includes all other parameters. The estimation follows the nested fixed point approach from Berry, Levinsohn and Pakes (1995). The outer loop searches for θ_2 that minimizes the GMM objective function, while the inner loop equates simulated and observed demand for both service subscriptions and titles, solves for θ_1, and evaluates the objective function at a given θ_2.

Here are the details. I begin by recovering ζ_{jt} and ξ_{cm} using the iterative contraction mapping method from Lee (2013). For each guess of θ_2, I first compute an initial estimate of content utility V_{hcm} for each household–bundle–market combination, assuming homogeneous preferences across all individuals. Next, I apply the contraction mapping from Berry, Levinsohn and Pakes (1995) to recover the mean utility of each service bundle in each market, $\delta^S_{cm} = \mathbf{x}_{cm}\boldsymbol{\alpha}^{\mathrm{x}} + \xi_{cm}$, such that the predicted bundle shares align with the observed shares given θ_2 and the current V_{hcm}. Using the recovered δ^S_{cm}, I compute the probability that each household selects a given bundle. Conditional on these subscription probabilities, I then recover the mean title utilities, $\delta^T_{jt} = \mathbf{w}_{jt}\bar{\boldsymbol{\beta}}^w + \zeta_{jt}$, using a similar contraction mapping process. Once δ^T_{jt} converges, I update the content utility values V_{hcm} using the definition in equation (11).

The procedure iterates between the contraction mappings of δ^S_{cm} and δ^T_{jt} until V_{hcm} converges. Once convergence is achieved, I project δ^S_{cm} and δ^T_{jt} on $\mathbf{x}_{cm}$ and $\mathbf{w}_{jt}$, respectively, to compute the unobserved service bundle and title demand shocks, ξ_{km} and ζ_{jt} and evaluate the GMM objective. Using multiple starting values, I find the vector that minimizes the objective function, which serves as the estimate of θ_2.

Appendix E Details on Supply Estimation

E.1 Computational Details: Supply

Step 1: Recovering r_k The process of recovering the per-subscriber revenue beyond subscriptions for streaming services, r_k, relies on the first-order condition of optimal pricing (14). This step involves calculating the expected sales profits of streaming services and their derivatives with respect to subscription prices. To assess the expected profits and their derivatives, I employ 25 random draws of (ζ, ξ) from the empirical distribution obtained from demand estimation. Specifically, the demand shocks for titles, ζ, are drawn based on the age and type (movie or TV show) of the titles. This is because the variation in ζ tends to decrease as a title ages and that the variation in ζ for TV shows is generally larger, due to the increasing knowledge of title quality over time and a better understanding of movie quality compared to show quality. The mean values of these simulated sales profits and the derivatives of subscription prices across all 25 draws are then employed to recover the "benefit" per consumer.

Step 2: Simulated Method of Moments Under each guess of bargaining parameters and studio payoff parameters, I simulate the probability of each distribution network to be the equilibrium outcome for every title, $\hat{P}$. This requires evaluating the expected market shares of streaming services and titles under each network. Using 25 random draws of demand shocks (ζ, ξ), I calculate expected market shares and title viewership while keeping other titles' distributions and subscription prices constant, consistent with the assumption that all titles' bilateral contracting and subscription price setting occur simultaneously.

I also use 1000 random draws of ν. For each draw of ν, I determine the equilibrium distribution network for each title that satisfies both the stability condition (21) and the optimality condition (22), holding subscription prices and other titles' distribution networks fixed. The network yielding the highest studio payoff is selected as the equilibrium. The simulated probability of each network being an equilibrium across all draws is used as $\hat{P}$.

To ensure robust optimization and avoid local minima, I use the Matlab command fminsearchOS, an improved version of the Nelder-Mead search algorithm. It is more effective in getting over the kinks and identifying the global minimum. I also use 10 different starting points to ensure the convergence to the global minimum.

E.2 Robustness Checks

Validating and Identifying Profit Margins of Prime Video Using Title Distribution Variation In the main model, I estimate the profit margin of Amazon Prime Video using first-order conditions (14), assuming all Prime Video users pay \$8.99 for the service. However, this margin can be overestimated if many Prime Video users are existing Prime members who would retain their full Prime subscription regardless of Prime Video, or underestimated if many Prime Video users subscribe to full Prime membership mainly for Prime Video and would cancel their subscription if it lacked sufficient content.

