How Does Consumer Voice Respond to Antitrust Policy? Evidence from Supermarket Divestitures[*]

Daniel Hosken
Federal Trade Commission
dhosken@ftc.gov

Frank Pinter
Federal Trade Commission
fpinter@ftc.gov

Devesh Raval
Federal Trade Commission
draval@ftc.gov

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Abstract

Little is known about how consumer voice responds to antitrust policy. We examine consumers' response to the common antitrust remedy of government mandated divestitures, for which Yelp reviews of supermarkets provide a measure of consumer voice. Our analysis focuses on the divestiture of 249 grocery stores in two large supermarket mergers. Using a difference in differences identification strategy, we find massive increases in consumer reviews following divestitures. The share of negative reviews for divested stores rises substantially, driven by reviews concerning prices. Finally, we find no change in the composition of users filing reviews for the divested stores post-divestiture.

Keywords: divestitures, antitrust, reviews, mergers

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1 Introduction

Hirschman (1972) argued that consumers have two approaches when confronted with problems in the marketplace: voice or exit. Antitrust economics has traditionally focused on the exit margin. For example, the U.S. Department of Justice (DOJ)-Federal Trade Commission (FTC) Horizontal Merger Guidelines highlight using the diversion ratio – a measure of the share of consumers that switch to a competitor after a small price increase – to evaluate a merger between potential rivals. An important weakness of this approach, however, is that it does not directly measure how quality responds to competition changes.

Policymakers are thus interested in complementing existing approaches by using consumer voice to learn about competition problems and assess competition policy. For example, in April 2024, the DOJ and FTC launched a portal for public reporting of anticompetitive practices in the health care sector, in an analogue to existing consumer protection complaint portals. The FTC has also begun a series of Open Commission Meetings where the public can listen to deliberations on antitrust policy, and potentially voice their complaints directly to the Commissioners deciding on such policy.

We examine how consumer voice can be used to assess, and potentially improve, competition policy in the context of divestitures. Divestitures are a major antitrust remedy that allow firms to merge if they agree to selling off assets in areas with significant overlap between the merging parties. Several high-profile failures have raised questions on the adequacy of the divestiture remedy, and little is currently known about how well divestitures work. We examine supermarket divestitures, where antitrust regulators have required over 600 grocery stores to be divested since 1990.

We measure consumer voice using the universe of Yelp supermarket reviews including the review rating, review text, and characteristics of the reviewing consumer. We focus on the 2015 Albertsons/Safeway and 2016 Ahold/Delhaize mergers; the FTC declined to block these mergers under the condition that 249 grocery stores be divested. The review data allows us to examine whether consumers are more likely to exercise their voice through reviews after a divestiture, whether post-divestiture reviews were positive or negative, and what concerns consumers had about the transaction.

Our main empirical strategy is a difference in differences regression. We consider the divested stores as treated and compare divested stores to control stores in the same state, but which did

not belong to the merging parties and were not located in the same geographic region. Thus, our control group should not include any stores directly affected by the merger, or any stores directly competing with the divested stores.

Our treatment group includes stores divested to Haggen (146 stores) in the Albertsons/Safeway transaction, stores not divested to Haggen in Albertsons/Safeway (22 stores), and all stores divested in the Ahold/Delhaize transaction (81 stores). The Haggen chain went bankrupt several months after the divestiture and as a result, all stores divested to Haggen closed at least temporarily. We can thus compare the strength of consumer's voice in a major, clear failure to other divestiture events.

We first show that consumers do express their voice in response to divestitures. We find massive increases in consumer reviews post-divestiture, with a 280% increase within four quarters of the divestiture. We continue to find 70% more reviews relative to baseline on these stores one to two years post-divestiture. Despite clear differences in long-run outcomes – the Haggen divestiture led to store failures, while the other divestitures generally did not – our results are similar across both groups.

This outpouring of consumer voice is mostly due to negative reviews. We measure negative reviews based both on the star rating as well as machine learning sentiment scores of the review text, and find that the share of negative reviews increases by 40% within four quarters of the divestiture. We additionally find several reviews that mention the FTC specifically and criticize the divestiture, indicating that some consumers were aware that the divestitures were due to competition policy.

To get a better sense of what consumers are reviewing, we use machine learning zero-shot classification methods to assess the topics that consumers address in their reviews. Zero shot classification uses a large language model to predict whether a consumer is referencing a specific topic, and has been found to be very effective in other contexts (e.g., Agarwal et al. (2024) on radiology diagnosis). We examine three topics – prices, products, and customer service – allowing reviews to touch on multiple topics. We find that the large increase in negative reviews is driven by an 103% increase in complaints about prices as a share of negative reviews within four quarters of the divestiture.

Finally, we examine several measures of differences in the composition of users, including whether the reviewer is a "new" supermarket reviewer, whether the reviewer has ever been Yelp

Elite (a frequent Yelp reviewer) in our sample period, and whether the review was flagged by Yelp as not recommended, which is an indicator of whether the review is fake (Luca and Zervas, 2016). Surprisingly, we find no differences in the composition of reviewers for divested stores post-divestiture across all of these measures.

Our work is related to three main strands of the literature in economics and marketing. First, Hirschman (1972) thought that consumers were more likely to respond with voice in concentrated markets. Both Beard, Macher and Mayo (2015) and Gans, Goldfarb and Lederman (2021) assess this prediction empirically and find greater voice (proxied by complaints or tweets) in more concentrated markets. Our paper contrasts with this work as it examines a change in market structure from competition policy rather than pre-existing differences in market structure.

Second, scholars in marketing have long focused on how consumer voice affects markets, including showing how consumer voice affects demand (Luca, 2011; Lewis and Zervas, 2020), potential biases in measures of voice such as reviews and complaints (Luca and Zervas, 2016; Mayzlin, Dover and Chevalier, 2014; Raval, 2020), as well as approaches to amplify consumers' voice and correct potential biases (Fradkin, Grewal and Holtz, 2021; Fradkin and Holtz, 2023; Grosz and Raval, forthcoming; Nosko and Tadelis, 2015).

Finally, this article adds to a small but growing literature examining the effects of divestitures as an instrument of competition policy. Both government agencies (Federal Trade Commission, 1999, 2017; General Accountability Office, 2002) and researchers (Argentesi et al., 2021; Brown, Eckert and Shaffer, 2023; Chen et al., 2022; Friberg and Romahn, 2015; Lagos, 2018; Osinski and Sandford, 2021; Soetevent, Haan and Heijnen, 2014; Tenn and Yun, 2011; Wang et al., 2023) have examined divestitures in several contexts. This literature has focused on identifying price and quantity effects, whereas we focus on consumers' voice and using that voice to assess price or quality effects of the divestiture.

2 Background

2.1 Divestiture Policy

The primary goal of prospective merger policy is to ensure that mergers do not harm competition. For many mergers, the merger only directly affects competition in markets associated with a small

part of the transaction. For example, in a merger between two large supermarket retailers, the two chains only directly compete in a handful of cities. An antitrust agency often allowed this type of merger to proceed if it could negotiate a divestiture that would maintain the pre-merger level of competition. To do so, the merging firms would need to identify a set of assets to divest and a buyer for those assets that could operate them effectively such that post-merger market prices and the quality of services in the market would not decrease.

