Marketing Science

Price Dispersion and Legacy Discounts in the National Television Advertising Market

Sylvia Hristakeva, Julie Holland Mortimer

Please scroll down for article—it is on subsequent pages

Price Dispersion and Legacy Discounts in the National Television Advertising Market

Sylvia Hristakeva,[a,*] **Julie Holland Mortimer**[b,c]

[a] UCLA Anderson School of Management, Los Angeles, California 90095; [b] Department of Economics, University of Virginia, Charlottesville, Virginia 22903; [c] National Bureau of Economic Research, Cambridge, Massachusetts 02138
*Corresponding author
Contact: sylvia.hristakeva@anderson.ucla.edu, ![orcid] https://orcid.org/0000-0003-2914-836X (SH); juliemortimer@virginia.edu, ![orcid] https://orcid.org/0009-0004-1845-0197 (JHM)

Abstract. Advertising is an input for many final goods, and broadcast television comprises a significant portion of ad spending in the United States. Yet, advertisers face different costs when purchasing national television ads. We seek to empirically confirm differences in firms' costs to advertise nationally. Network-advertiser contracts are secret, so we combine data on ad placements and average prices of program airings to analyze price dispersion. We document that "legacy" advertisers with established broadcast relationships receive favorable prices for equivalent ad inventories. This may benefit incumbents and potentially soften price competition from newcomers in product markets.

1. Introduction

Firms often negotiate the prices they face from their suppliers, which implies that price dispersion in input markets is likely to be the rule, rather than the exception. We demonstrate how price differences across advertisers can be empirically estimated using new data and analyze the factors that drive price dispersion in the market for national television (TV) advertising. Pricing data for national TV ads are rarely available, and researchers most often assume uniform prices for empirical analyses à la posted rate cards. Our analyses suggest that firms pay different prices for observationally equivalent ad inventories. To interpret these results, we correlate price differentials with observable characteristics of advertisers and their purchased inventories.

The advertising market we study is known in the industry as the "upfront" market and comprises roughly 80% of the national ad inventory of major broadcast networks (Lotz 2007), with more than $9 billion in commitments for primetime ads in 2012 (James 2013).[1] The upfront market operates in the spring and sells inventory for the upcoming TV season that begins in the fall. Prices are referred to as CPMs (costs per mille, or the cost to reach 1,000 viewers), and industry narratives describe price dispersion in the upfront market colloquially as "good" versus "bad" money: "'Good' money is that with a comparatively high CPM. 'Bad' money commonly can

be found in old brands that established very low CPMs long ago" (Lotz 2007, p. 553).

Such price differences may, in principle, reflect two types of price dispersion across advertisers: nonlinear pricing and market segmentation. The policy implications of the price dispersion in the market differ based on the type of price discrimination that is used. If advertisers face nonlinear prices (i.e., second-degree price discrimination), then they can adjust the dimensions of their ad purchase (e.g., by buying higher- or lower-quality ad inventory) in order to access the same prices as other advertisers. However, if networks charge different prices to different advertisers for equivalent inventory (what we call market segmentation), then there is no adjustment an advertiser can make to gain access to the price paid by a rival firm; instead, the advertiser must simply pay a higher price. Our goal is to "pull back the curtain" and describe the factors that drive price dispersion in this market, and we use these two broad dimensions of price dispersion to guide the interpretation of our results.

A significant challenge for studying pricing in most input markets is that firms consider contracts to be proprietary, and data on the terms of pricing contracts are rarely available. Indeed, despite the fact that we observe detailed information on which exact ad spots within a program airing are assigned to specific advertisers

(e.g., the first ad in the second ad break of *Grey's Anatomy* airing on ABC on 2/3/11 was for AT&T), we do not observe the prices paid by individual advertisers. To overcome this challenge, we combine the detailed information on ad placements across advertisers with the average transaction price of ad spots within each program airing (e.g., the average price across the set of advertisers showing national ads in *Grey's Anatomy*'s airing on 2/3/11 is $176,008).

Our main data sources provide information on (i) television viewership and detailed ad-placement information for individual program airings (telecasts) from 23 million cable set-top boxes in 13 million households during the 2011–2013 calendar years and (ii) average transaction-level ad prices for each telecast over the same three-year period. We infer price differentials across firms by mapping the average upfront prices in each telecast to the set of advertisers who purchased ads in the telecast. We are able to exploit this strategy because, unlike other data sets of TV ad pricing, our data consist of transaction-level ad prices. We interpret the implied price differentials using advertisers' observable characteristics. Intuitively, if car manufacturers pay lower prices than insurance companies, then we expect that the (average) upfront price is lower in telecasts where we observe more car advertisers and fewer insurance companies. The empirical strategy uses price variation across different telecasts, controlling for differences in telecast quality using a flexible fixed-effect parametrization with fixed effects for program-month, network-month-year, and network-month-day-of-the-week (network-month-dow). Effectively, we condition on a TV show-month pair and analyze how price variation is correlated with the profile of advertisers observed in different airings of the same TV show in a given calendar month.

A key aspect of our analysis is our ability to flexibly describe the different inventories purchased by advertisers. For example, one expects that advertisers may face lower costs for all of their ads if they purchase a larger share of less desirable inventory (e.g., inventory in the summer months or outside of primetime). We use rich observable details about the placements of specific ads across advertisers to control for differences in prices that are due to nonlinear pricing. For example, we use information on the share of an advertiser's ads that ran during the first ad break of a telecast, the share of ads positioned in the first slot of an ad break, or the share of ads across different programming genres. These details help explain the detected price dispersion and make efforts to control for the quality of the overall inventory purchased by different advertisers more credible.

In addition to nonlinear pricing, we may see price dispersion if networks charge firms different prices for equivalent inventory. Advertisers use media-buying agencies to implement ad campaigns; thus, one explanation is that networks charge different prices to different advertising agencies. To capture potential differences in prices attributed to agency representation, we hand-collected information on firms' media-buying agency of record for the 2011–2013 period. Market practitioners also attribute price dispersion to a so-called "legacy discount," in which firms with longer relationships in the upfront market pay lower prices (Poggi 2017). We hand-collected historical information on advertising expenditures by parent companies from 1960 to 2017. We use this data set to proxy for the length of time each firm has participated in the upfront market for national advertising, and we refer to this advertiser characteristic as its "legacy status." Our final specification also includes advertiser information on product-market category and its year of entry into the product market.

The empirical analyses suggest both the presence of nonlinear pricing and market segmentation. Price differentials exist, even when comparing large advertisers who are purchasing similar ads—that is, ads in the same TV show and calendar month. We infer that firms pay higher prices for inventory with a higher share of ads in the first ad break of an airing, a higher share of ads on Sunday through Thursday, and a higher share of ads outside the summer months. Industry practitioners highlighted that these features of ad inventory are typically more desirable.[2] Thus, these findings confirm our intuition that inventory with a larger share of "more desirable" ad slots commands a premium relative to inventory with "less desirable" ads. Consistent with industry narratives, we also find that, on average, prices paid for ads on broadcast networks are negatively correlated with a firm's legacy status, measured by the number of years of participation in the upfront market.

These findings are aligned with narratives from trade publications that legacy firms benefit from lower prices, and we refer to these discounts as legacy discounts.[3] The results are directly interpretable and allow us to quantify price differentials across advertisers. The estimated coefficient on legacy status suggests that advertisers pay 0.5% less per year of earlier entry to the upfront market, implying that, on average, an advertiser who entered in 1960 enjoys a 26.5% cost saving relative to one who entered in 2013. In order to speculate on how such cost differences may affect downstream market competition, we unconfound market segmentation from nonlinear pricing by controlling for the latter with a rich set of inventory descriptors. In contrast to nonlinear pricing, market segmentation implies that an advertiser may not change the prices it faces by altering its purchased inventory. Conditional on our inventory controls, the practical impact of legacy discounts may be to increase an important input cost for firms that are relatively new to the national TV advertising market.

Our empirical analyses and the implied cost differences may be used to offer guidance on which product markets are subject to large differences across advertisers in their returns on ad spend. We describe how industry practices may affect new entrants both across and within various product markets. We divide brands into 96 detailed product markets (e.g., Credit Cards, Diapers, and Water) and identify markets with substantial differences in upfront entry between the earliest and most recent entrants. For example, there are 41 product markets with a greater than 20-year gap between the most recent and earliest entrants (e.g., Casual Dining, Chocolate, and Telecom). We calculate the potential foregone cost savings for the most recent entrant within a product category by assigning the discount of the earliest entrant to the most recent entrant in each category. On average, the brand with most recent entry in a category pays roughly $3.5 million more for the same advertising inventory, on a base expenditure of $20.6 million.[4] These data patterns imply that legacy pricing may create significant differences in costs between firms competing in the same product market. Specifically, younger advertisers face higher costs, which may impede their ability to put pricing pressure on dominant (legacy) firms. Similarly, these cost advantages present a reason why legacy firms may be better positioned to introduce new brands than young independent firms, again with the potential to soften competition in downstream product markets.

Our estimates of legacy discounts imply advantages to firms that have long-standing relationships with broadcast networks, potentially reinforcing the advantages of advertising for incumbent firms à la Sutton's (1991) endogenous sunk costs. Concerns about unequal access to advertising have been considered previously by both academics and antitrust authorities. Porter (1976) documents that it is cheaper to reach a viewer with a national ad than a local ad, highlighting one mechanism that gives national firms a competitive advantage over regional (smaller) firms and potentially creating barriers to entry for small local firms. We add to this discussion by documenting that legacy firms benefit from lower prices, even when we condition on participation in the upfront market, the quality of purchased inventory, the media agency of record, the age of the firm, and the product-market category. These differences persist across advertisers with high exposure on national primetime television, which are often firms of interest for researchers, practitioners, and policy makers. Recognizing and quantifying differences in input costs is notoriously difficult because contracts are rarely disclosed to researchers or even practitioners. Our empirical analyses and the implied cost differences provide a road map for identifying cost differences in the absence of data on contracts between firms and offer guidance on which product markets may be subject to large differences across advertisers in their returns on ad spend.

The economics and marketing fields have long been interested in investigating how the strategic use of advertising may shape product-market competition and market structure. Empirical analyses have documented that advertising is an important tool for product-market success (some examples include Ackerberg 2001, Dubé et al. 2005, Shapiro 2018, and Yang et al. 2021) and generally considered how advertising affects competition (Vilcassim et al. 1999, Dubé and Manchanda 2005, Qi 2013).[5] Most studies of advertising effectiveness and the effects of advertising on product-market competition assume that advertisers incur the same costs to reach a viewer because of data limitations (e.g., Wilbur 2008, Shapiro 2018, and Gentzkow et al. 2022).[6] One exception is Moshary (2020), who documents that local television stations price discriminate between Republican and Democratic political action committees according to committees' willingness to pay for ads in contested markets. She considers local (spot) advertising choices, which are important for political campaigns. In contrast, we focus on national advertising, which accounts for the bulk of ad spending in product markets. Yang et al. (2021) analyze how differences in advertising costs impact the market for satellite and cable TV. In this industry, the entering satellite providers advertise nationally and, thus, benefit from cheaper advertising costs compared with incumbent cable firms who advertise locally. Our results, instead, highlight a form of price dispersion for an input that more often has negative consequences for new entrants.

The rest of the paper is structured as follows: Section 2 describes the market for national television advertising. The novel data sources used in this analysis are presented in Section 3. Section 4 describes our identification strategy, and Section 5 exploits average prices to infer information about price dispersion across advertisers. In Section 6, we describe the inferred price differences across brands within the same product market. Section 7 concludes.

2. Market for National Television Advertising

National television advertising is sold in two markets: the upfront and the "scatter." The upfront market dates back to the 1960 s and involves selling national advertising for the upcoming season in advance. Each spring, between March and June, networks organize events to preview and promote their programming for the upcoming television season, which begins in the fall. The scatter market sells ad slots close to the air date of a program.[7] The majority of national broadcast ad slots are sold through the upfront market, with the top broadcast networks (ABC, NBC, and CBS) selling about 80% of their ad inventory in this market (Lotz 2007). Consistent with Lotz (2007), we confirmed that the main benefits for advertisers to purchasing in the

upfront relate to lower prices compared with purchasing in the scatter market, availability of programming, and the use of firm-specific discounts. Using SQAD data on prices, we document that upfront prices on broadcast television are, on average, 12% lower than scatter prices for the same program airing in our sample.

Most advertisers work with ad agencies to create advertising campaigns for their products, determine advertising budgets, and recommend a programming mix. Media-buying agencies also negotiate on behalf of their clients in the upfront market. The upfront typically proceeds in two steps. First, advertisers negotiate a programming mix with each network. The programming-mix negotiations are over blocks of ad slots, rather than at the level of an individual ad in a specific television show. Figure 1 shows a sample sales-request form for NBC, reproduced from Bollapragada et al. (2002). In the sales request, the advertiser communicates its budget and a plan for how the ads are to be distributed over various weeks and programs. For example, an advertiser may request to show more ads in certain weeks (e.g., leading up to Christmas) and programs (e.g., *Dateline*); however, the advertiser does not negotiate on the exact placement of its ads across airings of specific programs.