To test the accuracy of this estimation, I re-specify Prime Video's profit margin as $\phi \cdot \hat{\eta}$, where $\hat{\eta}$ is the margin, or $p_k + r_k$, recovered from first-order conditions (14). I then estimate ϕ using variation in title distribution. A $\phi > 1$ would indicate an underestimation of Prime Video's margins in the main model, while $\phi < 1$ would

Table E.1: Supply Estimation: Robustness

	(1) With Amazon Payoff Parameter		(2) Alt. Studio Categorization		(3) Differential b for Services		(4) Only New Releases	
	Estimates	SE	Estimates	SE	Estimates	SE	Estimates	SE
Bargaining Parameters $\boldsymbol{b}$								
Big Five	0.790	0.102			0.866	0.158	0.882	0.114
Big Five: Major			0.817	0.155				
Big Five: Minor			0.820	0.117				
Smaller Studios	0.463	0.244	0.576	0.152	0.559	0.154	0.647	0.222
Against Netflix					−0.063	0.169		
Studio Payoff Parameters								
Viewership preference γ	0.827	0.222	0.869	0.207	0.780	0.187	0.511	0.181
STD of Unobserved Preferences σ_ν	0.190	0.099	0.164	0.030	0.146	0.026	0.094	0.069
Internalization μ	0.635	0.130	0.657	0.134	0.626	0.124	0.379	0.230
Amazon Payoff Parameter	0.980	0.036						

Notes. Studios' payoffs are measured in millions of dollars. Standard errors are computed using 100 bootstrap samples.

suggest an overestimation.

The identification of ϕ relies on variation in title distributions. If $\phi < 1$, some titles predicted to be exclusively distributed to Amazon based on the recovered margins $\hat{\eta}$ may fail to satisfy the stability condition (21), meaning they would not be observed to be exclusively available on Amazon. In contrast, if $\phi > 1$, the opposite would hold. In short, the difference between the predicted and observed likelihood of exclusive distribution helps identify ϕ.

I estimate this Amazon payoff parameter ϕ together with other supply-side parameters $\boldsymbol{b}, \gamma, \sigma_\nu, \mu$ using the same moment conditions as in the main model. I report the results in Column (1) of Table E.1. The estimated value of ϕ is 0.98 with a small standard error (0.04). In addition, the remaining parameters align well with the estimates from the main specification, reported in Table 4. showing strong support for the profit margins recovered from first-order conditions.

Alternative Studio Categorization The production of most titles involves collaboration between multiple studios. In the main specification, I categorize titles into two groups based on whether any of their production studios belong to the "Big Five." This categorization reflects the industry norm that if at least one studio is among the "Big Five," it typically handles contract negotiations due to its strong bargaining power.

To ensure the robustness of the estimation results to different studio categorizations, I re-estimate the model using an alternative categorization approach. Specifically, I divide titles involving at least one "Big Five" studio into two categories: those where at least 50% of the production companies are "Big Five," and those where less than 50% are "Big Five." This results in 216 titles in the first category, named "Big Five: Major," and 327 titles in the second category, named "Big Five: Minor."

I re-estimate the supply model, allowing for different bargaining powers for these two categories. The regression results, reported in Column (2) of Table E.1, show that the parameters change only marginally from the main specification in Table 4. Specifically, the bargaining powers of studios for these two categories are indifferent, reflecting the industry norm of larger studios handling contract negotiations and supporting the validity of the main specification.

Differential Bargaining Powers of Streaming Services In the main specification, I assume that all streaming services have the same bargaining powers against studios. As a robustness check, I relax this assumption by allowing Netflix, the largest streaming service worldwide, to have a different bargaining power from its competitors, Amazon Prime and Hulu. I parameterize the bargaining power as follows:

$$b_{jk} = \mathbf{1}(j \in \{\text{Smaller Studios}\})b_{small} + \mathbf{1}(j \in \{\text{Big Five}\})b_{big} - \mathbf{1}(k = \text{Netflix})b_{Netflix}. \tag{E.1}$$

The parameter $b_{Netflix}$ captures the difference in bargaining power between Netflix and its competitors. A larger $b_{Netflix}$ implies stronger bargaining power for Netflix.

The identification of $b_{Netflix}$ relies on the variation in distribution networks. As shown in Section B.2, all else equal, a streaming service with stronger bargaining power is more likely to be excluded, as the studio suffers smaller losses from excluding it.

I present the estimation results in Column (3) of Table E.1. I find that the difference in bargaining powers between Netflix and its competitors is statistically insignificant and small in magnitude. This robustness check suggests that the main specification has captured most of the variation in bargaining powers across pairs of firms.

Limiting the Sample to Newly Released Titles I conduct this robustness check to test if the estimation results are robust to the static bargaining assumption. In addition to the defense of this assumption in Section 5.3, I limit the sample to include only titles released during the observation period. Unlike older titles, studios that produce these new titles should not face any switching costs when choosing the contractual streaming services, even if such costs exist. If switching costs were of first-order importance, the estimates based on this more restricted sample would be different from those based on the full sample.