Identifying the set of assets and the buyer for a divestiture is challenging. First, the merging firms have an inherent agency problem constructing the divestiture. The antitrust agency wants the merging firms to divest valuable assets to a strong competitor to maintain competition, while the merging parties would prefer to divest low quality assets to a weak competitor. Second, the agency has an informational disadvantage relative to the merging firms. The merging firms have deep knowledge of the industry and the quality of the assets they choose to divest and hold. Agency staff must rely on third parties – potential buyers and industry experts – with potentially different interests than the agency to evaluate the quality of the divestiture package.

The evidence is mixed on how successful divestitures have been in maintaining competition. While the FTC's 1999 and 2017 Divestiture studies (Federal Trade Commission, 1999, 2017) concluded that the FTC's divestures were successful overall, both reports also noted that a significant fraction of divestitures failed.[1] For example, the 1999 study found that, in about 25% of divestitures examined, the buyer was no longer actively participating in the market. The 2017 study concluded that more than 80% of orders across 50 examined divestitures maintained or restored competition, suggesting a significant fraction of divestitures failed to maintain competition.

A small but growing subset of the merger retrospective literature has begun to evaluate the efficacy of divestitures and, like the FTC studies, finds decidedly mixed results. Three studies have examined divestitures in retail markets broadly similar to those in our study. Argentesi et al. (2021) studies a merger of Dutch supermarket chains and finds that divestitures were successful in maintaining competition post-merger. Lagos (2018) examines divestitures of gasoline stations in Chile and concludes that divestures were only effective where the divested stations were located within one kilometer of one of the merging parties' stations. Finally, Osinski and Sandford (2021)

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[1]The 1999 FTC Divestiture study states, "The Study supports the view that divestitures have been successful remedies for anticompetitive mergers." (page 8). The 2017 FTC Divestiture Study states, "The Study supports the view that divestitures have been successful remedies for anticompetitive mergers." (page 1).

stidy a divestiture following a casino merger and find that, while the merged firm's casino did not raise prices post-merger and increased output, the divested casino performed worse than before the merger.

2.2 Albertson's/Safeway and Ahold/Delhaize Mergers

In this article, we examine two large supermarket mergers – Albertson's and Safeway as well as Ahold and Delhaize – in which the government did not block the merger after a set of divestitures. At the time of the mergers, Albertson's and Safeway operated 630 and 1,332 stores, and Ahold and Delhaize operated 710 and 1,291 stores. While these chains were large, they did not directly compete in most of the regions in which they operated. The FTC required 168 stores divested in the Albertson's/Safeway merger and 81 stores in the Ahold/Delhaize merger to preserve competition in relatively narrow geographic markets.[2]

In the divestitures for these mergers, the FTC did not require the merging firms to sell off an entire business unit, e.g., all of the stores in the business unit servicing the area where the firms competed, the distribution centers servicing those stores, and the use of one of the retail brand names.[3] Instead, the divestitures included stores owned by both of the merging firms even in adjacent markets. For example, of the 83 stores divested in California, 28 were previously operated by Safeway and 55 by Albertson's.[4]

Most of the firms purchasing divested stores were much smaller supermarket chains than the merging firms. [5] Empirical work examining productivity growth (Foster, Haltiwanger and Krizan,

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[2]For example, in its aid for public comment, the FTC stated that "The relevant geographic markets in which to analyze the effects of the Acquisition are areas that range from a two- to ten-mile radius around each of the Respondents' supermarkets, depending on factors such as population density, traffic patterns, and unique characteristics of each market." See https://www.ftc.gov/system/files/documents/cases/150127cereberusfrn.pdf. For example, the FTC identified 168 stores located in 130 distinct geographic markets that would be adversely affected by the Albertson's/Safeway merger. Some of these markets were very close to one another. For example, the FTC identified one market as Santa Barbara, California and another as Santa Barbara/Goleta, California, two regions about 9 miles apart.

[3]The decision to accept this divestiture deviated from the FTC's stated preference to prefer divestitures of standalone businesses. For example, the FTC's 2017 Divestiture study stated "The study found that all divestitures of ongoing businesses succeeded, whether the divestiture was to an upfront buyer or a post-order buyer. This finding reinforces what the Commission and staff have long known: divestiture of an ongoing business, which includes all assets necessary for the buyer to begin operations immediately, maximizes the chances that the market will maintain the same level of competition post-divestiture." See page 21.

[4]See the FTC's Albertson's/Safeway Aid to Public Comment at: https://www.ftc.gov/system/files/documents/cases/150127cereberusfrn.pdf. For instance, the divesture required two Safeway stores to be divested in the Santa Barbara/Goleta market and two Albertson's stores in the nearby Santa Barbara market.

[5]Haggen, the firm that purchased 146 of the divested stores in the Albertson's/Safeway merger, owned only 18 stores prior to the merger. While two of the divestiture buyers in the Ahold/Delhaize case were large firms, 70 of
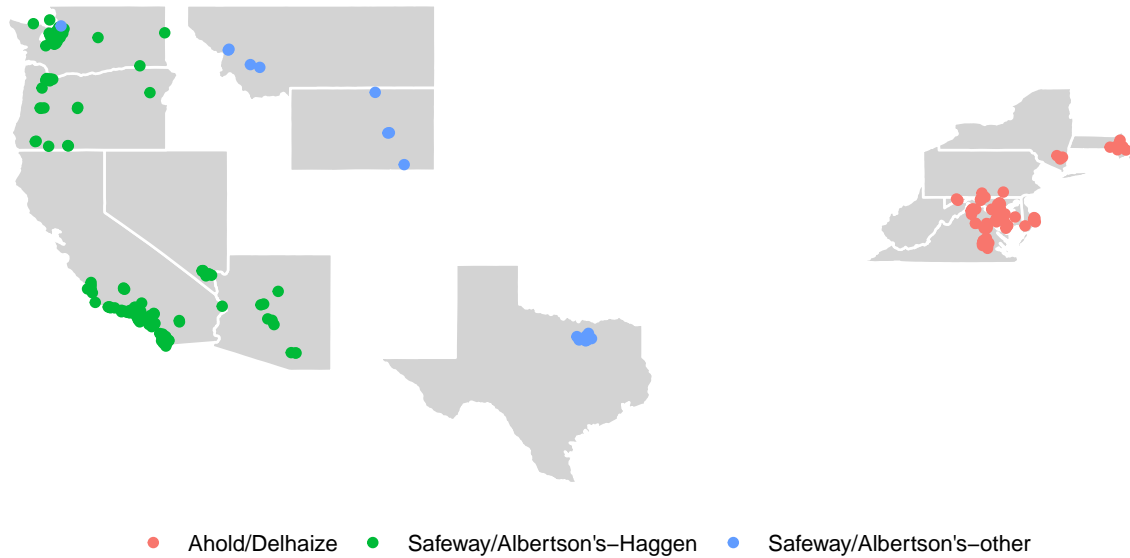
Figure 1: Map of divested stores in the Safeway/Albertson's and Ahold/Delhaize mergers.

2006) finds that large firms are much more likely to obtain high labor productivity (and presumably lower costs) in the retail trade sector, suggesting that small retailers obtaining divested stores may face difficulties in effectively competing with larger chain retailers. In addition, the divestiture did not require the merging firms to divest a retail brand. As a result, the owner of the divested asset had to enter the retail market with a new, unknown retail product that likely increased the riskiness of the divestiture.