Once the programming mix is established, prices are determined. Prices are described as CPM and may vary by audience size, viewer demographics, daypart, seasonality, day of the week, and advertiser (Bollapragada et al. 2008). The price-determination process differs between new and returning business (Lotz 2007). In the case of new accounts for a network, the agency negotiates a base rate for the new client. For all returning advertisers, each network negotiates a uniform percent increase (or, rarely, a decrease) that is applied to their existing base rates. For example, if Proctor & Gamble's (P&G) base rate with ABC in 2011 is $10, and ABC secures a 10% increase in 2012, then P&G will pay $11 in the 2012 upfront market.

Industry narratives report that firms "have been grandfathered into legacy ad deals that reward marketers for decades of consistent business by guaranteeing relatively small price hikes on relatively low bases" (Poggi 2017). The incumbent firms maintain their preferential base rates as long as they maintain a continued relationship with the network (Lotz 2007).[8] If negotiated prices for new businesses are consistently higher than the prices paid by returning businesses, then this price-determination process creates differences between incumbents and newcomers that persist over time. In 2005, an auditor of media spending, Media Performance Monitor America (MPMA), analyzed actual prices paid by major U.S. advertisers. The set of audited firms accounted for $3 billion in advertising expenditure. The report documents the presence of price variation across firms for identical inventory in the upfront (Bloom 2005).

Figure 1. Example of Sales Request

Source. Sales-request form provided by NBC, obtained from Bollapragada et al. (2002).

The findings show that so-called "legacy" firms, who have long histories of participation and "old" base rates, pay prices that are as much as 50% lower than the prices faced by firms on the other side of the distribution (i.e., new entrants). The report further reveals that these deals are not associated with the size of the firm or the identity of the firm's media-buying agency.

The contracts in the market for national television advertising are further complicated by the use of audience delivery guarantees. If a program's viewership is lower than the contracted expected viewership, then the network provides additional ad spots to the advertiser during other time slots or shows at no charge. Alternatively, if a program's viewership is larger than predicted, the advertiser captures these gains at no additional cost. To fulfill these audience guarantees, networks typically reserve some inventory in advance, which may affect inventory availability and prices in the scatter market (e.g., see Geng and Mallik 2019). That said, sources explain that "network[s] will try to deliver the [guaranteed] audience with as little displacement of scatter business as possible" (Philips and Young 2012, p. 192). Industry practitioners confirmed to us that networks prefer not to use primetime inventory to deliver audience guarantees. Accordingly, our empirical analyses focus on primetime telecasts to alleviate concerns that the ad placements we analyze do not result from audience guarantees.[9] Conversations with practitioners revealed that multiyear contracts may be used in the case of sporting events, so we omit advertising on sports programming.

Cable networks differ from broadcast networks in several ways. Some cable networks are primarily supported by viewer subscriptions (e.g., HBO) and have a much smaller presence in the advertising market. Large ad-supported cable networks (e.g., USA, TNT, and TBS) entered the upfront market in the 1990 s. Unlike broadcast networks, however, they sell less than half of their inventory through the upfront market (Lotz 2007, Bollapragada et al. 2008). Using SQAD data, we see that inventory on cable commands, on average, lower prices than on broadcast television. In confidential interviews, practitioners stated that cable networks do not typically offer legacy discounts on upfront ad buys. We evaluate the relationship between firm characteristics and price dispersion separately for broadcasters and cable networks.

3. Data

The data for the project come from six sources: Rentrak Corporation, SQAD, Winmo, and three sources that report historic information on advertising spending: Kantar Media's Ad$pender, AdSummary periodicals, and Leading National Advertiser periodicals.[10] The data from Rentrak Corporation and SQAD cover a three-year period (January 2011 through December 2013).

In the television market, Rentrak collects viewership (i.e., ratings) data from over 13 million households, or 23 million set-top cable boxes. Unlike the Nielsen Company, which tracks 25,000 households using a "PeopleMeter" to monitor which member of a household is viewing a telecast, Rentrak collects data for a much larger population at the level of each "tune-in" of a remote control. The demographic detail covers over 100 standard demographic variables for all members of each household (e.g., gender, race, education, and income). A drawback for Rentrak is that it does not identify the household member who is viewing a given telecast, which calls for caution when using the demographic detail on telecast viewership provided in the data.

Rentrak combines these viewership data with information on ad placements. The information about each advertisement is extensive, describing the advertiser, industry, product, ad copy, timing, and placement of each ad. For example, an observation describes that Coca-Cola Co. ran the 30-second "Let the World Come to Your Home" ad as the second ad during the first ad break of the 9:00 p.m. showing of *Modern Family* on ABC on October 16, 2013. The Rentrak data also contain information on the corporate relationships across advertisers, identifying parent companies for brands across products in different industries.

Prices of ad spots are closely guarded by industry participants and are notoriously difficult to observe. We access previously unavailable data on television ad prices based on actual transactions between networks and advertisers. These transaction-level data, which SQAD receives directly from ad agencies and calls Net-Costs, report the average transaction price for an ad spot in a specific telecast (for example, *Modern Family* on ABC, shown at 9:00 p.m. on October 16, 2013), where the average is taken over the set of advertisers showing ads in that telecast.[11] Compared with CPM data more commonly used by researchers (e.g., Nielsen's Ad Intel product) that provide estimates of the cost of an ad spot, often aggregated at the level of the network-month-daypart or program-month, NetCost prices do not rely on imputations and directly reflect average prices paid across advertisers observed in a telecast. To the best of our knowledge, this is the first time that the NetCosts data have been used for academic research.

These two data sources allow us to map the average prices in a program airing with the identities of the advertisers in each program airing. Table 1 presents a snapshot of the data. Each row shows the ad placements for a parent company across show six specific telecasts (e.g., *Big Bang Theory* on CBS, airing on three dates—March 31, 2011; April 7, 2011; and May 5, 2011). For example, Hyundai Corp purchased a 30-second ad in the April 7 airing of *Big Bang Theory* and three 30-second ads on *Grey's Anatomy* (one in the February 3 airing and

Table 1. Data Snapshot: Sample Ad Placements across Telecasts

Parent	Upfront entry	*Big Bang Theory*, CBS			*Grey's Anatomy*, ABC		
		3/31/11	4/7/11	5/5/11	2/3/11	2/17/11	2/24/11
Amazon.com Inc.	2009						30
AT&T	1960	30	60		30	30	60
Bank of America Corp.	1995				30		30
Eli Lilly & Co.	1993				75	75	
Ford Motor Co.	1960		30		30		30
Hyundai Corp.	1986		30		30	60	
JCPenney Co. Inc.	1972				30		
L'Oréal SA	1973		30	30	30	15	60
McDonald's Corp.	1966	30					
Microsoft Corp.	1992				60	30	
Procter & Gamble Co.	1960	30					
Target Corp.	1993					30	
Wendy's Co.	1977	30				30	
Total ad seconds		405	505	555	1,010	970	1,200
Audience		6,372,422	6,517,965	6,152,365	6,628,356	6,447,069	5,447,443
Price (upfront)		246,109	250,698	227,386	176,008	182,575	163,321

Notes. The table reports a selected sample of ad placements from the Rentrak data for six telecasts (three airings of *Big Bang Theory* on CBS and three airings of *Grey's Anatomy* on ABC). Total ad seconds comprises all ads for a telecast (not just the ads purchased by the example firms). Audience reflects Rentrak ratings data for the telecast. The upfront price is the SQAD-reported average upfront price for the telecast.

two in the February 17 airing). The bottom panel of the table shows summary information at the telecast level, tracking total number of national ad seconds, telecast audience, and average upfront price.

We conducted an extensive data-collection project to document historic advertising expenditures and infer the length of a relationship between a parent company and television networks. We combine three data sources, each reporting information on advertising expenditures across multiple media outlets (e.g., broadcast television). The distinction between the sources is that they cover different time periods. Kantar Media's Ad$pender reports monthly advertising expenditures for more than 3 million brands for the 1995–2018 sample period. For previous years, we "digitized" data from printed publications from 1995 to 1960. AdSummary books publish annual expenditures for the top 1,000 parent companies from 1974 to 1995. For the 1960–1973 period, data are collected by hand from Leading National Advertiser publications. The full sample includes information on advertising expenditures starting in 1960, allowing us to track the length of a parent company's presence in the broadcast advertising market.

Last, we collect information on the media-buying agency of record for each advertising firm. We used Winmo as a starting point, as the company collects information on media-buying and creative agencies for each advertiser over time. To the best of our knowledge, this is the first time that the Winmo data have been used by researchers. Unfortunately, many of the agency-advertiser pairs have missing or inaccurate information. Advertising media outlets typically report when a major advertiser starts an agency review and

the outcome of that review. As a result, we confirmed by hand and updated each reported advertiser-agency pair with news announcements, assigning the appropriate agencies for the 2011–2013 period.

3.1. Sample

Our sample includes three years of pricing and detailed advertising data during the period of January 2011 through December 2013, with the associated advertising histories of each firm. We focus the analysis on 20 networks, for which we observe average prices and ad placements in each telecast.[12] These networks include the top three broadcasters (ABC, CBS, and NBC), and 17 cable networks.[13] During the sample period, ABC and NBC are affiliated with cable channels, which we group with the main broadcast network. NBC is combined with Comcast's Bravo, MSNBC, Syfy, and USA channels.[14] The cable networks are grouped into conglomerates according to their ownership structure during the sample period. They include A&E (A&E, History, and Lifetime), Scripps Networks (Food Network, HGTV, and Travel Channel), Time Warner (CNN, TBS, TNT, and TruTV), and Viacom (BET, MTV, and Spike). We refer to network conglomerates as networks.

The analysis is applied to data on primetime prices and advertisers' input-sourcing choices. Primetime refers to the 8:00 p.m.–11:00 p.m. "daypart" block of television programming; most television viewership and advertising expenditures are concentrated in primetime. In our data, the average advertiser sends 42% of its broadcast ad exposures (ratings-weighted ads) during primetime; the analogous number is 24% for cable ads. We see prices for 11,504 telecasts on primetime for the set of 20

Table 2. Summary Statistics

Variable	Mean	SD	Med	Min	Max
Price (broadcast, $1,000's)	74.61	72.94	61.05	1.14	1,582.27
Price (cable, $1,000's)	13.19	14.05	10.93	0.79	645.91
Annual firm spending ($1,000's)					
Total spending	186,000	254,043	91,426	9,312	2,421,780
Broadcast spending	67,024	99,913	26,994	0	642,150
Broadcast primetime spending	41,781	66,863	14,495	0	441,047
Cable spending	60,959	78,842	32,057	937	817,822
Digital spending	21,144	38,267	7,547	1	289,345
Newspaper spending	3,035	8,594	254	0	112,564
Magazine spending	31,778	79,852	7,859	0	883,938
Legacy (broadcast, vs. 1960)	26	19	20	1	54
Legacy (cable, vs. 1985)	20	9	20	1	29

Notes. Prices are summarized using SQAD data. Ad$pender data, 2011–13, is used to construct advertising annual spending for the sample of 298 parent companies. Entry in the broadcast upfront market is constructed by authors using Ad$pender, AdSummary, and LNA data from 1960 to 2013 at the level of a parent company. The legacy variable reports the year of entry in the upfront market prior to 2014. For example, *legacy* = 1 if entry was in 2013. Cable spending is only observed in the data starting in 1985, so the earliest entry on cable is 1985.

networks. Table 2 summarizes reported prices separately for broadcast and cable. The average upfront price for a 30-second ad is $74,610 on broadcast primetime and $13,190 on cable.[15] We use the Ad$pender data to evaluate our pricing information from SQAD, by comparing firms' annual primetime spending on broadcast networks reported in Ad$pender with annual primetime spending on broadcast constructed using average prices from SQAD and ad placements from Rentrak. We may not directly compare the two data sets because SQAD reports prices only for a subset of program airings. Reassuringly, the correlation between firm annual spending on broadcast networks in the two data sources is 0.98.

Our sample tracks 298 parent companies with large advertising exposure in primetime during the 2011–2013 period, which comprise 95% of the broadcast primetime ad slots in the Rentrak data.[16] Parent companies are described by their brands, advertising budgets, and legacy status. We track 1,039 brands produced by these 298 parent companies. For example, the parent company Toyota Motor Corp. owns three brands in the data: Lexus, Scion, and Toyota. We assign brands into 96 product subcategories and then group these into 28 categories, which allows us to assign an industry to each parent company. In cases where the parent company produces brands in multiple categories, we assign the category with highest advertising exposure (ratings-weighted ads) during our sample period. For example, P&G is assigned to Personal Care, which accounts for 45% of the firm's ad exposure during the sample. Table 2 summarizes advertising budgets at the firm level during our sample period of 2011–2013 using Ad$pender data. The average parent company spends $67.0 million on broadcast networks and $61.0 million

on cable networks annually; primetime advertising constitutes 62.3% of advertisers' total spending on broadcast television.[17] During the sample period, national television advertising accounts for 68.8% of firms' total advertising spending, on average, which includes online display advertising, radio, newspapers, and magazines.