In Column (4) of Table E.1, I present the estimation results using this restricted sample. I find that all parameters are not statistically different from those using the full sample, including the bargaining parameters, though the standard errors become larger due to the smaller sample size ($N = 244$) compared to the full sample ($N = 1145$).

E.3 In-Sample Model Fit

To investigate in-sample model fit, I simulate the equilibrium outcomes using the model and estimates, following the algorithm described in Section 8.1. In the first two columns of Table E.2, I present the results of the in-sample fit comparison. It shows a close alignment between the model's predictions and actual data on subscription prices, consumer demand, and distribution networks, though it overestimates Amazon's shares in both content licensing and consumer demand while underestimating Hulu's.

Appendix F Detailed on Counterfactuals

F.1 Additional Counterfactual: Complete Network

In this section, I investigate another counterfactual, where studios are required to license their titles to all of Netflix, Amazon Prime, and Hulu, ensuring a complete distribution network for each title. This counterfactual quantifies the effects of removing all exclusive distribution networks, including those not facilitated by exclusive contracts. Following Section 8.1, I assume the current array of streaming services and titles remains unchanged.

I present the results in the last column of Table E.2. Under the complete network scenario, the downstream competition intensifies significantly, since streaming services can only rely on their in-house content for differentiation. Therefore, comparing the status quo to the counterfactual, all studios and streaming services gain from exclusive contracts, which differs from the findings in Section 8.1.

Table E.2: In-Sample Model Fit and Additional Counterfactual

	Observed	Simulated Status Quo	Complete Network
Monthly Avg. Prices			
Netflix	13.532	14.678	7.416
Amazon Prime	8.990	9.546	8.359
Hulu	8.407	8.204	6.116
Disney Plus	7.907	7.829	8.064
Distribution Networks			
Share of Titles on			
Netflix	0.712	0.755	1.000
Amazon Prime	0.185	0.229	1.000
Hulu	0.248	0.222	1.000
Only One Service	0.867	0.829	0.000
Consumer Demand			
Market Shares			
Netflix	0.570	0.556	0.613
Amazon Prime	0.461	0.443	0.442
Hulu	0.358	0.289	0.231
Disney Plus	0.300	0.299	0.301
Multi-Homing	0.526	0.500	0.477
Multi-Homing (Excl. Disney)	0.447	0.414	0.294
Avg. Weekly Streaming Hours	2.562	2.537	3.128
Service Payoffs			
Netflix		5.940	2.084
Amazon Prime		2.416	0.570
Hulu		0.331	0.016
Disney Plus		2.056	2.174
Total Service Payoff		10.744	4.844
Studio Payoffs			
Big Five		8.470	8.203
Remaining		4.361	3.201
Total Studio Payoff		12.831	11.405
Consumer Surplus (per HH-Year)		204.476	329.121

Notes. Prices are measured in dollars, service and studio payoffs in billion dollars per year, and consumer surplus in dollars per household-year. Subscription prices and market shares are monthly averages from March 2021 to February 2022.

However, the relative pattern between firms remains consistent. Small studios enjoy additional benefits from exclusive contracts compared to the “Big Five” (+36.2% vs. +3.3%) due to the reliance on using exclusive contracts as a bargaining tool. Small services like Hulu gain substantially more than streaming giants like Netflix and Amazon Prime because they rely more on exclusive third-party content for differentiation. Consumers, however, continue to lose due to reduced title distribution and increased subscription prices, as discussed in Section 8.1.

F.2 Distributional Impact of Exclusive Contracts with Increased Content Production

In Section 8.2, I explore the impact of exclusive contracts when they can stimulate content production. I further explore the distributional effects in Figure F.1, which reports the minimum production share needed to maintain the status-quo surplus by household size and income. One-person households below the 75th income percentile are always better off without exclusive contracts—even if small studios produce no content. In contrast, large, high-income households require a substantial share of content to maintain status-quo surplus. This contrast arises because smaller, lower-income households are more price-sensitive, and therefore, lose more from subscription price increases caused by exclusive contracts, while deriving less value from additional content. Therefore, even if exclusive contracts stimulate content production, their welfare impact may remain regressive, disproportionately harming smaller and poorer households.

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Figure F.1: Minimum Share of Small Studio Titles (Without Exclusivity) Needed to Maintain Status-Quo Surplus

Notes. This figure reports the minimum share of small studios' titles that must be produced—under the no-exclusive-contract counterfactual—for each household group to maintain its status-quo surplus. Households are grouped by size and income quartile.

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