One of the divestitures – stores in the Albertson's/Safeway transaction sold to the retailer Haggen (see Figure 1) – became a notorious failure. The divestiture transformed Haggen from a small chain that operated 18 stores in Washington and Oregon pre-merger to a regional West Coast chain by adding 146 stores from Albertson's/Safeway located in Arizona, California, Nevada, Washington, and Oregon. Thus, the transaction required Haggen to establish a retail presence in a large number of disparate regions far from its traditional markets, and quickly develop a network to supply these stores.

the divested stores were purchased by much smaller retailers operating less than 200 stores prior to the divestiture. Albertson's and Publix purchased 1 and 10 of the divested stores. Weis and Topps were regional supermarket chains that operated 165 and 163 stores prior to the divestiture. Weis and Topps purchased 38 and 6 stores respectively. The remaining purchasers were much smaller, operating 61 or fewer stores. See FTC Aid to Public Comment: https://www.ftc.gov/system/files/documents/cases/160722koninklijkeanalysis.pdf.

Haggen took over the divested stores between March and June of 2015, but very quickly began to have severe problems effectively operating its stores. It ultimately filed for bankruptcy in September of 2015 and began the process of closing all of its California stores, many of which were subsequently purchased by Albertson's. Because of the potential significance of the failed Haggen divestiture, we examine the sensitivity of our findings to samples limited to and excluding the Haggen outlets.

3 Data

Our primary data set contains the universe of U.S. Yelp supermarket reviews that took place between October 2004 and July 2021. The data contains each review's star rating (1-5), text, some characteristics of the reviewing consumer, and the address and brand affiliation of the reviewed supermarket. Overall, the data set contains 1.9 million reviews associated with 77,347 grocery store and supermarket establishments across the United States. Of these reviews, 4% are updates (when a user revisits a prior review) and the remaining 96% are original reviews.

The Yelp data contains a separate store identifier for each establishment, identified by an address and store name. When a retail outlet changes names, e.g., due to a merger, Yelp sometimes creates a new store identifier for the renamed establishment. Because the goal of our study is to measure the change in the quality of establishments before and after ownership changes, we create a time invariant identifier corresponding to each "store" defined by a unique retail address. After grouping the establishments by physical location, our sample consists of 71,268 unique stores.[6]

For our analyses, we define the unit of observation as a store/quarter where we aggregate the number of reviews a store receives to the quarter. This aggregation addresses both data availability (many store-quarter combinations have no reviews or only one review) and missing data about the exact dates divested stores reopened with their new ownership and banner.[7]

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[6]In the Yelp data, multiple establishments can be observed at what is effectively the same address over time for a number of reasons. First, there is sometimes simple duplication (common in user-generated data), user-generated distinctions (for example, separating pharmacy and food departments at a supermarket), or the turnover of stores and banners over time. To address these issues we simply collapse all establishments at an address into one unit. To overcome inconsistencies in address strings, we use a combination of text cleaning with R and geocoding with ArcGIS to map establishments in the raw Yelp data to stores.

[7]Because the divestitures associated with a given merger usually occurred in a single quarter, or across two consecutive quarters, this level of aggregation also mitigates issues due to staggered treatment.

3.1 Topics analysis

To get a better sense of what consumers are reviewing, we use machine learning zero-shot classification methods to assess the topics that consumers address in their reviews. Zero shot classification uses a large language model to predict whether a consumer is referencing a specific topic. We examine three topics -– prices, products, and customer service -– allowing reviews to touch on multiple topics.[8]

We used the `bart-large-mnli` large language model with Hugging Face to assign a vector of topics to each review.[9] The model assigns each review a score, between 0 and 1, for each topic; the scores are independent and need not add to one. To validate our use of star ratings, we also use the `twitter-roberta-base-sentiment-latest` model with Hugging Face to assign a sentiment score to each review.[10]

Figure 2 shows histograms of our three topic scores across all the reviews relevant to our divestitures analysis. The scores span the full range from zero to one, giving us useful variation (observations are not clustered entirely around zero or around one). Scores in the intermediate range (around 0.5) could indicate ambiguous text or limitations of the zero-shot method.[11]

3.2 Summary statistics

Time trends. As shown in Table 1, reviews grew in the early 2010s before plateauing. The number of reviews plateaued around 280,800 in 2015; the number of stores reviewed each year plateaued around 35,000 in 2018. Ratings generally became more negative over time, which could indicate compositional changes in the makeup of Yelp reviewers or changing norms about the purpose of Yelp reviews.

Number of reviews per store, 2013–19. Among stores that received any reviews, the median number of reviews per store is 5; the 80th percentile is 21 (or, on average, slightly more than one

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[8]In an initial manual examination of reviews, we observed that consumers often left positive and negative reviews discussing the prices changed at stores, customer service, and products (often discussing the variety available in store and quality). For this reason, we choose these three topics to be the focus of our analysis.

[9]See https://huggingface.co/facebook/bart-large-mnli.

[10]See https://huggingface.co/cardiffnlp/twitter-roberta-base-sentiment-latest.

[11]In manual review of a small random sample, we found that in most cases where the zero-shot score is around 0.5, the text is ambiguous.
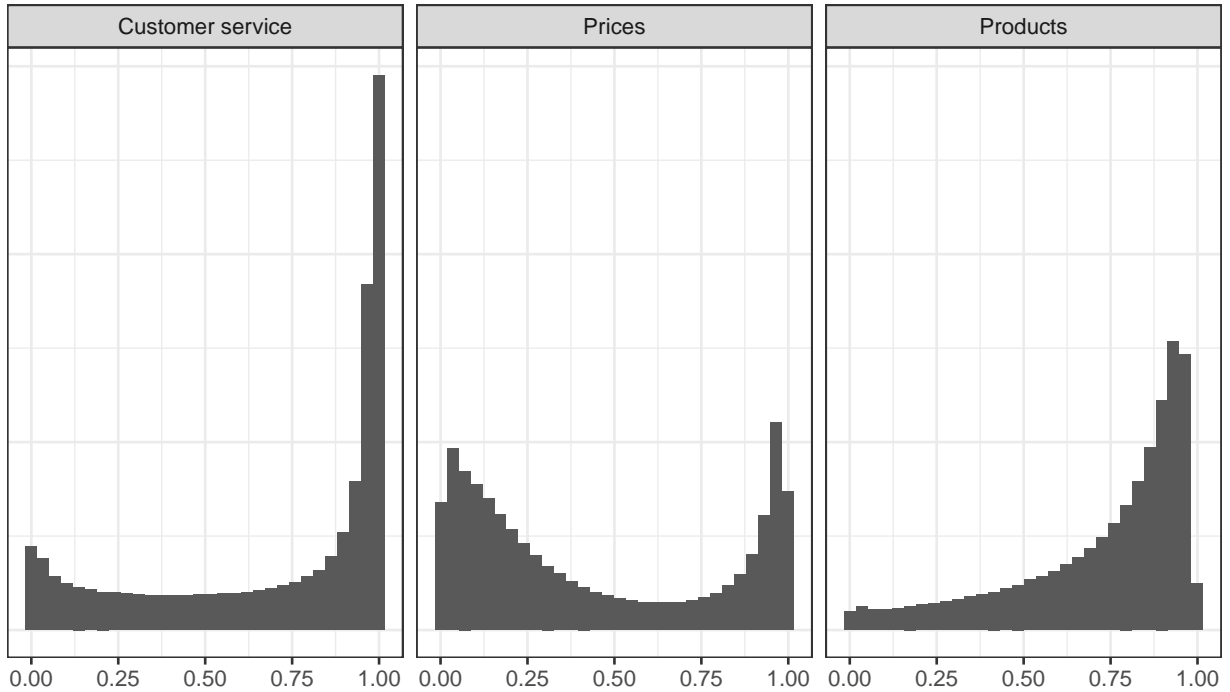
Figure 2: Histograms of topic scores across all reviews in states with divestitures.