The price-determination process in the upfront market for broadcast advertising suggests that ad prices may be correlated with the legacy status of the advertising firm (Lotz 2007). To allow for such a relationship, we use the annual advertising expenditure of each parent company from 1960 to 2013 to track the length of each firm's participation in the upfront market. We calculate the legacy status of each parent company, separately for the broadcast and cable markets. According to trade publications, firms maintain their preferential base rates as long as they maintain a continued relationship with the network (MMi 2010). Thus, for the broadcast market, we assume that a firm enters the upfront market in the first year during which the parent company advertises on broadcast television, as long as: We observe no gaps in spending greater than two years, and the broadcast spending by the company accounts for at least 0.01% of total broadcast revenues in that year.[18] We infer that 48 parent companies have uninterrupted relationships with a broadcaster since 1960, and the data track the entry of the remaining 250 companies. The legacy variable in Table 2 reports the year of entry in the upfront market prior to 2014. The average firm entered the upfront market in 1988 (i.e., average legacy = 26, with legacy = 1 for firms that enter in 2013; 2 for firms that enter in 2012; etc.).

The legacy variable for cable spending follows the same rules, except that cable spending is only observed in the data starting in 1985. We infer that 89 firms have

been consistently advertising on cable networks since 1985; 80 of these firms entered the broadcast upfront market prior to 1985. For the remaining 209 firms, 35 have longer uninterrupted relationships in the broadcast advertising market than on cable; the inferred entry is the same for 58 firms; and 116 firms enter the cable market before they enter the broadcast market. The correlation between the cable and broadcast legacy variables is 0.79.

Table 3 provides examples of advertisers with different entry timing in the broadcast upfront market. To facilitate a visual comparison, the legacy variable is categorized into cohorts of decades. For each cohort, we summarize information from three different representative parent companies: companies with high, mid, and low levels of advertising expenditure. Average annual spending on broadcast over the 2011–2013 sample period is summarized in the last column and reported in millions (calculated by the authors using data from Ad\$pender). For example, AT&T is inferred to have entered the upfront market in 1960, and its average annual advertising spending on broadcast TV in 2011–2013 is \$602 million. One of its competitors, T-Mobile, enters in 2001, and its average annual spending on broadcast is \$180 million. The numbers in the table suggest that legacy status may be correlated with annual advertising expenditure by parent company. We confirm that the correlations between broadcast or cable legacy status and broadcast or cable budget is 0.45. Interestingly, the correlation between legacy status and annual spending at the brand level is −0.045.

These differences suggest that legacy firms have higher budgets because they have more brands.

A key aspect of our empirical analyses is that we describe price dispersion in this market across several dimensions, including the fact that firms may pay different prices because they choose to purchase inventory with different characteristics. For example, one expects that advertisers may face different costs if they purchase ads reaching households with different demographic profiles, or showing more ads just before Christmas. Using the detailed nature of the Rentrak data, we construct an extensive set of variables to describe the ad portfolios purchased by different firms. In addition to capturing the size of each firm's ad buy (as ratings-weighted ads), we also observe the fraction of each advertiser's total ad exposure that ran on Sunday through Thursday, what fraction was shown during primetime, and what fraction was shown on a network's top 20% of programs (by ratings). Within each program airing, we also observe how many of an advertiser's ads were shown in a telecast's first ad break, or were shown as the first ad of any given ad break. We use this information to construct variables that describe the ad inventory purchased for each advertiser-network pair. For example, we describe inventory in terms of the share of the advertiser's exposure on a given network appearing in the first ad break of a telecast. In conversations with practitioners, we confirmed that inventory with these characteristics are typically considered to be more desirable by all advertisers (see also Bollapragada and Garbiras 2004).[19]

Table 3. Sample of Firms by Legacy "Cohort"

Cohort	Firm	Upfront entry	Spending (millions)
≤1970	AT&T Inc.	1960	602
≤1970	Burger King Holdings Inc.	1960	99
≤1970	Hillshire Brands Co.	1960	7
1971–1980	Toyota Motor Corp.	1972	352
1971–1980	Wendy's Co.	1977	78
1971–1980	Ace Hardware Corp.	1974	14
1981–1990	Apple Computer Inc.	1981	423
1981–1990	Toys-R-Us Inc.	1985	39
1981–1990	Nintendo Co. Ltd.	1986	6
1991–2000	Microsoft Corp.	1992	349
1991–2000	Staples Inc.	1996	26
1991–2000	Office Depot Inc.	1994	6
2001–2010	T-Mobile	2001	180
2001–2010	Arby's Restaurant	2010	19
2001–2010	Kayak.com	2009	6
2011–2013	Novo Nordisk AS	2011	29
2011–2013	Petco	2011	10
2011–2013	eharmony.com Inc.	2013	1

Notes. Column (1) notes legacy cohorts by decade. Firms with inferred entry before 1970 are grouped into one cohort. In each cohort, we list three examples of parent companies with high, medium, and low levels of advertising expenditure on broadcast. Average annual spending on broadcast over the three-year sample period for each advertiser is reported in millions of dollars and reflects authors' calculations using Ad\$pender data.

Table 4. Summary Statistics on Ad Inventory

Variable	Mean	St. dev.	Median	Min	Max
Size of ad buy	471.86	675.00	206.86	5.00	4,830.92
Share of ads allocated to (in %)					
Top programming	20.96	8.77	20.61	0.00	76.14
Primetime	31.49	11.45	30.89	5.62	88.92
Sun-Thu	72.42	6.40	72.02	43.51	99.63
1st ad pod	20.81	2.46	20.94	10.89	30.77
1st ad in a pod	12.17	4.64	11.37	0.99	32.57
Action/Sci Fi	0.42	0.37	0.36	0.00	3.09
Animation	1.03	1.98	0.37	0.00	18.21
Comedy	8.63	4.78	8.57	0.00	30.21
Drama	14.72	7.79	13.95	0.09	48.19
Kids	0.02	0.10	0.00	0.00	1.47
News	8.75	11.56	4.23	0.00	68.45
Reality	21.46	7.86	20.74	0.21	53.08
Sports	7.84	8.13	4.42	0.00	40.02
Christmas (Nov&Dec)	20.03	16.30	15.37	0.00	100.00
Summer months	23.02	10.69	24.86	0.00	68.12

Notes. Author calculations from Rentrak data for 298 parent companies used in the analyses. The variables summarize the ad inventory for each advertiser-network pair in terms of both size (ratings weighed number of ads) and the allocation of ads across types of programs (e.g., share of ads on primetime, share of ads in Reality programming). We use all national ad placements in Rentrak to construct these variables.

Firms also differ in the targeting profiles of viewers they would like to reach, which reflect horizontal differences in their purchased ad inventory. Rentrak demographic variables do not identify which household member watches a specific program; thus, we capture horizontal differences in ad portfolios in terms of the share of ads in different genres and the share of ads in different calendar seasons. For genres, we use both popular ones based on share of viewers (Comedy, Drama, and Reality), as well as genres that are likely to appeal to different demographics (Action/Sci Fi, Animation, Kids, News, and Sports). To capture seasonal variation in programming and industry cycles, we describe inventory in terms of the share of ads in the summer months and the share of ads leading up to Christmas (November and December). We use all telecasts and ad placements observed in Rentrak to construct variables that describe the purchased inventory for each advertiser on each network.[20]

Table 4 summarizes differences in purchased inventory across advertisers using the variables described above. An observation is an advertiser-network pair. We define the size of a firm's ad buy as total ratings-weighted ads for an advertiser-network pair. There is significant variation in both the size of a firm's ad buy and the way ad inventory is allocated along vertical and horizontal dimensions. For example, size of ad buy has a mean of 97.1 and standard deviation of 112.9; the share of spending on sports programming has a mean of 7.8% and standard deviation of 8.1. Expectedly, differences in advertisers' targeting profiles are correlated with their

downstream product markets. Table 5 summarizes these variables across our 28 product categories. Patterns match well with our intuition; for example, we see that Toy companies have the largest share of ads allocated to the months of November and December (on average, 69.6% of firm ads) compared with advertisers from the other product categories, whereas Beer advertisers have the largest share allocated over the summer months (31.5%). The product categories with the largest share of ads allocated to the sports genre are Cars, Beer, and Satellite TV; for the news genre, they are Pharmaceutical, Finance, and Insurance. We use this variation in the data to describe the inventory purchased by different advertisers.

We supplement the data with information on the media-buying agency of record for each advertising firm for the 2011–2013 period. The Wimno data and news announcements confirmed that advertising firms use the same media-buying agency for all of their brands. During the sample period, seven major holding companies provide media-buying services: Dentsu, Havas, Horizon Media, Interpublic Group, Omnicom, Publicis, and WPP. We were not able to identify the media-buying agency of 27 parent companies, and we combined smaller agencies (for which we identified fewer than five clients) into "other." Summary statistics are reported in Table 6. The first column describes the number of advertisers associated with each agency. The second and third columns report the total annual budget under each agency's control and the average annual client budget at each agency, in millions of dollars. Across agencies, client size varies from an annual ad buy of $119 million for the average Havas client to $311 million for the average Publicis client.[21] The rest of the columns summarize differences in advertisers across agencies vis-à-vis their legacy status. Most agencies work with a variety of advertisers across the legacy spectrum. Apart from Horizon Media, all agencies work with at least one firm that entered the upfront broadcast market in the 1960s.

4. Estimation Approach

The empirical analyses aim to increase our understanding of price dispersion in a market where most prices are negotiated confidentially. Researchers rarely observe vertical contracts between firms, and we face the same constraint. Even though we have high-quality data on telecast prices and detailed data on ad placements both within and across program airings, we do not observe the prices paid by each advertiser for individual ads. For example, we observe that the first ad in the second ad break of *Grey's Anatomy* on 2/3/11 was for AT&T, but we do not observe the price that AT&T paid for that ad spot. We overcome this data limitation because our price data are based on actual transactions: SQAD reports the

Table 5. Inventory Characteristics by Product Category

Product category	Share of ads allocated to														
	Top prog.	Prime	Sun-Thu	First pod	First ad	Action	Anim	Com	Drama	Kids	News	Realty	Sports	Christ	Summ
Apparel	18.0	33.8	73.2	21.5	10.1	0.4	1.9	12.3	12.5	0.1	4.4	25.9	7.7	27.9	27.1
Auto Other	20.8	27.1	72.7	21.7	12.3	0.4	0.2	5.7	14.3	0.0	8.8	28.7	11.5	10.1	31.1
Beer	15.7	32.5	73.4	22.6	10.4	0.6	2.5	7.0	3.7	0.0	0.8	28.1	15.0	17.2	31.5
Beverages	20.7	29.9	71.2	20.7	11.5	0.2	0.4	8.9	13.4	0.0	6.2	19.2	11.1	18.6	25.2
Breakfast Food	20.2	24.1	66.1	21.2	10.8	0.2	0.1	9.2	15.7	0.0	6.7	18.1	3.8	9.2	30.5
Cars	19.1	38.8	74.8	20.5	18.5	0.4	0.3	7.4	14.1	0.0	6.7	21.0	16.6	14.2	23.4
Casual Dining	17.5	30.5	73.3	22.8	11.0	0.5	2.1	11.5	11.7	0.0	3.1	27.2	6.2	14.8	26.8
Depart. Stores	18.9	33.2	69.7	22.8	11.9	0.6	0.3	9.5	17.3	0.0	7.1	21.1	3.3	31.7	21.5
Discount Stores	26.9	30.7	69.5	22.3	11.4	0.3	0.6	12.4	19.6	0.0	4.9	18.5	2.1	25.0	20.0
Fast Food	21.2	36.6	73.9	22.4	10.1	0.7	1.4	11.2	14.2	0.0	1.0	30.3	11.1	12.5	25.7
Finance	17.0	33.3	74.2	19.0	17.1	0.4	0.4	6.5	13.7	0.0	20.1	18.1	11.7	16.6	16.4
Home Improv.	24.2	31.5	69.8	20.9	10.9	0.4	0.5	8.3	17.5	0.0	8.3	21.3	4.7	17.7	22.5
Household Supp.	21.0	22.7	68.4	21.1	7.5	0.4	0.7	7.1	13.7	0.1	4.5	20.0	1.3	14.8	28.2
Insurance	22.4	27.4	72.6	19.9	15.4	0.4	0.6	6.4	16.6	0.0	16.6	20.0	9.9	18.2	23.3
Jewelry	25.5	42.5	72.8	23.0	12.5	0.9	0.6	10.8	20.2	0.0	5.1	23.0	16.2	69.2	0.0
Motion Pictures	22.9	35.4	79.5	22.6	12.5	0.5	1.5	11.2	14.8	0.0	2.1	25.5	9.3	17.6	21.6
Other	24.2	31.2	72.6	20.2	11.3	0.3	2.0	9.0	17.0	0.0	11.0	19.7	6.7	20.4	22.7
Personal Care	19.1	25.5	70.6	21.2	10.0	0.3	0.2	8.6	14.5	0.0	6.3	17.9	3.0	20.2	24.4
Pets	24.7	31.3	68.3	21.1	8.3	0.2	0.9	10.4	21.3	0.0	6.1	17.0	1.7	21.0	21.3
Pharma	20.9	21.5	69.4	18.3	13.5	0.3	0.3	4.0	14.9	0.0	25.5	14.3	2.7	16.4	23.1
Prepared Dinners	30.4	25.9	73.4	21.5	9.6	0.2	0.3	8.2	17.3	0.0	3.1	18.3	1.9	15.2	21.8
Satellite TV	26.4	35.7	74.5	18.9	13.3	1.0	1.8	7.8	16.2	0.0	2.1	18.1	15.1	16.2	23.5
Streaming	14.6	37.9	68.1	21.4	10.8	1.0	2.7	12.3	16.1	0.0	6.7	26.5	1.4	17.4	18.6
Sweets & Snacks	16.7	29.0	70.7	20.1	10.2	0.4	0.6	8.9	16.6	0.0	1.4	21.1	2.3	24.4	17.9
Technology	17.7	38.6	75.8	20.3	12.1	0.5	2.1	9.9	13.1	0.0	6.3	22.3	10.6	34.9	21.1
Telecom	20.5	42.0	73.5	20.7	12.5	0.7	0.8	9.7	17.4	0.0	3.6	24.4	8.5	18.0	27.4
Toys	36.1	25.0	60.9	20.4	7.3	0.2	1.9	13.3	16.1	0.2	0.6	15.6	2.7	69.6	0.2
Travel	19.3	30.6	72.4	20.5	10.7	0.4	0.7	7.7	12.8	0.0	13.3	20.1	6.3	8.9	24.7

Notes. Author calculations from Rentrak data for 298 parent companies used in the analyses. The table reports the average inventory profile at the category level. We use all national ad placements in Rentrak to construct these variables.

average telecast-level price across the set of advertisers showing ads in the telecast. That is, SQAD reports that the average price paid for a 30-second ad slot in the *Grey's Anatomy*'s airing on 2/3/11 is $176,008. We extract information on price dispersion across advertisers by matching average prices for each program airing (reported by SQAD) and the universe of firms advertising in each telecast (reported by Rentrak). We use this strategy to answer the question: How do differences in ad prices correlate with observable characteristics of advertisers and their purchased inventory?

A stylized example showcases how one can exploit the nature of our data to back out information on price dispersion. Suppose there are two program airings with

Table 6. Summary Statistics of Agency-Holding Companies

Holding	No. of firms	Annual budget	Client budget	"Average" entry	St. dev. entry	"Oldest" advertiser	"Youngest" advertiser
Dentsu	10	2,102	210	1990	17	1960	2006
Havas	11	1,304	119	1983	23	1960	2011
Horizon Media	16	1,743	109	2000	10	1974	2012
Interpublic Group	39	7,970	204	1991	18	1960	2011
Omnicom	49	8,354	170	1990	18	1960	2013
Publicis	62	19,259	311	1980	19	1960	2011
WPP	57	10,905	191	1981	18	1960	2011
Other	27	2,887	107	1994	17	1960	2013
Unmatched	27	1,498	55	2003	8	1985	2012

Notes. For each holding company, the table first summarizes the number of advertisers we map to each agency. Under "other," we combine smaller advertising agencies, for which we mapped fewer than five advertisers. We were not able to identify the agency for 27 parent companies. We also report own calculations of the budget under control for each agency using Ad$pender data (both annual budget from all advertisers and average client budget, in millions) and the average legacy status of the advertisers for each holding company. Upfront entry years reflect a firm's entry in the broadcast upfront market.

average upfront prices p_1 and p_2 selling ads to two advertisers (a and b). For simplicity, suppose that each advertiser pays the same price to purchase an ad in both programs, p_a and p_b, an assumption that we will relax shortly. If firm a advertises in both telecasts, and firm b advertises only in telecast 1, then average upfront prices are constructed as follows:

$$p_1 = \frac{p_a + p_b}{2} \text{ and } p_2 = p_a. \quad (1)$$

That is, variation in the average telecast-level prices observed in the data are determined by differences in the set of advertisers observed in each program.

This simple example assumes that firms pay the same price for advertising in each telecast, an assumption that is easily violated when one applies this intuition across thousands of programs aired on different networks, months, and days of the week. Thus, our empirical implementation controls for differences in telecast characteristics that likely influence prices. We use a flexible fixed-effects parametrization to capture information about each program airing, which includes fixed effects for program-month pairs, and interactions at the network-month-year and network-month-day-of-the-week level. The program–by-calendar-month fixed effect is included for programs for which we observe at least 10 prices in the full three-year sample period. Programs with fewer airings (and prices) in our sample are grouped into an "other" program (for example, the airing of the movie *Die Hard*).[22] Networks typically announce their programming schedules during the upfront presentations, and we capture this information in the fixed effects. Moreover, conditional on these fixed effects, we only use variation in ad placements across airings of the same program in the same calendar month to infer information on price dispersion. Our main identifying assumption is that, conditional on these telecast controls, all remaining variation in average prices across airings of the same program is driven by differences in prices charged to each advertiser by the network.[23] Section 4.1 provides descriptive analyses that help the reader evaluate this assumption.

Consider the program airings and ad placements described in Table 1. If Ford Motor Corp. (which entered the upfront market in 1960) pays a lower price to advertise in *Grey's Anatomy* than Hyundai Corp. (entered in 1986), then we expect to see lower (average) prices in program airings where Ford Motor Corp. advertises compared with telecasts with Hyundai. To interpret price differentials, we condition on advertisers' observable characteristics and use the same intuition. For example, if car manufacturers pay lower prices than insurance companies, then we expect that the (average) upfront price is lower in telecasts where we observe more car advertisers and fewer insurance companies. For the regression analyses, an observation is a program

airing, so we construct a representative advertiser per telecast by averaging over each $\tilde{Z}$ describing advertisers' characteristics and their purchased ad inventory. That is, for each program airing j, we construct $Z_j = \sum_i \omega_{ij} \tilde{Z}_i$, where ω_{ij} are weights equal to the share of ad seconds attributed to advertiser i in telecast j; for example, the weight for Hyundai in the *Grey's Anatomy* airing on 2/3/11 is $\omega_{Hyunday, GA2/3/11} = 30/1,010$. Table A1 in the online appendix summarizes the constructed variables Z_j that are used in the regression analyses. We take the following expression to the data

$$\log(p) = X\beta + Z\gamma + u, \quad (2)$$

where the analysis conditions on fixed effects describing telecast characteristics in X to make differences comparable across program airings. Before presenting our results, we discuss potential threats to identification.

4.1. Identification

Despite the high-quality data on prices, the fact that we do not observe individual-level prices across advertisers means that our parameters of interest are identified from both variation within telecasts (advertiser identity) and across telecasts (telecasts with different prices). We assume selection on observables and include a flexible set of fixed effects describing telecasts to support that assumption. The assumption states that, conditional on our telecast controls in X, any remaining differences in upfront prices across airings of the same program are driven by differences in prices paid by the set of advertisers present in each airing. Implicitly, this imposes that, conditional on X, ad placements (across airings of the same TV show in the same calendar month) are randomly assigned. Reassuringly, the approach aligns well with industry practices described in Bollapragada et al. (2002). Figure 1 provides an examples of a sales-request form that allows an advertiser to request more ads in certain weeks (e.g., in the first week of September) or programs (e.g., *Grey's Anatomy*). However, the advertiser cannot negotiate the exact placement of its ads across different airings of any particular program. Our fixed-effects parametrization aims to capture information on this order sheet in a flexible way.

Still, one may be concerned that we capture variation in prices due to endogenously different choices of ad inventory by advertisers, rather than variation in prices across firms for the same choice of ad inventory. If we observed firm-level prices, then we would be able to directly confirm the manner in which prices differ across firms within a telecast. To our knowledge, there is no data set accessible to academics that contains such detailed information. To help evaluate our assumption, we estimate a series of regressions of the form

$$y = X\beta + Z\gamma + u, \quad (3)$$

where y tracks a series of telecast characteristics, such as viewership and demographic information of viewers, in addition to prices. We focus on the following demographic variables: single male, households with age 65+, whether the household has children, and households with income above $100,000. Rentrak only captures demographic information at the household level, and we select these demographics as the most informative proxies for gender, age, and income.

We describe the profile of the set of advertisers in each telecast, Z, in terms of the average legacy status and average size of total ad buy. To address concerns about current own-network quantities being simultaneously determined with prices, we track advertiser size using ratings-weighted ads in competitors' networks during the first season in which we observe the firm in the Rentrak data; the size variable is then logged in the regressions. Importantly, the regressions include the extensive set of fixed effects in X to capture variation in telecast characteristics (including fixed effects for program-network-month, network-month-year, and network-month-day-of-the-week).

Table 7 reports the correlation between the advertiser profile observed in a telecast and the telecast's price, viewership, and demographics. Standard errors are clustered at the program-month level. The top panel uses broadcast networks, and the bottom panel repeats the analysis for cable networks. There is a negative relationship between a telecast's price and the average legacy status of the set of firms in the telecast for broadcast networks. Importantly, we also see that legacy firms aren't

more/less heavily represented in airings with higher viewership or any other dimension describing ad placements.[24] For cable networks, the regressions suggest no correlation between legacy status and prices, or telecast viewership and most demographic variables.[25] These correlational analyses are reassuring for our identification strategy, as we do not see a relationship between the characteristics of realized outcomes, such as the viewership or demographic reach of audiences, and legacy status. Conditional on X, we proceed with the assumption that the remaining variation in average prices can be attributed to differences in prices paid by advertisers for equivalent ad inventory.

5. Price Dispersion in the Upfront Market

Our estimation approach allows us to shed light on differences in firms' access to national television advertising by analyzing the factors that drive price dispersion in this market. Researchers often must impose an assumption that advertisers pay the same prices because of limited data (e.g., Wilbur 2008 and Shapiro 2018). Previous work has pointed out the presence of price dispersion in local markets (Moshary 2020) and across local and national markets (Yang et al. 2021). Our work shows that price dispersion also exists within the market for national television ads.

Price dispersion across advertisers might arise because of differences in the quality of purchased ad inventory across advertisers: For example, an advertiser may pay lower prices for all of its ads if it buys a larger share of less desirable inventory, which may be harder

Table 7. Do Legacy Status or Size of Ad Exposure Correlate with Firm Ad Placements?

	Log(*price*)	Log(*viewers*)	Hh age 65+	Hh with children	Single male hh	Hh income $100,000+
Broadcast networks						
Legacy	−0.009***	−0.002	0.018	0.020	−0.038	−0.005
	(0.002)	(0.001)	(0.022)	(0.045)	(0.032)	(0.027)
Size ad buy	0.018	0.004	0.505	−1.103	−0.387	−0.490
	(0.030)	(0.019)	(0.431)	(0.848)	(0.703)	(0.514)
Observations	5,268	5,268	5,268	5,268	5,268	5,268
R^2	0.956	0.972	0.872	0.917	0.885	0.917
Cable networks						
Legacy	0.000	0.001	0.001	0.025	−0.037	−0.066*
	(0.002)	(0.002)	(0.031)	(0.044)	(0.070)	(0.033)
Size ad buy	0.030**	0.013	0.255	−0.185	−0.044	0.065
	(0.011)	(0.010)	(0.245)	(0.353)	(0.328)	(0.226)
Observations	4,519	4,519	4,519	4,519	4,519	4,519
R^2	0.788	0.843	0.924	0.925	0.655	0.923
Program × month	Yes	Yes	Yes	Yes	Yes	Yes
Net × mon × dow	Yes	Yes	Yes	Yes	Yes	Yes
Net × mon × year	Yes	Yes	Yes	Yes	Yes	Yes

Notes. An observation is a telecast (program airing). Legacy status and firm size track the profile of the average advertiser in the telecast. Average firm size is constructed as ratings-weighted ads placed in competitors' networks; the variable is then logged. All regressions include telecast controls for program-by-month, network-by-month-year, and network-by-month-day-of-week fixed effects. Standard errors are clustered at the program-month level.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

to move for the network (and vice versa). To this end, we use an extensive set of inventory controls to capture both preferential placements across programs (e.g., share of ads on primetime, share of ads in sports, share of ads during the summer months) and preferential placements within a program (e.g., the share of ads in the first ad pod, the share of first ads in a pod). We also condition on the size of a firm's ad buy. In addition, media-buying agencies act as intermediaries in facilitating the buying process. Therefore, we check whether price dispersion is explained by agency fixed effects. Another peculiarity of the market is that firms with longer relationships are said to benefit from lower grandfathered base rates. We include a variable tracking the legacy status of a firm in order to evaluate whether data patterns align with this narrative. Industry participants report that discounts on broadcast advertising are correlated with the legacy status of a firm (in the form of grandfathered base rates), whereas legacy discounts do not apply to stand-alone cable networks. Consequently, we present the analysis separately for broadcast and cable network conglomerates, with the expectation of finding a relationship only for broadcast networks.