Note: Topic scores computed using zero-shot encoding on all reviews from the following states and time periods: AZ, CA, MT, NV, OR, TX, WA, WY (2013–17); DE, MA, MD, NY, PA, VA, WV (2014–19).

Table 1: Time trends in review counts and ratings, 2013–2019.

	2013	2014	2015	2016	2017	2018	2019
# stores w/ reviews	27,559	29,885	32,392	33,762	35,070	36,857	36,344
# reviews	199,570	240,851	280,800	273,684	280,242	292,762	273,946
Negative share	24%	27%	30%	33%	36%	37%	41%
Mean star rating	3.54	3.50	3.42	3.37	3.30	3.27	3.16

Note: Reviews are assigned to stores by unique address. A small number of locations are dropped as invalid or outside the US. Negative reviews are 1- or 2-star reviews.
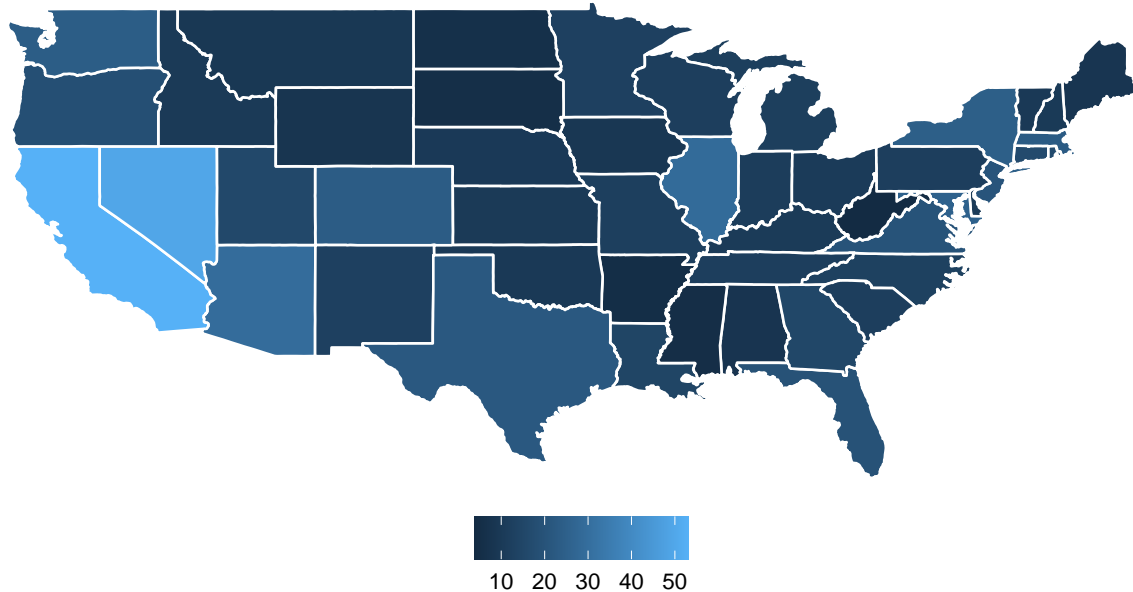
Figure 3: Average number of reviews per location, 2014–18, across states.

review per quarter) and the mean is 24. The top 1% of stores account for 16% of the reviews; the top 20% of stores account for 73% of the reviews.

Regional variation in Yelp review density. Figure 3 shows the average number of reviews per location (across 2014–18) in each of the 48 contiguous states. California and Nevada (and Hawaii, not shown) have the most (50, 53, and 60 reviews per location, respectively); conveniently, California was the largest state affected by the Haggen divestiture. West Virginia, Arkansas, and Mississippi have the fewest (4, 5.2, and 5.3 reviews per location, respectively).

Divestiture specific reviews. We identified several Yelp reviews as specifically critiquing the FTC's divestiture policy. We excerpt several examples below:

> The FTC took Vons away from us, a store that had a great organic brand, good specialty items, AND competitive prices.

> Thanks FTC (Obama) for making them sell our local stores to an upscale expensive grocer. Is there anything not getting worse under this administration?

The morons at the FTC made Albertson's divest itself of the two Von's in the area out of fear that it would hold a monopoly. Von's was replaced by the overpriced Haggen's which screwed the workers and closed in six months. Now, we have Gelson's in its place and I fear it will meet the same fate.

4 Empirical approach

Our main empirical strategy is a difference in differences regression. We consider the divested stores as treated and compare divested stores to control stores that were not directly affected by the merger, or directly competing with the divested stores. To interpret our results as causal effects, we assume that had the merger not occurred, trends in the review patterns of the control group would have been parallel to trends in the review patterns of the treatment group.

Table 2: Summary statistics on reviews, by store group (treatment/control/excluded) and time (pre/post merger).

		Control		Excluded		Treatment	
		Pre	Post	Pre	Post	Pre	Post
Ahold/Delhaize	Reviews	74,764	111,147	20,235	32,963	261	834
	Avg. rating	3.48	3.25	3.29	3.10	3.15	2.79
	Stores represented	6,688	8,308	2,147	2,546	51	67
Albertson's/Safeway	Reviews	60,337	232,106	90,114	361,228	1,280	9,107
	Avg. rating	3.62	3.35	3.49	3.18	3.06	2.82
	Stores represented	5,938	9,297	7,048	9,949	155	165

Note: Compiled using reviews from January 2013 to July 2021. In this table, review dates are assigned to pre/post merger using a cutoff of January 1, 2015 for Albertson's/Safeway and July 1, 2016 for Ahold/Delhaize, shortly before the mergers closed; actual divestitures occurred in the months following. Reviews are assigned to stores by unique address. Stores are assigned to treatment, control, and excluded groups as described in the text.

Our treatment group includes stores divested to Haggen (146 stores) in the Albertsons/Safeway transaction, stores not divested to Haggen in Albertsons/Safeway (22 stores), and all stores divested in the Ahold/Delhaize transaction (81 stores). In sum, our treatment group includes 13,097 reviews across 242 unique addresses.[12]

Our control group includes stores that were in the same state, but not the same geographic region based upom three-digit zip code, as any divested store, and did not belong to any of the merging parties. The control group thus includes grocery stores and supermarkets of various sizes

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[12]We were unable to match 13 divested stores to the Yelp data.

and formats in urban, suburban, and rural areas. In sum, our control group accounts for 637,067 reviews across 21,449 unique addresses. In Table 2, we provide the number of reviews, average rating, and stores for the treatment group, control group, and excluded group both pre and post divestiture.

Our difference in differences regressions have the standard two-way fixed effects form. The unit i is the store, the time period t is the quarter, and the time period relative to the quarter of the divestiture is post_{it}.

For store i in quarter t, we model the conditional expectation of a nonnegative outcome variable y_{it} as:

$$E[y_{it} \mid i, \text{treat}_i, \text{post}_{it}] = \exp\left(\gamma_i^y + \delta_{t,\text{state}(i)}^y + \beta^y \, \text{treat}_i \, \text{post}_{it}\right).$$

Throughout, we report standard errors clustered by store; the treatment effect in percentage units is $\exp(\beta) - 1$.