We evaluate these potential sources of price dispersion using Equation (2), which exploits variation in reported average upfront prices and the profile of the advertisers observed in each program airing. An observation is at the telecast level, so we construct a representative advertiser per program airing by averaging over advertisers' characteristics. We also condition on telecast characteristics to account for differences in prices due to differences in telecast timing, quality, or audience. The initial analyses reported in Section 4.1 suggest that we observe lower prices in telecasts with more legacy advertisers, whereas these patterns do not hold for other characteristics of the telecast (e.g., viewership and demographic profiles). In these regressions we also included the size of each advertiser's ad buy and saw no clear relationship with prices.[26] One expects that legacy status and size of ad buy are correlated with firms' overall ad strategy, suggesting the presence of potential differences in purchased inventories. Hence, the impacts of the estimated discount depend on the interpretation for why our data suggest that legacy firms pay lower prices. For example, if price differences are driven by differences in the overall quality of the purchased inventory, then price dispersion simply reflects the fact that some advertisers choose to pay higher prices to access a higher-quality product. Thus, our next step is to examine whether inventory differences or other features of the market explain the negative correlation between prices and legacy status.

The first set of market features that we include relates to the identity of the media-buying agency of record for each advertiser. Results are shown in column (1) of Table 8, and the excluded agency is WPP. The legacy

Table 8. Is (Average) Upfront Price Lower If More Legacy/Large Firms Advertise in a Show?

	(1)	(2)	(3)	(4)
Broadcast conglomerates				
Legacy	−0.009***	−0.005**	−0.004**	−0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
Size ad buy	0.028	−0.028	0.040	0.037
	(0.029)	(0.029)	(0.033)	(0.033)
Dentsu	0.274*	0.298*	0.075	0.075
	(0.123)	(0.119)	(0.124)	(0.124)
Havas	−0.012	0.119	0.066	0.069
	(0.163)	(0.160)	(0.174)	(0.174)
Horizon Media, Inc.	−0.573***	−0.312	−0.338	−0.345
	(0.163)	(0.160)	(0.178)	(0.177)
Interpublic Group	0.198*	0.195*	0.110	0.113
	(0.083)	(0.080)	(0.084)	(0.085)
Omnicom	0.118	0.017	−0.091	−0.089
	(0.073)	(0.073)	(0.094)	(0.094)
Publicis	0.102	0.134	0.039	0.041
	(0.075)	(0.072)	(0.080)	(0.081)
Other	0.460**	0.448***	0.286*	0.288*
	(0.153)	(0.132)	(0.118)	(0.118)
Unmatched	0.191	0.199	−0.065	−0.064
	(0.188)	(0.185)	(0.202)	(0.202)
Firm entry				0.000
				(0.001)
Share of exposure in				
Top 20%		0.002	0.004	0.004
		(0.003)	(0.003)	(0.003)
Primetime		0.001	0.001	0.001
		(0.002)	(0.003)	(0.003)
Sun-Thur		0.026***	0.019***	0.019***
		(0.004)	(0.004)	(0.004)
1st break		0.020***	0.017**	0.017**
		(0.005)	(0.006)	(0.006)
1st ad		0.004	−0.001	−0.001
		(0.009)	(0.010)	(0.010)
Action/Sci Fi			0.023	0.024
			(0.031)	(0.031)
Animation			0.045	0.044
			(0.036)	(0.036)
Comedy			−0.014	−0.014
			(0.008)	(0.008)
Drama			−0.002	−0.002
			(0.004)	(0.004)
Kids			0.143	0.147
			(0.272)	(0.272)
News			−0.000	−0.000
			(0.002)	(0.002)
Reality			0.003	0.003
			(0.007)	(0.007)
Sports			−0.001	−0.001
			(0.003)	(0.003)
Christmas(Nov&Dec)			0.004	0.004
			(0.003)	(0.003)
Summer months			−0.008*	−0.008**
			(0.003)	(0.003)
Telecast controls (X)	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
"Vertical" inventory chars	No	Yes	Yes	Yes
"Horizontal: inventory chars	No	No	Yes	Yes
Category FE	No	No	Yes	Yes
Observations	5,275	5,275	5,275	5,275
R^2	0.956	0.958	0.959	0.959

Notes. An observation is a telecast. Legacy status and firm size track the profile of the average advertiser in the telecast. Average firm size is constructed as ratings-weighted ads placed in competitors' networks; the variable is then logged. Standard errors are clustered at the program-month level.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

status does not change with the addition of these fixed effects. The estimate on Horizon Media is negative and statistically significant; however, this effect "disappears" once we control for observable characteristics of purchased inventory in the next regressions. We find that clients of smaller agencies (grouped into "Other") pay higher prices (significant at 5%), even after we add all additional variables in column (5).

In the next two columns, we include a rich set of variables describing differences in the purchased ad inventory across advertisers. We exploit the detailed information from the Rentrak data set to capture the overall characteristics of the purchased portfolio. Our first set of characteristics describes "vertical differences" in purchased ad portfolios across firms: the share of each advertiser's total ad exposure (ratings-weighted ads) shown during primetime, the share on a network's top 20% of programs (by ratings), the share on Sunday through Thursday, the share shown in a telecast's first ad break, and the share shown in the first ad of any given ad break. In column (2) of Table 8, we find a positive and statistically significant relationship between prices and the share of ads placed on Sunday through Thursday and the share of ads placed in the first ad break, which persists across all columns. We do not find a relationship between prices and the share of ads in the first ad of any given ad break, which is consistent with quasi-random assignments of ads to slots exploited in many papers and documented in McGranaghan et al. (2022). The parameter estimate on firm legacy falls in absolute terms from 0.009 to 0.005, highlighting the importance of controlling for differences in the characteristics of the purchased inventories across advertisers. Comparing a firm that entered in 2013 to a firm that entered in 1960, this implies that estimated price differentials decrease from 47.7% to 26.5%. Interestingly, trade press sources often cite price differences that are as large as 50%, which is the implied price differential if we do not carefully control for the characteristics of the overall purchased inventories (Bloom 2005).

Firms also differ in the targeting profiles of viewers they would like to reach. Our second set of variables describes advertiser portfolios in terms of horizontal characteristics, where the value of the characteristic may differ across advertisers, especially across advertisers in different product markets. If a specific targeting profile is more expensive, then that may explain the price variation inferred in the data. To proxy for differences in the targeting profiles across firms, we use several sets of variables. Different genres appeal to different viewers; thus, we first describe advertiser portfolios in terms of the share of ads in different genres: Action/Sci-Fi, Animation, Comedy, Drama, Kids, News, Reality, and Sports Programming. Second, we account for seasonal variation in programming and industry cycles using share of ads that ran during the summer months and

share of ads in anticipation of Christmas (November and December). Finally, we add product category fixed effects to proxy for any other differences in portfolios that were not captured by our list of inventory controls.[27]

Column (3) shows these results. We see the expected negative relationship between prices and share of spending during the summer months, whereas the estimates on genre characteristics are not statistically different from zero. Most of the category fixed effects are indistinguishable from zero, with the exception of Motion Pictures and Toys (with positive estimates).[28] This suggests that our inventory proxies are flexible enough to capture differences in firm portfolios that are correlated with their downstream markets. Adding these extensive sets of controls is important both for explaining the detected price dispersion and for separating any price differences correlated with legacy status of the firm from price differences based on the characteristics of the inventory purchased by each advertiser. The estimate on legacy status does not change in column (3).

One may suspect that firms of different ages use advertising in different ways and purchase different ad inventories, which is not captured by the variables in column (3). Thus, the last column in Table 8 adds a variable that tracks the year in which the firm was established.[29] We see that prices are not correlated with firm age (separately from legacy status), and the other estimates do not change.

Overall, the estimates in Table 8 aim to describe price dispersion in this market using a rich set of inventory characteristics in order to capture price differences that are due to differences in firms' purchased inventory. Indeed, the positive estimates with the share of ads in Sunday–Thursday and share of ads in the first ad break imply that networks do charge different prices based on the purchased inventory. Yet, despite the extensive set of controls at the advertiser and telecast levels, the negative relationship between broadcast prices and legacy status of the average advertiser is stable across specifications at −0.005. The estimates are directly interpretable—the −0.005 estimate implies a discount of 0.5% per year of earlier entry. That is, a firm that entered in 1960 benefits from a 26.5% discount relative to the cost of an entrant in 2013 ($0.265 = 0.005 * (2013 − 1960)$). Comparing the legacy estimates to our results on nonlinear pricing, this difference is analogous to increasing the share of advertising exposure shown in the first ad breaks by 15.6%.

We next repeat the analysis using cable network prices and ad placements. We present the same set of regressions in Table 9 using cable networks.[30] Results show a positive relationship between cable prices and the vertical characteristics of ad inventories—share in primetime, share on Sunday–Thursday, and share in the first ad break. For the horizontal characteristics, the estimates

Table 9. Is (Average) Upfront Price Lower If More Legacy/Large Firms Advertise in a Show?

	(1)	(2)	(3)	(4)
Cable conglomerates				
Legacy	0.001	0.000	−0.000	−0.000
	(0.002)	(0.002)	(0.003)	(0.003)
Size ad buy	0.028*	0.018	0.019	0.021
	(0.012)	(0.013)	(0.016)	(0.016)
Dentsu	−0.015	−0.070	−0.065	−0.064
	(0.079)	(0.080)	(0.084)	(0.083)
Havas	−0.049	0.005	0.059	0.049
	(0.083)	(0.083)	(0.100)	(0.100)
Horizon Media, Inc.	−0.008	−0.036	−0.118	−0.113
	(0.074)	(0.077)	(0.089)	(0.090)
Interpublic Group	−0.011	−0.021	−0.036	−0.042
	(0.058)	(0.058)	(0.061)	(0.064)
Omnicom	0.026	0.021	−0.000	−0.005
	(0.046)	(0.048)	(0.053)	(0.054)
Publicis	0.043	0.062	0.023	0.021
	(0.040)	(0.041)	(0.048)	(0.047)
Other	0.041	−0.039	−0.034	−0.037
	(0.048)	(0.053)	(0.061)	(0.062)
Unmatched	0.073	0.047	0.054	0.051
	(0.063)	(0.064)	(0.077)	(0.078)
Firm entry				−0.000
				(0.000)
Share of exposure in				
Top 20%		−0.001	−0.002	−0.002
		(0.001)	(0.001)	(0.001)
Primetime		0.006**	0.006*	0.006*
		(0.002)	(0.002)	(0.002)
Sun-Thur		0.008**	0.009**	0.009**
		(0.002)	(0.003)	(0.003)
1st break		0.010**	0.012**	0.012**
		(0.003)	(0.004)	(0.004)
1st ad		0.001	−0.002	−0.002
		(0.004)	(0.004)	(0.005)
Action/Sci Fi			0.005	0.003
			(0.081)	(0.082)
Animation			−0.001	−0.001
			(0.011)	(0.011)
Comedy			0.005	0.005
			(0.007)	(0.007)
Drama			0.001	0.002
			(0.004)	(0.004)
Kids			−0.351	−0.363
			(0.591)	(0.586)
News			0.001	0.001
			(0.003)	(0.003)
Reality			−0.002	−0.002
			(0.003)	(0.003)
Sports			0.004	0.005
			(0.004)	(0.004)
Christmas(Nov&Dec)			0.005*	0.005*
			(0.002)	(0.002)
Summer months			0.001	0.001
			(0.002)	(0.002)
Telecast controls (*X*)	Yes	Yes	Yes	Yes
Agency FE	Yes	Yes	Yes	Yes
"Vertical" inventory chars	No	Yes	Yes	Yes
"Horizontal" inventory chars	No	No	Yes	Yes
Category FE	No	No	Yes	Yes
Observations	4,541	4,541	4,541	4,541
R^2	0.795	0.797	0.800	0.799

Notes. An observation is a telecast. Legacy status and firm size track the profile of the average advertiser in the telecast. Average firm size is constructed as ratings-weighted ads placed in competitors' networks; the variable is then logged. Standard errors are clustered at the program-month level.

*$p < 0.05$; **$p < 0.01$.

imply a statistically significant relationship with share in spending leading up to Christmas. In line with statements from media buyers, we do not find a relationship between prices and legacy status on cable networks.[31] Thus, we view the results on cable not only as useful descriptors of price dispersion in that market, but also as a falsification exercise.