Our specifications vary in the choice of outcome variable y_{it}. First, we measure how frequently stores are reviewed in a quarter to determine if divestitures cause consumers to be more or less likely to exercise their voice. In this analysis n_{it} is the count of reviews for store i in quarter t. Second, we examine how the share of a given type of review, such as negative reviews, changes post-divestiture.

In each specification, β^y is the causal effect of divestiture on y, the number of reviews of a given type. Furthermore, $exp(\hat{\beta}^y - \hat{\beta}^n)$ estimates the causal effect of divestiture on that type's *share* of overall reviews in percentage terms.[13]

5 Results

We find that the divestiture caused large changes in the number of reviews, the proportion of negative reviews, and in the topics discussed in those reviews. Our difference-in-differences estimates are stark in percentage terms. Divested stores immediately experience multi-fold increases in reviews, with most (but not all) of the additional reviews skewing negative. The increases in review activity

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[13]Standard errors on the difference in $\hat{\beta}$ across specifications requires calculating the covariance across specifications. To do so, we stack the regressions with different outcome variables and estimate jointly.

are concentrated in the quarters immediately following the divestitures suggesting the consumers are exercising their voice in response to a change in product offerings. We continue to find more reviews relative to the pre-divestiture baseline in the 2nd year post-divestiture, although the size of the increase is smaller. Table 3 summarizes these results.

We also examine heterogeneity in our effects by comparing stores divested to Haggen in the Albertson's/Safeway transaction – a clear failure – to stores divested to other parties in Albertson's/Safeway and Ahold/Delhaize. While our estimates are more noisy for the non-Haggen stores, we see similar magnitudes in the increase in reviews for both groups.[14]

Table 3: Summary of difference-in-differences estimates, aggregated to four-quarter time periods.

Time Period	No. Reviews	Share Negative Reviews	Topic Share of Negative Reviews		
			Prices	Products	Customer Service
Quarters 0-3	278%	44%	103%	17%	-22%
	[145%, 483%]	[20%, 71%]	[66%, 149%]	[7%, 28%]	[-29%, -14%]
Quarters 4-7	70%	-27%	40%	11%	-9%
	[32%, 119%]	[-40%, -11%]	[10%, 78%]	[0%, 23%]	[-18%, 0%]
Pre-period mean	0.69	0.41	0.37	0.66	0.74

Note: This table shows the results of the difference-in-differences regressions. Each column represents a different dependent variable; the table presents the estimated effect on either the dependent variable itself, or on the *share* of the dependent variable within a broader category, computed as the difference between estimated regression coefficients. The Quarters 0-3 and 4-7 rows show the estimated dynamic treatment effects, both point estimates and 95% confidence intervals, transformed to percentage units. The 'Pre-period mean' row shows either the mean of the dependent variable in the treatment group in the quarter before divestiture, or the ratio of means (mean dependent variable divided by mean of 'as share of' variable).

5.1   Number of reviews

We begin by examining how the Albertson's/Safeway and Ahold/Delhaize divestitures affected the frequency of reviews. Figure 4 shows the estimated percentage effect of divestiture on reviews, relative to the quarter prior to the divestiture. For the event study estimated using the entire sample (overall, in red), divestitures cause consumers to write more reviews although the effect decays over time. The total effect over the first year (the quarter of divestiture and the three quarters following) is a massive 278% increase in reviews. In the second year, the effect is smaller but still positive at a 70% increase. For comparison, the average divested store had 0.69 reviews in

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[14]Because most of the non-Haggen stores were mainly in the Northeast, where Yelp reviews of supermarkets were generally less common, the confidence intervals for these stores are fairly wide.
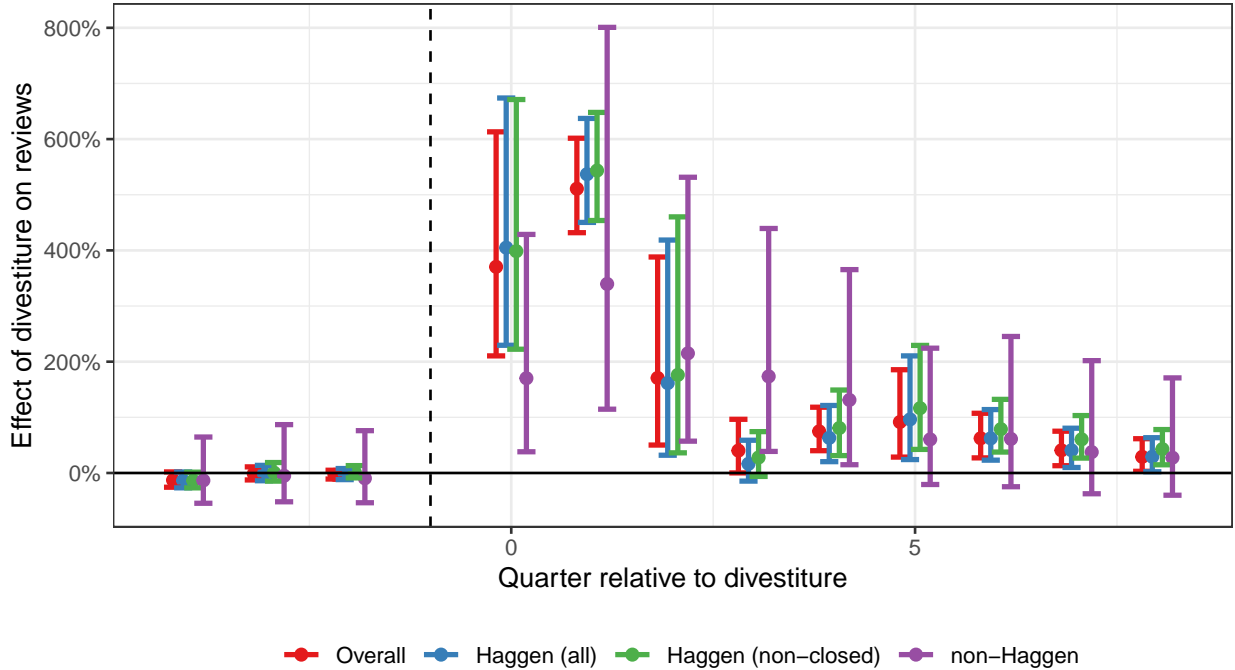
Figure 4: Effect of divestiture on number of reviews (event study plot)

the quarter before divestiture, as shown in the first column of Table 3.

Because so many of the divested stores in our sample went to a single buyer, Haggen, that failed in the year following the divestiture, we also explore the robustness of the estimates to the composition of the divestiture sample. We estimate the the difference-in-difference model including only the stores divested to Haggen (blue), only the stores divested to Haggen that continued being operated as supermarkets after Haggen's exit (green), and the non-Haggen sample (all of the Ahold/Delhaize stores, and the other Albertson's/Safeway divested stores, shown in purple).[15] The results of the event study are remarkably similar for all of the samples: consumers are much more likely to review stores in the year following the divestiture and then decline in the following year. While the confidence intervals are much larger for the non-Haggen stores due to the lower baseline level of reviewing at these stores, the pattern and estimated magnitudes are very similar. Overall estimates for the first and second year following the divestiture are shown in Table 5.