The estimation approach aims to capture nonlinear pricing separately from any market segmentation. Thus, we rely on an extensive list of observable characteristics of the advertisers and their purchased inventory to capture such pricing strategies. Any unobservables correlated with prices and our variables of interest (e.g., legacy status) may bias the estimates. For example, we do not observe audience delivery guarantees, and, if some firms pay higher prices to get better audience guarantees, then this would be an omitted variable. To the best of our knowledge, this is not happening in the market; however, we may not discard this concern given our data.

We refer to the negative estimate of legacy status on price as a legacy discount and acknowledge that the correlation may be driven by other strategies in which broadcast networks charge different prices to different advertisers for equivalent inventory. For example, it is possible that networks price discriminate across advertisers' willingness to pay in a way that is correlated with legacy status on broadcast, but not on cable (or that only broadcast networks price discriminate).[32] Despite our detailed data on ad placements, we may not empirically test across these explanations—for example, test for the presence of legacy discounts à la Lotz (2007) versus a network practice of charging different prices due to differences in firms' willingness to pay that are correlated with their legacy status. The difficulty in separating these explanations would be present, even if the researcher observes individual-level prices, rather than the averages reported in the SQAD data used for our analyses. A common feature of these explanations, however, is that the advertiser may not change the prices it faces by altering its purchased ad inventory or by employing different agency representation. Therefore, they imply that younger firms face higher costs to access this input market, which may disproportionately affect the costs of younger firms with the potential of limiting their ability to compete with incumbent legacy firms. The next section interprets the size of the legacy discounts in terms of cost savings within granular product markets.

6. Discussion of Differences in Firms' Advertising Costs

Even though we may not definitively state what drives the negative relationship between prices and legacy on broadcast, the fact that more recent entrants face higher
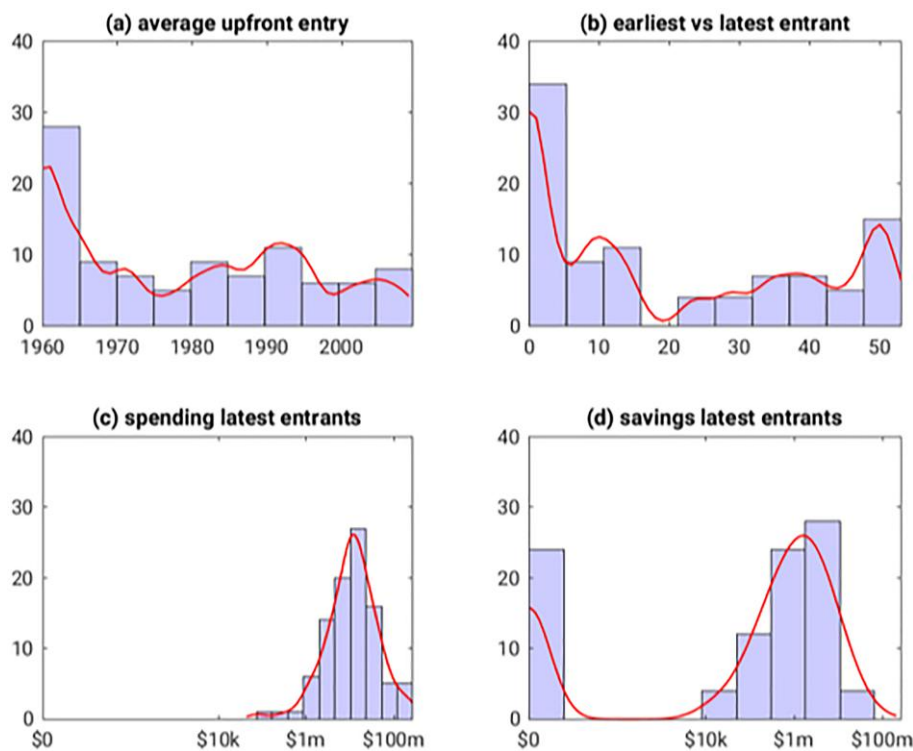
prices for equivalent inventory may limit their ability to compete with incumbent firms. Here, we use our estimates to quantify cost differentials across firms with different legacy status. For the remainder of the section, we consider brands (rather than parent companies) and divide them into 96 detailed product subcategories. Even though the upfront legacy variable is the same within a parent company, we analyze the data at the brand level because it allows us to consider more clearly defined product markets. For each subcategory, we summarize the differences in upfront entry across brands and calculate the implied cost savings for brands with access to legacy discounts.

The first panel of Figure 2 shows the distribution of average upfront entry across subcategories. For 18 subcategories, all parent companies entered the upfront broadcast market in 1960. For the remaining subcategories, data patterns suggest a relatively uniform distribution of average subcategory entry. The market for national television advertising connects firms across different industries, and the patterns imply unequal access across product markets. As expected, many of the national advertisers of consumer packaged goods are legacy advertisers, and these subcategories enter the upfront early (e.g., Cereal, Laundry Detergents,

Deodorants, etc.). On the other side of the spectrum, the subcategories that are "new" to the broadcast market include relatively new product markets (e.g., Energy Drinks or Streaming) and established businesses that are only new to the upfront [e.g., Education, Pet Stores, or Small Appliances (e.g., Dyson or Shark)]. This variation across subcategories is expected, as the historical data track entry over a 50-year period, and different industries and firms have developed and entered the advertising market at different time periods.

A more important comparison considers implied cost differences within a product market. We start by describing the variation in upfront entry within a subcategory. In panel (b), we plot the difference between the earliest and most recent parent companies to enter the upfront market. The variation in this variable shows that legacy discounts may imply large differences in advertising costs across competing brands within subcategories, and these differences vary across subcategories. Naturally, there is no variation in upfront entry for the 18 subcategories with average upfront entry of 1960, explaining much of the zero mass in panel (b); 7 other subcategories are also described by brands that enter at the same time because there is only one parent company assigned to the subcategory.[33] On the other

Figure 2. (Color online) Category Analysis: 96 Subcategories

Notes. Panel (a) shows the average upfront entry of brands within each subcategory. Panel (b) shows the maximum difference in the legacy status (between the earliest and newest entrant) for each product market. Panel (c) plots broadcast spending of the newest entrant in each subcategory. Panel (d) plots cost savings for newest entrant, which applies the estimated legacy discount (for the maximum difference in each product category) to the broadcast spending of the newest entrant.

side of the spectrum, we have 41 subcategories where the difference between the earliest and most recent entrants is more than 20 years, suggesting the potential for cost disparities (examples include Casual Dining, Chocolate, and Telecom).

Some of the variation in upfront entry across product markets is driven by our definitions of subcategories. Mechanically, we may infer larger cost savings for subcategories that have more parent companies. We assigned brands into subcategories relying mainly on the descriptions provided by Rentrak. Table 10 lists all subcategories and describes the legacy status of each. The subcategories are sorted by the 28 categories

used for our main analyses (e.g., the Finance category consists of 4 subcategories: Credit Cards, Finance, Finance Other, and Taxes). We also summarize the number of brands and parent companies with national advertising assigned to the subcategory in columns (2) and (3). Examples of subcategories with a large number of parent companies include Finance, Insurance, Cars, Movies, Over-the-Counter Medications, and Pharma. The correlation between the number of parent companies and the difference in upfront entry between earliest and most recent parents is 0.68. As a result, we present this discussion as a descriptive tool and do not compare results across subcategories.

Table 10. Category Analysis: Inferred Differences in Upfront Entry across Brands

| Category | Subcategory | # brands | # firms | Legacy status | | | | Spending net (ave) | Newest entrant | |
				Mean	Newest	Earliest	Diff.		Spending	Savings
Auto Other	Auto Trading	2	2	2,003.50	2008	1999	9	14,172.62	11,803.80	531.17
Auto Other	Gas	9	3	1,979.78	1990	1960	30	9,989.70	4,010.98	601.65
Auto Other	Tires	3	2	1,965.00	1975	1960	15	13,559.85	14,942.37	1,120.68
Beer	Alcohol	7	1	2,001.00	2001	2001	0	672.59	672.59	0.00
Beer	Beer	16	5	1,971.44	2001	1960	41	26,608.24	2,013.80	412.83
Beer	Energy Drink	3	2	2,004.67	2010	2002	8	7,093.26	9,686.20	387.45
Cars	Cars	33	16	1,976.03	2013	1960	53	89,838.43	3,774.43	1,000.22
Finance	Credit Cards	9	9	1,981.00	1998	1960	38	1.2 e+05	2.4 e+05	44,730.46
Finance	Finance Other	2	1	2,005.00	2005	2005	0	979.07	979.07	0.00
Finance	Taxes	3	2	1,999.67	2004	1991	13	37,052.72	22,775.60	1,480.41
Beverages	Beverages	9	4	1,971.00	1993	1960	33	30,075.55	11,702.78	1,930.96
Beverages	Coffee & Tea	8	7	1,976.00	2008	1960	48	11,886.52	13,057.00	3,133.68
Beverages	Juice	9	6	1,963.67	1993	1960	33	13,625.53	8,030.70	1,325.07
Beverages	Water	6	3	1,960.00	1960	1960	0	13,895.85	13,895.85	0.00
Breakfast Food	Cereal	6	4	1,960.00	1960	1960	0	32,528.67	32,528.67	0.00
Breakfast Food	Cookies	4	2	1,960.00	1960	1960	0	4,715.05	4,715.05	0.00
Breakfast Food	Food Other	13	8	1,969.38	2004	1960	44	7,326.98	75.37	16.58
Breakfast Food	Yogurt	4	4	1,984.00	2011	1960	51	23,845.39	14,434.80	3,680.87
Prepared Dinners	Prepared Dinners	33	8	1,966.27	1983	1960	23	6,389.04	2,960.32	340.44
Prepared Dinners	Soups	4	3	1,960.00	1960	1960	0	22,407.44	22,407.44	0.00
Prepared Dinners	Weight Loss	5	3	1,969.20	2006	1960	46	11,577.26	39,935.07	9,185.07
Sweets & Snacks	Chocolate	7	5	1,980.29	2003	1960	43	8,771.29	9,178.47	1,973.37
Sweets & Snacks	Confectionery	21	4	1,965.24	1970	1960	10	7,864.98	8,524.38	426.22
Sweets & Snacks	Gum & Mints	6	4	1,965.50	1983	1960	23	5,229.44	300.53	34.56
Sweets & Snacks	Snacks	13	7	1,967.31	2009	1960	49	7,342.16	12,664.33	3,102.76
Home Improv.	Appliances	4	4	1,979.25	2002	1960	42	1.9 e+05	28,187.07	5,919.28
Home Improv.	Home Improvement	6	6	2,000.17	2013	1974	39	51,482.81	1,381.27	269.35
Home Improv.	Home Other	5	4	1,988.20	2000	1960	40	6,415.63	6,174.57	1,234.91
Home Improv.	Office Supplies	2	2	1,995.00	1996	1994	2	13,957.52	25,242.50	252.43
Home Improv.	Small Appliances	4	2	2,009.00	2011	2003	8	5,988.73	2,808.63	112.35
Household Supp.	Air Fresheners	3	3	1,960.00	1960	1960	0	13,340.00	13,340.00	0.00
Household Supp.	Batteries	2	2	1,960.00	1960	1960	0	15,939.15	15,939.15	0.00
Household Supp.	Cat Litter	2	2	1,964.50	1969	1960	9	4,994.85	3,887.00	174.91
Household Supp.	Cleaner Other	3	2	1,966.00	1969	1960	9	3,575.46	4,212.48	189.56
Household Supp.	Cleaning Products	10	5	1,964.00	1971	1960	11	7,858.31	4,173.47	229.54
Household Supp.	Household Supplies	2	2	1,964.50	1969	1960	9	9,134.85	11,403.83	513.17
Household Supp.	Laundry	9	5	1,961.22	1971	1960	11	9,648.30	36,979.23	2,033.86
Household Supp.	Oral Hygiene	13	5	1,960.85	1971	1960	11	15,296.01	36,979.23	2,033.86
Household Supp.	Paper Supplies	14	4	1,977.43	1995	1960	35	9,321.16	5,860.52	1,025.59
Household Supp.	Personal Hygiene Other	4	3	1,962.75	1971	1960	11	5,760.35	3,156.10	173.59
Household Supp.	Pest Control	2	2	1,960.00	1960	1960	0	1,351.80	1,351.80	0.00
Pets	Pet Food	13	3	1,960.00	1960	1960	0	9,009.00	9,009.00	0.00

Table 10. (Continued)

Category	Subcategory	# brands	# firms	Legacy status				Spending net (ave)	Newest entrant	
				Mean	Newest	Earliest	Diff.		Spending	Savings
Pets	Pet Stores	2	2	2,007.50	2011	2004	7	23,731.53	10,798.87	377.96
Insurance	Apparel	3	3	1,992.33	1994	1991	3	46,182.18	2,614.40	39.22
Insurance	Finance	17	13	1,994.47	2010	1960	50	65,068.92	61,711.14	15,427.78
Insurance	Health Insurance	3	3	1,988.00	2004	1968	36	47,699.12	50,678.07	9,122.05
Insurance	Insurance	16	12	1,984.06	2010	1960	50	51,329.54	61,711.14	15,427.78
Motion Pictures	Motion Pictures	24	13	1,981.21	2011	1960	51	59,561.85	10,084.31	2,571.50
Streaming	Streaming	3	2	2,007.67	2009	2005	4	14,634.66	8,529.40	170.59
Other	Dating	2	2	2,006.00	2013	1999	14	1,412.68	1,469.67	102.88
Other	Delivery	2	2	1,981.50	1984	1979	5	36,154.68	38,621.07	965.53
Other	Education	2	2	2,009.50	2012	2007	5	20,003.17	3,296.73	82.42
Other	Other Services	6	5	1,991.00	2009	1960	49	10,644.03	8,635.00	2,115.57
Other	Rental	3	3	2,002.67	2011	1998	13	10,447.34	13,573.17	882.26
Personal Care	Contact Lenses	1	1	1,960.00	1960	1960	0	11,718.93	11,718.93	0.00
Personal Care	Cosmetics	5	3	1,965.20	1973	1960	13	70,144.58	1.4 e+05	9,374.66
Personal Care	Deodorant	3	3	1,960.00	1960	1960	0	9,692.05	9,692.05	0.00
Personal Care	Deodorant men	2	2	1,960.00	1960	1960	0	10,598.50	10,598.50	0.00
Personal Care	Diapers	4	2	1,960.00	1960	1960	0	8,107.32	8,107.32	0.00
Personal Care	Dishwasher	3	2	1,960.00	1960	1960	0	7,627.67	7,627.67	0.00
Personal Care	Feminine Hygiene	3	2	1,960.00	1960	1960	0	4,274.70	4,274.70	0.00
Personal Care	Hair Products	17	5	1,963.29	1973	1960	13	24,630.18	1.5 e+05	10,003.03
Personal Care	Ice Cream	5	2	1,960.00	1960	1960	0	4,308.77	4,308.77	0.00
Personal Care	Laundry Softener	1	1	1,960.00	1960	1960	0	1,220.23	1,220.23	0.00
Personal Care	Perfumes	7	4	1,992.14	2007	1973	34	5,255.91	14,341.98	2,438.14
Personal Care	Razors	2	2	1,960.00	1960	1960	0	22,501.30	22,501.30	0.00
Personal Care	Skin Care	11	5	1,970.73	2006	1960	46	28,600.55	29,804.27	6,854.98
Personal Care	Toiletries	4	2	1,960.00	1960	1960	0	18,939.55	18,939.55	0.00
Pharma	OTC meds	50	13	1,962.00	2000	1960	40	9,903.77	12,138.57	2,427.71
Pharma	Pharma	24	16	1,973.42	2011	1960	51	43,604.04	31,843.23	8,120.02
Casual Dining	Casual Dining	10	7	1,989.00	2012	1960	52	40,560.41	20,122.20	5,231.77
Fast Food	Fast Food	16	13	1,984.75	2010	1960	50	72,746.10	22,103.13	5,525.78
Apparel	Apparel Other	3	1	1,989.00	1989	1989	0	8,096.01	8,096.01	0.00
Apparel	Shoes	3	2	1,991.33	2007	1960	47	6,898.77	2,897.95	681.02
Apparel	Sports Apparel	3	2	1,984.33	1985	1984	1	12,208.26	25,971.60	129.86
Apparel	Underwear	6	3	1,971.50	1995	1960	35	11,982.55	43,830.47	7,670.33
Depart. Stores	Depart. Stores	5	5	1,990.00	2009	1960	49	95,609.14	4,546.80	1,113.97
Discount Stores	Discount Stores	9	7	1,994.22	2010	1960	50	56,387.41	9,844.63	2,461.16
Discount Stores	Drug Stores	2	2	2,005.00	2006	2004	2	34,624.00	56,434.77	564.35
Jewelry	Jewelry	3	2	1,995.00	1996	1993	3	56,879.11	78,459.66	1,176.90
Toys	Toy Stores	2	1	1,985.00	1985	1985	0	21,647.75	21,647.75	0.00
Toys	Toys	9	2	1,961.33	1962	1960	2	2,899.76	1,450.76	14.51
Technology	Cameras	3	3	1,983.67	2002	1973	29	45,787.60	23,578.90	3,418.94
Technology	Computers	7	7	1,991.43	2005	1981	24	3.5 e+05	15,000.57	1,800.07
Technology	Software	5	2	1,991.60	1992	1991	1	2.2 e+05	2.6 e+05	1,309.76
Technology	Tablets & Phones	10	10	1,994.90	2010	1973	37	2.8 e+05	48,667.50	9,003.49
Technology	Tech Stores	2	2	1,985.00	1998	1972	26	68,769.63	1.3 e+05	16,263.98
Technology	Technology Other	2	2	1,996.00	2000	1992	8	17,246.90	6,938.13	277.53
Technology	V/A Equipment	7	7	1,995.71	2011	1973	38	2.8 e+05	15,964.00	3,033.16
Technology	Video Games	9	6	1,992.11	2002	1973	29	1.0 e+05	12,284.03	1,781.18
Technology	unassigned	73	34	1,971.38	2010	1960	50	24,683.30	6,779.90	1,694.97
Satellite TV	Satellite TV	2	2	1,995.00	1995	1995	0	78,645.98	78,645.98	0.00
Telecom	Telecom	12	6	1,990.25	2010	1960	50	1.4 e+05	9,480.17	2,370.04
Travel	Hotels	5	5	1,972.00	1988	1960	28	18,267.91	28,887.47	4,044.25
Travel	Travel	6	4	2,001.33	2009	1994	15	13,862.76	5,769.47	432.71
Travel	Travel Other	3	1	1,988.00	1988	1988	0	17,244.06	17,244.06	0.00

Notes. "Mean legacy" is the average entry of a parent company within the product category. The maximum difference in the legacy status reports the "earliest" firm less the "youngest" firm for each product category.

Network spending and savings are in $1,000's. Average spending is calculated for each product category using spending on broadcast networks reported by Ad$pender. Average cost savings applies the estimated legacy discount for the maximum difference in each product category. Similarly, the spending for the newest entrant is the average budget for the advertiser over the three-year sample period (or the subset of years when an advertiser enters in 2012 or 2013).

To describe cost differentials within a subcategory, we construct implied cost savings for the most recent entrant as if it had the benefit of the legacy pricing of the earliest-arriving advertiser in its subcategory. Figure 2(c) and (d) plot the variation in the average annual broadcast spending of the most recent entrant and its implied annual savings. On average, the most recent brand in a subcategory would save roughly $3.5 million on a base of $20.6 million. Advertisers within subcategories that have no variation in entry date have an "equal playing field" and no relative savings, and this is true whether all firms enter early (like Cereal) or late (like Satellite TV). In contrast, subcategories with wide variation in entry dates create the potential for wide cost disparities. For example, we calculate that T-Mobile (2001 entry) would save $36.9 million on its annual spending of $180 million if it could access the legacy discount of AT&T (1960). Similarly, Lindt (2003) would save $3.9 million (on $18.4 million in annual spending) if it could access the same legacy price as its competitor Dove chocolate, produced by Mars (1960). Arby's (2010 entry) savings add up to $3.1 million (on $19 million) if it could access Wendy's (1977) discount and $4.8 million if compared with Burger King's (1960) legacy deal.

The variation in firms' upfront entry, coupled with our empirical findings, suggests that there is substantial heterogeneity in advertising costs across firms. One may also view the implications of our findings through the lens of returns on ad spend (ROAS) across firms with large national broadcast expenditures and large differences in their upfront entry dates. Consider two symmetric firms that have the same variable profit increase from an additional ad ($\Delta \pi_j^{var} = \Delta \pi^{var}$) and only differ in their legacy discounts. The change in costs for firm j from an additional ad is $\Delta C_j(ads) = CPM * (1 - \delta * legacy_j)$. Describe ROAS for each firm as $ROAS_j = (\Delta \pi_j^{var} - \Delta C_j(ads))/\Delta C_j(ads)$, and one may easily see that ROAS increases as the legacy status (and discount) of the firm increases $\partial ROAS_j/\partial dlegacy = CPM * \delta * \Delta \pi_j^{var}/(CPM * (1 - \delta * legacy_j))^2 > 0$. Much of the previous literature in marketing and economics has focused on understanding how advertising changes π_j^{var}, and we highlight the importance of learning more about the cost structure of ad expenditure ($C_j(ads)$). Our results show that acknowledging cost differences implies different cost-benefit analyses across firms, which may lead to differences in optimal advertising exposures or the allocation of advertising dollars across different media, all else equal.

7. Conclusion

We analyze dispersion across advertisers in their cost to access advertising inputs. Understanding the cost of advertising in traditional media has been a challenge because firms view their contracts as trade secrets, and transaction-level data are rarely available. As a result, researchers typically only have access to list prices or imputed prices. Using new data based on actual transactions, we quantify price differences in the market for national broadcast advertising.

Intuitively, if we see that average telecast prices are lower in telecasts where we observe more legacy firms, then we conclude that legacy firms pay lower prices. As our empirical strategy uses price variation across telecasts, we control for differences across telecasts that may be correlated with prices using fixed effects for program-month, network-month-year, and network-month-day-of-the-week. Effectively, we only use variation in ad placements across airings of the same program in the same calendar month to back out price dispersion.

We find price dispersion across advertisers who purchase in advance in the upfront market. Our results indicate that incumbent firms with long histories of participation in the upfront advertising market benefit from lower advertising prices. Our estimates suggest a 0.5% discount per year of earlier entry, implying that an advertiser who entered in 1960 enjoys a 26.5% discount relative to one who entered in 2013. These price differentials exist even when comparing large advertisers who are purchasing similar inputs—that is, purchasing ads in the same TV show. These findings support industry narratives of the use of secret legacy discounts to advertisers, which are based on the length of their ad-buying relationship. We confirm that the price differences remain relatively unchanged once we condition on observable characteristics of purchased inventory, category fixed effects, and the media-buying agencies used by advertisers. Our most complete specification also controls for differences in each firm's year of entry in the product market.

The analysis documents that legacy firms face lower costs to advertise on national broadcast television for equivalent ad inventories. One important consequence of these correlations is that they may create differences in costs across product-market competitors, which persist even when comparing across large advertisers with relatively high exposure on national primetime television. Concerns about unequal access to advertising have been considered previously by both academics and antitrust authorities (Porter 1976). We add to this discussion by documenting that selling practices in the broadcast upfront market confer advantages to incumbent firms. Our empirical analyses and the implied cost differences offer guidance on which product markets may be subject to large cost differences across advertisers.

Chicago Booth School of Business, Columbia University, Duke Fuqua, Harvard Business School, Rochester University, Stanford Graduate School of Business, University of California San Diego, the University of Wisconsin, and the 12th Workshop on the Economics of Advertising and Marketing. Any remaining errors are our own. Both authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or nonfinancial interest in the subject matter or materials discussed in this manuscript.

Endnotes

[1] The three main broadcast networks in the United States are ABC, CBS, and NBC, and they sell national ads. Local channel affiliates sell local ad inventory in a market known as the "spot" market. Buyers of local ads are typically local businesses (e.g., auto dealers and furniture stores). We refer to other networks as cable networks. National inventory not sold through the upfront market is sold a few weeks before a program's airdate in the scatter market. The networks offer discounts for purchasing through the upfront market relative to the scatter market. We use SQAD data on prices and document that in our sample, upfront prices on broadcast television are on average 12% lower than scatter prices within the same program airing.

[2] We interviewed industry participants who remain anonymous, including a media buyer from one of the large media buying agencies, the CMO of a large apparel advertiser, a data aggregator not allowed to disclose prices, and an executive at one of the major broadcast networks.

[3] Lotz (2007, p. 553) describes legacy discounts as follows: "Each client an agency represents likely has a different base dependent on when it began advertising with the network and the specific considerations each requires. Clients who have been advertising the longest typically have a lower base than those who began advertising on a network more recently. Consequently different companies pay different amounts to reach the same size and 'quality' of audience, and these discrepancies remain year-to-year because of the even base increase or decrease across all existing advertisers." This term would also capture any unobservable variation across advertisers that is correlated with their legacy status (e.g., the correlation in the data may be attributed to broadcast networks price discriminating according to advertisers' willingness to pay, which is correlated with legacy status). Despite our detailed data, we cannot empirically distinguish between potential rationales for market-segmentation pricing.

[4] These back-of-the-envelope calculations do not take into account the ability of brands to reoptimize their advertising mix if given access to a lower price.