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[15]Following Haggen's failure, some of the formerly Haggen store locations were sold to firms operating outside of the supermarket industry. To explore if our findings are driven by relatively poor retail locations, we estimated the model limited to stores that remained viable as supermarkets.

5.2 Share of negative reviews

We now use the same difference-in-difference approach to estimate how the share of negative reviews changed following the divestiture. We consider 1- or 2- star reviews as negative reviews. Figure 5 shows the percentage effect of divestiture on the negative share of reviews for each of the four estimation samples. We indeed find that negative reviews increase more upon divestiture than overall reviews do, but the effect diminishes over time. Using the overall sample, within the first year, the share of negative reviews increases 44%.[16] In the second year and afterward, the share of negative reviews *decreases* by 27% relative to the counterfactual.

Interestingly, we see a slightly different pattern in the second year for the Haggen and non-Haggen divested stores. For the Haggen stores, the fraction of negative reviews declines relative to the baseline by roughly 40% in the second year. This decline suggests that the new non-Haggen operators of stores originally divested to Haggen likely improved the quality of these stores, or that consumers were happy to have an operating grocery store again. However, for the non-Haggen stores, which were still operated by the original divestiture buyers, the fraction of negative reviews increases in the second year by a similar magnitude to the first year following the divestiture. Reviewers of these stores continue to be more likely to leave negative reviews, likely because the decline in quality post-divestiture persists.

5.3 Review topics

We next examine the content of consumers' negative reviews to understand what led consumers to post a review. We estimate how the share of consumers' negative reviews that mention the topics "prices", "products", or "customer service" changed following the divestiture; Figure 6 depict these estimates. Since these three topics are not mutually exclusive, it is possible for the share of all three topics in consumers' reviews to increase or decrease.

We observe a large increase in the number of consumers discussing prices in their negative reviews post-divestiture. The estimated effect is largest for the Haggen divested stores. In the first and second year following the divestitures, the number of consumers commenting on prices in negative reviews increases by about 100% and 40%, respectively. This finding is consistent with

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[16]For comparison, the divested stores' reviews were 41% negative, on average, in the quarter before divestiture; a 44% increase on this baseline would be a jump of eighteen percentage points, to 59%.
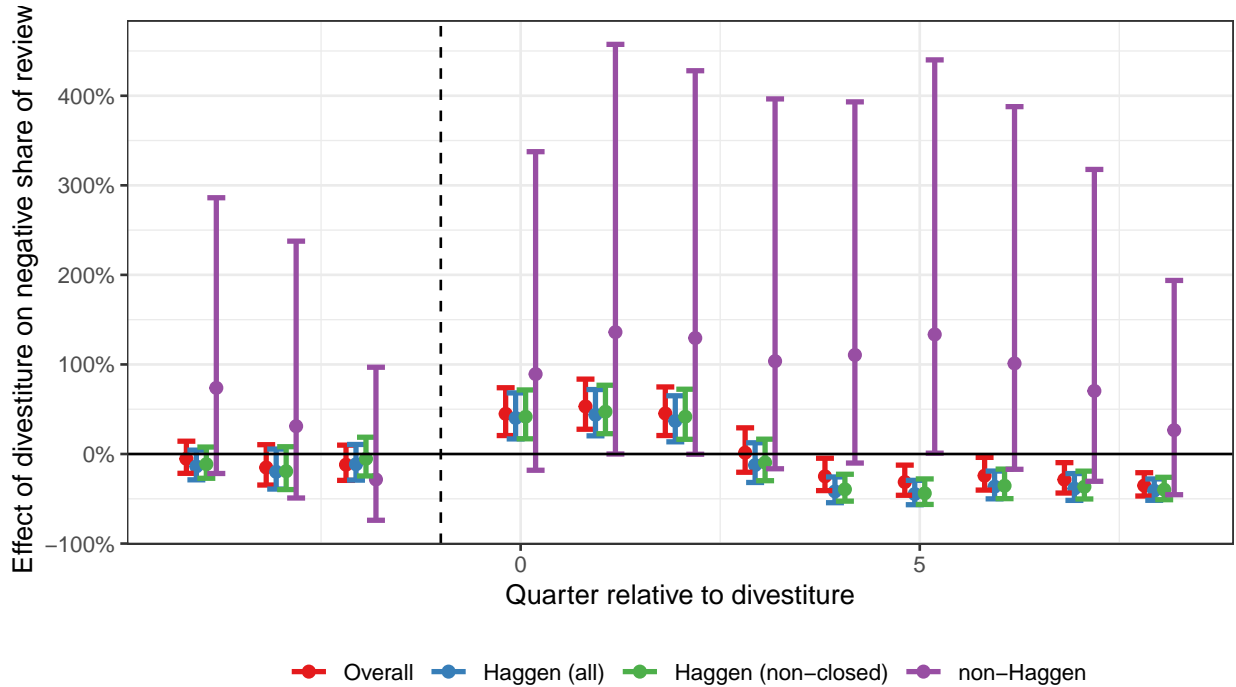
Figure 5: Effect of divestiture on negative share of reviews (event study plot)

allegations made by Haggen in litigation related to the divestiture that Albertson's/Safeway did not share pre-divestiture store level pricing information. Because it lacked this pricing information, Haggen claimed that it charged prices that were much higher than consumers expected when it began running the divested stores.[17] Interestingly, consumers were still more likely to mention pricing in negative reviews after the Haggen stores had been sold to other buyers in the second year following the divestiture.

For the non-Haggen stores, the increase in the fraction of negative reviews discussing prices is smaller and relatively constant over time. While the estimates are much less precise, the fraction of negative reviews mentioning price is predicted to increase by 57% and 35% in the first and second year following the divestiture relative to the pre-divestiture period.

We also observe differences in the change in the mentions of products and customers service between the models estimated using the Haggen and non-Haggen divested stores. For the non-

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[17]In its legal complaint, Haggen claimed that Albertson's/Safeway did not share its pre-merger pricing data (See paragraphs 35 and 36 of the complaint). Haggen's plan had been to use the same general pricing approach as Albertson's/Safeway when launching the new stores. Instead, Haggen was forced to uses its existing pricing strategy for its stores in the Pacific Northwest that were often much higher than the prices previously charged at the Southern California stores. This allegation is also consistent with some of the complaints we have seen in the text of Haggen's Yelp reviews.
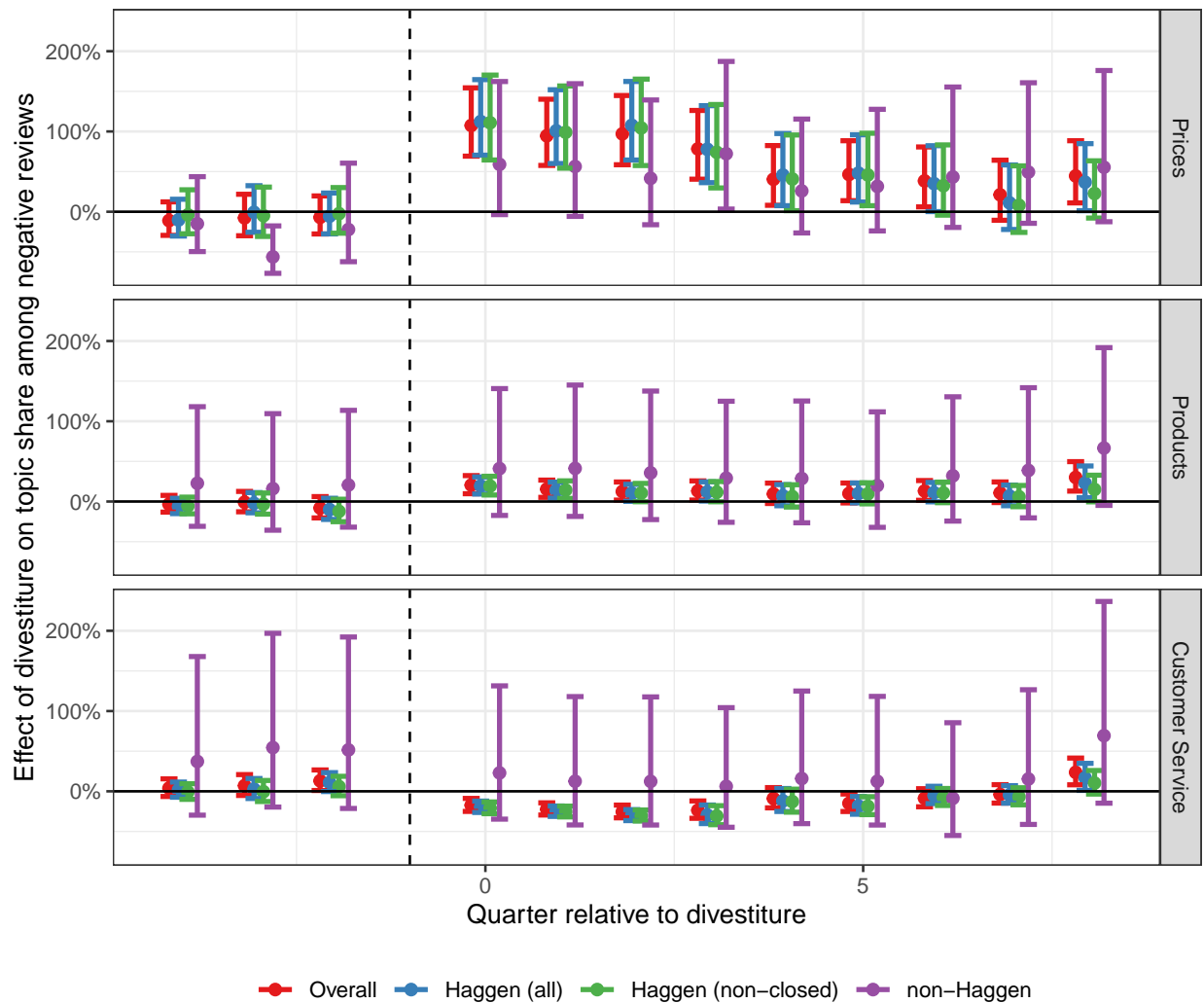
Figure 6: Effect of divestiture on each topic's share among negative reviews (event study plot)

Haggen stores, we estimate an increase in the fraction of negative reviews mentioning products (38%) and customer service (13%). Although these estimates are imprecise, they are suggestive of lower quality on product selection and customer service post-divestiture. By contrast, for the Haggen sample, we observe a smaller increase in the fraction of reviews mentioning products, at 16% in the year following the divestiture, and a decrease in the fraction of reviews mentioning customer service, at -25% in the year following the divestiture.

5.4 Reviewer composition

Because the divestitures generated such a large surge in reviews, one might expect the composition of reviewers who posted reviews in Yelp to have also changed. We thus examined three measures of consumer type in the Yelp data available to us. First, in order to capture changes in users who do not normally review on Yelp, we examine the share of reviewers that post their first supermarket review on Yelp. Second, we use the share of reviewers that were never "Yelp Elite" to measure changes in reviews from frequent Yelp reviewers. Finally, the share of reviews flagged as "not recommended" allows us to examine whether more uncommon reviewers (such as first-time reviewers) that Yelp might flag as fake review post-divestiture.

Surprisingly, we find small and insignificant effects of the divestiture on all of these measures of user composition, with a rise of 7% for the share of new supermarket reviewers, 0% for the share of never Yelp Elite reviewers, and -12% for the share of reviews flagged as not recommended. The results are summarized in Table 4.

Table 4: User composition effects of divestitures, difference-in-differences estimates.

Time Period	New Supermarket Reviewer	Never Yelp Elite	Not Recommended
Quarters 0-3	7%	0%	-12%
	[-6%, 22%]	[-7%, 7%]	[-37%, 22%]
Quarters 4-7	-1%	-4%	-14%
	[-13%, 13%]	[-10%, 3%]	[-38%, 21%]
Pre-period mean	0.57	0.80	0.18

Note: This table shows the effect of divestiture on the dependent variable as a share of the count of reviews, computed as the difference between estimated regression coefficients. The Quarters 0-3 and 4-7 rows show the estimated dynamic treatment effects, both point estimates and 95% confidence intervals, transformed to percentage units. The pre-period mean row shows the ratio of the mean of the dependent variable to the mean count of reviews, in the treatment group in the quarter before divestiture.

6   Conclusion

In this article, we have examined how consumers responded to a major antitrust remedy – government divestitures – in the supermarket industry; we studied the divestiture of 249 stores in the Albertson's/Safeway and Ahold/Delhaize transactions. Using consumer reviews on Yelp, we found

that consumer reviews rose massively after the divestiture for divested stores. These reviews are mostly negative reviews. We then used a large language model to classify the topic of these reviews, and found that negative reviews about prices drive the rise in negative reviews after the divestiture. Our estimates on changes in consumer voice are similar for the stores divested to Haggen in the Albertson's/Safeway transaction, which went bankrupt soon after the divestiture, and other stores.

While our work has shown that consumer voice responds to divestitures, the underlying mechanisms behind the consumer dissatisfaction that we document are less clear. The divestitures that we study involve two major change – an ownership change and a banner/brand change. In addition, the merging parties have strategic incentives to compete against a weaker divestiture buyer. Future work could examine individual mechanisms separately, such as a banner change without an ownership change or an ownership and brand change without strategic motives.

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A   Additional Results

A.1   Breakdown of results by treatment

Table 5 and Table 6 show how our headline difference-in-differences results break down across four treatments: (1) overall, (2) stores divested to Haggen, (3) stores divested to Haggen that did *not* subsequently close, and (4) stores not divested to Haggen (including all Ahold/Delhaize divestitures).

A.2   Difference-in-differences estimates

Table 7 and Table 8 show the regression estimates in original (Poisson) units and in percentage change units $(\exp(\hat{\beta}) - 1)$, with the post-event effects aggregated to four-quarter groups.

In the first column of Table 7, we use the number of reviews n_{it} as the outcome variable. In the second, we use the number of negative reviews n_{it}^- as the outcome variable. In subsequent columns, we use the total score of a topic among negative reviews. In Table 8 we use the total number of reviews of a given 'type' (reviewer characteristic or Yelp classification).