[5] Other papers include Chandra and Weinberg (2018), who use a merger in the U.S. brewing industry to analyze empirically the relationship between market structure and firms' advertising expenditures. Scott Morton (2000) and Ellison and Ellison (2011) analyzed whether firms use advertising as an entry deterrent. Earlier empirical cross-industry analyses of the association between advertising and entry are summarized in Bagwell (2007).

[6] The analysis of advertising markets is further complicated by the two-sided nature of the market; for example, Wilbur (2008) finds that advertisers' preferences influence networks' choice of programming more strongly than viewers' preferences. Goettler and Shachar (2001) and Goettler (1999) analyze television networks' scheduling choices. Earlier analyses of TV ad prices include Bowman (1976) and Fournier and Martin (1983).

[7] Firms may also purchase ads in specific geographic regions through local affiliates. These ads are heavily used by local advertisers, such as car dealers, professional services, local retailers, or political candidates in state or local elections. Industry participants

refer to these local markets as the spot market. We do not observe local advertisements, and our focus throughout is on the national ads sold by the national networks.

[8] In addition, advertisers have some flexibility to adjust their upfront commitments. Typically, advertiser commitments for the fourth quarter of the current year are considered "firm" buys, whereas advertisers may cancel about 25% of their upfront commitments for the first quarter of the following calendar year and 50% for the second and third quarters. Historically, advertisers have not aggressively exercised this option. Cancellations run between 10% and 15% (Wang et al. 2009).

[9] Our empirical analyses include a rich set of telecast characteristics and observable advertiser characteristics (describing inventory, media buying agency, and product category), which alleviates the concern that legacy status is correlated with the quality of the audience deficiency units received by an advertiser. As a robustness test, we repeat our analyses using a subsample that drops the bottom 25% of primetime telecasts based on realized ratings for each network-season (in case those telecasts receive audience deficiency ad placements) and confirm that the estimates do not change.

[10] Rentrak was acquired by ComScore in February 2016. SQAD is owned by Clarion Capital Partners, LLC.

[11] In order to solve the information-revelation problem, the transaction prices are reported as an average transaction price for telecasts in which advertisers from at least two agencies purchased a spot.

[12] Our sample includes all telecasts for which we observe an upfront and a scatter price. Not all telecasts are sold on the scatter market, which is likely the rationale for many of the missing prices. We have no prior information to make us believe that the missing data are related to pricing practices or idiosyncratic agency representation.

[13] We do not include the fourth broadcaster, FOX, which was established in the 1980s. Robustness analyses in online appendix confirm that results remain the same if we include FOX in the regressions.

[14] ABC is affiliated with ABC Family (Freeform) and ESPN, but we do not use these networks in the analysis. ABC Family is not included because we observe very few prices for the network. We drop ESPN and other sport programs because sporting events are often characterized by sponsorship deals and multiyear contracts, which are done separately from the upfront market.

[15] During the sample period, eMarketer.com (2019) reports upfront prices of \$17–\$21 on broadcast, and \$11–\$12 on cable. To compare these values with our data, we construct telecast CPM by dividing reported prices by the number of viewers watching within the 18–44 age group, as most networks receive payments only for this age group. Rentrak reports household viewership, whereas CPMs count individuals. To make valid comparisons between our data and trade publications, we scale Rentrak's household numbers by 2, assuming that, on average, a household has two members. The prices in our data match well with the upfront prices cited in industry reports: We calculate an average CPM on broadcast of \$18.31, and \$15.49 on cable. We likely see higher prices on cable because SQAD tracks prices for cable networks that are relatively popular.

[16] The upfront market involves large fixed costs for advertisers; thus, the scatter market is typically used by firms with smaller ad buys who are not willing to make the upfront commitments (Philips and Young 2012).

[17] Authors' calculations using Ad\$pender data.

[18] Ideally, we would measure a firm's legacy status separately for each specific network. However, our data on historic advertising expenditures aggregate information across networks to the level of broadcast spending and cable spending. This requires an implicit assumption that if a company's spending is significant for the broadcast (or cable) market, then the company advertises on all

broadcast (or cable) networks. We can confirm the plausibility of this assumption for the observed sample period using Rentrak data. On average, parent companies advertise in 6.85 of the 7 network conglomerates in a year. Data show that advertisers are typically present in all three broadcasters: 98% of the firms that show ads in any broadcaster show ads in all three networks. Similarly for cable companies, 93% of the large advertisers are present in all cable conglomerates for the 2011–2013 sample period.

[19] For example, a network executive shared that advertisers prefer to show fewer ads on Friday and Saturday because viewership is typically lower on these days (anecdotally because viewers go to the movies or participate in other activities), which also coincides with networks choosing less popular programs for these days.

[20] For example, we include Sports and nonprimetime programming, which are not included in the sample of ads used for estimation.

[21] We did not identify the media-buying agency for smaller advertisers (with average spending of $55 million).

[22] We confirmed that our results are not sensitive to the "aggregation rule" when constructing program fixed effects (e.g., they are robust to including a program fixed effect for all programs, irrespective of the number of prices that we observe). Alternatively, if we remove the program-by-month controls (leaving in place network-month-dow and network-month-season fixed effects) our estimate of the legacy parameter (shown in Table 8, column (4)) changes from -0.005 to -0.008, implying that the stringent fixed-effects comparisons provide conservative estimates for the relationship between legacy status and prices.

[23] Our full specification also includes a rich set of observable characteristics describing the inventory purchased by each advertiser.

[24] Legacy firms are observed slightly more often in telecasts with lower viewership (significant at 10%). This relationship disappears once we add any other observable characteristic of the advertisers or their purchased inventory (one at a time or jointly), which are used for our main results in Table 8. That is, the relationship between legacy and viewership can be explained by, for example, the category of the firm, the agency of the firm, or inventory observable characteristics (such as share of ads on primetime).

[25] We see a negative relationship between legacy status and high-income households in the last column. This is driven by 4 television shows on A&E (24 observations), which have a higher viewership among higher-income households than the other A&E shows.

[26] To minimize concerns about current own-network quantities being simultaneously determined with price, we measure advertiser size using ratings-weighted ads in competitors' networks in the first season in which we observe the firm; the size variable is logged in the regressions. We also analyzed three other potential definitions of firm size and got very similar results for our main analyses, reported in the online appendix.

[27] Prices may also differ across advertisers in different product categories if networks use this observable characteristic to price discriminate across their clients. For example, McGranaghan et al. (2022) show that TV ads for pharmaceutical drugs repel viewer interest, which may be a rationale for charging higher prices to advertisers in the Pharmaceutical product category. Wilbur et al. (2013) analyze how to select, order, and price TV ads in an ad break to correct for potential externalities of ad content on viewership.

[28] These estimates are reported in the online appendix.

[29] The correlation between firm entry and upfront entry is 0.502 for broadcast and 0.538 for cable.

[30] Cable networks do not have schedules (in showing the same shows on each weekday evening) that are as consistent as broadcast networks. This is likely the reason why we get lower R^2 in the cable regressions.

[31] We confirm that the lack of correlation is not driven by the definition of legacy on cable (starting in 1985 rather than the 1960s) by also using the (broadcast) legacy status and get the same results.

[32] Another explanation is that networks face different costs to work with legacy firms on broadcast, and the inferred price differentials represent a pass-through of these costs.

[33] The one exception is Satellite TV, where both parent companies enter in 1995, when the product market is established.

References

Ackerberg DA (2001) Empirically distinguishing informative and prestige effects of advertising. *RAND J. Econom.* 32(2):316–333.

Bagwell K (2007) The economic analysis of advertising. Armstrong M, Porter RH, eds. *Handbook of Industrial Organization,* vol 3 (Elsevier), 1701–1844.

Bloom J (2005) You have to live with the upfront, so at least try to be smart about it. *Advertising Age* 76(18):28.

Bollapragada S, Garbiras M (2004) Scheduling commercials on broadcast television. *Oper. Res.* 52(3):337–345.

Bollapragada S, Gupta S, Hurwitz B, Miles P, Tyagi R (2008) NBC-Universal uses a novel qualitative forecasting technique to predict advertising demand. *Interfaces* 38(2):103–111.

Bollapragada S, Cheng H, Phillips M, Garbiras M, Scholes M, Gibbs T, Humphreville M (2002) NBC's optimization systems increase revenues and productivity. *Interfaces* 32(1):47–60.

Bowman GW (1976) Demand and supply of network television advertising. *Bell J. Econom.* 7(1):258–267.

Chandra A, Weinberg M (2018) How does advertising depend on competition? Evidence from U.S. brewing. *Management Sci.* 42(11):5132–5148.

Dubé J-P, Manchanda P (2005) Differences in dynamic brand competition across markets: An empirical analysis. *Marketing Sci.* 24(1):81–95.

Dubé J-P, Hitsch GJ, Manchanda P (2005) An empirical model of advertising dynamics. *Quant. Marketing Econom.* 3(2):107–144.

Ellison G, Ellison SF (2011) Strategic entry deterrence and the behavior of pharmaceutical incumbents prior to patent expiration. *Amer. Econom. J. Microeconom.* 3(1):1–36.

eMarketer.com (2019) Average CPM for US primetime TV upfront ads, broadcast vs. cable, 2008-2020. Accessed May 10, 2023, https://www.emarketer.com/chart/230277/average-cpm-us-primetime-tv-upfront-ads-broadcast-vs-cable-2008-2020.

Fournier GM, Martin DL (1983) Does government-restricted entry produce market power? New evidence from the market for television advertising. *Bell J. Econom.* 14(1):44–56.

Geng Q, Mallik S (2019) Managing television commercial inventory under competition: An equilibrium analysis. *Decision Sci.* 50(1):170–201.

Gentzkow M, Shapiro J, Yang F, Yurukoglu A (2022) Pricing power in advertising markets: Theory and evidence. NBER Working Papers No. 30278, National Bureau of Economic Research.

Goettler R (1999) Advertising rates, audience composition, and competition in the network television industry. GSIA Working Paper 1999-E28, Graduate School of Industrial Administration, Carnegie Mellon University.

Goettler RL, Shachar R (2001) Spatial competition in the network television industry. *RAND J. Econom.* 32(4):624–656.

James M (2013) Upfront advertising sales heat up; CBS nearing finish line. *Los Angeles Times* (June 7), https://www.latimes.com/entertainment/envelope/la-xpm-2013-jun-07-la-et-ct-upfront-advertising-sales-heat-up-cbs-nearing-finish-line-20130607-story.html.

Lotz AD (2007) How to spend $9.3 billion in three days: Examining the upfront buying process in the production of US television culture. *Media Culture Soc.* 29(4):274–303.

McGranaghan M, Liaukonyte J, Wilbur KC (2022) How viewer tuning, presence, and attention respond to ad content and predict brand search lift. *Marketing Sci.* 41(5):873–895.

MMi (2010) Is the TV upfront right for your organization? Accessed July 6, 2022, https://www.mediaaudit.com/post/is-the-tv-upfront-right-for-your-organization.

Moshary S (2020) Price discrimination in political advertising: Evidence from the 2012 presidential election. *RAND J. Econom.* 51(3):615–649.

Philips R, Young G (2012) Television advertisement pricing in the US. Özer Ö, Phillips R, eds. *The Oxford Handbook of Pricing Management* (Oxford University Press, Oxford), 181–198.

Poggi J (2017) P&G shift to TV may hit resistance – From the networks. *Advertising Age* (May 26), https://adage.com/article/special-report-tv-upfront/p-g-shift-ad-dollars-back-tv-upfronts-networks-money/309168.

Porter ME (1976) Interbrand choice, media mix and market performance. *Amer. Econom. Rev.* 66(2):398–406.

Qi S (2013) The impact of advertising regulation on industry: The cigarette advertising ban of 1971. *RAND J. Econom.* 44(2):215–248.

Scott Morton FM (2000) Barriers to entry, brand advertising, and generic entry in the US pharmaceutical industry. *Internat. J. Indust. Organ.* 18(7):1085–1104.

Shapiro BT (2018) Positive spillovers and free riding in advertising of prescription pharmaceuticals: The case of antidepressants. *J. Polit. Econom.* 126(1):381–437.

Sutton J (1991) *Sunk Costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration* (MIT Press, Cambridge, MA).

Vilcassim NJ, Kadiyali V, Chintagunta PK (1999) Investigating dynamic multifirm market interactions in price and advertising. *Management Sci.* 45(4):499–518.

Wang S, Stabler P, Mukherjee S (2009) Demystifying the upfront. Credit Suisse Report. Accessed July 6, 2022, https://tvbtn.files.wordpress.com/2009/05/3210-tvupfrontanalysts.pdf.

Wilbur KC (2008) A two-sided, empirical model of television advertising and viewing markets. *Marketing Sci.* 27(3):356–378.

Wilbur KC, Xu L, Kempe D (2013) Correcting audience externalities in television advertising. *Marketing Sci.* 32(6):892–912.

Yang J, Lee JY, Chintagunta P (2021) Commercial success through commercials? Advertising and satellite TV operators. *J. Marketing Res.* 58(5), 925–947.