Table 5: Summary of difference-in-differences estimates, aggregated to four-quarter time periods.

| | Effect | | |
Treatment	Quarters 0-3	Quarters 4-7	Pre-period mean
Dep. var.: Review count			
Overall	278% [145%, 483%]	70% [32%, 119%]	0.69
Haggen (all)	287% [138%, 530%]	69% [29%, 123%]	1.23
Haggen (non-closed)	292% [144%, 529%]	87% [43%, 144%]	1.25
non-Haggen	223% [66%, 526%]	74% [-13%, 248%]	0.39
Dep. var.: Negative review count, as share of review count			
Overall	44% [20%, 71%]	-27% [-40%, -11%]	0.41
Haggen (all)	36% [15%, 63%]	-40% [-50%, -27%]	0.48
Haggen (non-closed)	39% [16%, 66%]	-38% [-50%, -25%]	0.46
non-Haggen	115% [-7%, 399%]	104% [-11%, 370%]	0.30
Dep. var.: Prices topic (neg.), as share of negative review count			
Overall	103% [66%, 149%]	40% [10%, 78%]	0.37
Haggen (all)	110% [69%, 161%]	39% [6%, 82%]	0.39
Haggen (non-closed)	108% [62%, 166%]	36% [1%, 83%]	0.39
non-Haggen	57% [-4%, 158%]	35% [-19%, 125%]	0.32
Dep. var.: Products topic (neg.), as share of negative review count			
Overall	17% [7%, 28%]	11% [0%, 23%]	0.66
Haggen (all)	16% [6%, 26%]	9% [-1%, 21%]	0.68
Haggen (non-closed)	16% [6%, 27%]	9% [-2%, 21%]	0.68
non-Haggen	38% [-20%, 138%]	29% [-26%, 124%]	0.61
Dep. var.: Customer service topic (neg.), as share of negative review count			
Overall	-22% [-29%, -14%]	-9% [-18%, 0%]	0.74
Haggen (all)	-25% [-30%, -18%]	-10% [-19%, -1%]	0.74
Haggen (non-closed)	-26% [-32%, -19%]	-12% [-20%, -3%]	0.76
non-Haggen	13% [-41%, 117%]	10% [-43%, 111%]	0.71

Note: This table shows the results of the difference-in-differences regressions. The dependent variable is presented at the beginning of each section of the table; the table presents the estimated effect on either the dependent variable itself, or on the *share* of the dependent variable within a broader category, computed as the difference between estimated regression coefficients. The Treatment column gives the treatment group: all divested stores (Overall) or selected divested stores. The Quarters 0-3 and 4-7 columns show the estimated dynamic treatment effects, both point estimates and 95% confidence intervals, transformed to percentage units. The 'Pre-period mean' column shows either the mean of the dependent variable in the treatment group in the quarter before divestiture, or the ratio of means (mean dependent variable divided by mean of 'as share of' variable).

Table 6: User composition effects of divestitures, difference-in-differences estimates.

Dep. var.	Treatment	Effect		Pre mean
		Quarters 0-3	Quarters 4-7	
New to grocery	Overall	7% [-6%, 22%]	-1% [-13%, 13%]	0.57
	Haggen (all)	10% [-6%, 28%]	0% [-14%, 16%]	0.56
	Haggen (non-closed)	7% [-8%, 26%]	-2% [-16%, 14%]	0.57
	non-Haggen	-6% [-26%, 18%]	-5% [-24%, 19%]	0.58
Never Yelp Elite	Overall	0% [-7%, 7%]	-4% [-10%, 3%]	0.80
	Haggen (all)	0% [-7%, 8%]	-4% [-12%, 3%]	0.83
	Haggen (non-closed)	0% [-7%, 9%]	-4% [-12%, 4%]	0.83
	non-Haggen	-3% [-18%, 13%]	0% [-15%, 18%]	0.74
Not-recommended flag	Overall	-12% [-37%, 22%]	-14% [-38%, 21%]	0.18
	Haggen (all)	-19% [-43%, 15%]	-24% [-47%, 8%]	0.16
	Haggen (non-closed)	-12% [-39%, 26%]	-19% [-44%, 17%]	0.15
	non-Haggen	37% [-52%, 297%]	56% [-47%, 353%]	0.22

Note: This table shows the effect of divestiture on the dependent variable ('Dep. var.' column) as a share of the count of reviews, computed as the difference between estimated regression coefficients. The Treatment column gives the treatment group: all divested stores (Overall) or selected divested stores. The Quarters 0-3 and 4-7 columns show the estimated dynamic treatment effects, both point estimates and 95% confidence intervals, transformed to percentage units. The 'Pre mean' column shows the ratio of the mean of the dependent variable to the mean count of reviews, in the treatment group in the quarter before divestiture.

Table 7: Difference-in-differences estimates, aggregated to four-quarter time periods.

	Quarter	Review count	Review count (-)	Dep. var. Prices (-)	Products (-)	Customer service (-)
% effect	0-3	278% [145%, 483%]	443% [229%, 795%]	1002% [551%, 1765%]	536% [282%, 958%]	326% [154%, 613%]
	4-7	70% [32%, 119%]	25% [-4%, 62%]	75% [25%, 144%]	39% [7%, 80%]	13% [-13%, 46%]
	8-19	30% [4%, 63%]	-15% [-34%, 9%]	25% [-5%, 64%]	11% [-13%, 41%]	6% [-18%, 35%]
Coefficient	0-3	1.33 [0.90, 1.76]	1.69 [1.19, 2.19]	2.40 [1.87, 2.93]	1.85 [1.34, 2.36]	1.45 [0.93, 1.96]
	4-7	0.53 [0.28, 0.78]	0.22 [-0.04, 0.48]	0.56 [0.23, 0.89]	0.33 [0.06, 0.59]	0.12 [-0.14, 0.38]
	8-19	0.26 [0.04, 0.49]	-0.16 [-0.41, 0.08]	0.22 [-0.05, 0.49]	0.10 [-0.14, 0.35]	0.05 [-0.19, 0.30]
Mean dep. var.	-1	0.693	0.287	0.108	0.189	0.211

Note: Columns are labeled with dependent variables; '(-)' indicates negative (1- or 2-star) reviews. Rows labeled 'Coefficient' report the Poisson regression coefficient with the given dependent variable and its 95% confidence interval. Rows labeled '% effect' transform the Poisson estimates into percentage changes. The row labeled 'Mean dep. var.' reports the mean of the dependent variable in the treatment group in the quarter prior to divestiture.

Table 8: Difference-in-differences estimates, aggregated to four-quarter time periods.

	Quarter	Review count	New reviewer	Dep. var. Never Elite	Not recommended
% effect	0-3	278% [145%, 483%]	304% [157%, 535%]	278% [144%, 485%]	231% [77%, 518%]
	4-7	70% [32%, 119%]	69% [30%, 119%]	64% [27%, 111%]	47% [-11%, 144%]
	8-19	30% [4%, 63%]	28% [2%, 61%]	25% [1%, 54%]	9% [-35%, 82%]
Coefficient	0-3	1.33 [0.90, 1.76]	1.40 [0.94, 1.85]	1.33 [0.89, 1.77]	1.20 [0.57, 1.82]
	4-7	0.53 [0.28, 0.78]	0.52 [0.26, 0.78]	0.49 [0.24, 0.75]	0.39 [-0.12, 0.89]
	8-19	0.26 [0.04, 0.49]	0.25 [0.02, 0.48]	0.22 [0.01, 0.43]	0.08 [-0.43, 0.60]
Mean dep. var.	-1	0.693	0.394	0.552	0.124

Note: Columns are labeled with dependent variables; '(-)' indicates negative (1- or 2-star) reviews. Rows labeled 'Coefficient' report the Poisson regression coefficient with the given dependent variable and its 95% confidence interval. Rows labeled '% effect' transform the Poisson estimates into percentage changes. The row labeled 'Mean dep. var.' reports the mean of the dependent variable in the treatment group in the quarter prior to divestiture.