Distributor Consolidation and Prices: Evidence from the US Energy Drinks Market*

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Abstract

I study the welfare and price effects of a consolidation of regional distributors. I show that assuming that price negotiation between distributors and retailers are for all the regions simultaneously or independently leads to different predictions about equilibrium retail prices. These approaches are named *multi* and *single* market bargaining, respectively. Under *multi-market* bargaining, the expansion of a distributor into new regions, all else being equal, generates price effects in both the new and legacy regions. To empirically explore these effects, I study the consolidation of distributors in the U.S. energy drinks market. Leveraging the regional variation in distributor changes, I observe that national retailers decreased their prices not only in the regions affected by the consolidation, but also in other regions; indicating that negotiations in the retail sector are *multi-market*. I then build a structural model of *multi-market* bargaining and find that, after the consolidation, distributors reliance on retailers exceeded the retailers' reliance on distributors. This caused the decrease in distributors' bargaining position that lead to reduction in retail prices.

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1 Introduction

In markets such as the retail, pay-TV, or healthcare sectors, prices result from negotiations between upstream and downstream firms. Whereas firms' bargaining positions determine whether they secure a favorable deal, variations in the structure of the market, like upstream or downstream mergers, shift it. While some structural changes may be limited to a geographic market, this is not always the case. Industries like retail involve firms operating in multiple regions, meaning that changes in the number of firms affect simultaneously multiple regions. Although the welfare effects of mergers between upstream firms in the same market have been studied, there is comparatively less understanding of mergers between upstream firms present in multiple markets. In this paper, I investigate how a consolidation of regional distributors affect retail prices and welfare and, if so, by which mechanisms.

To evaluate the impact of changes in the upstream market structure on retail prices, I study the consolidation of regional distributors in the U.S. energy drinks market. In this industry, soft drink manufacturers delegate the production and distribution of their products to regional distributors, each with exclusive non-overlapping territories. In March 2015, Monster Energy Drinks (hereafter referred to as Monster) designated The Coca-Cola Company (hereafter referred to as TCCC) as its sole national distributor, terminating its contract with Anheuser-Busch (hereafter referred to as AB) and extending TCCC distribution territories. Regions previously covered by the distribution system of TCCC did not experience changes from the Monster -TCCC agreement. However, in the regions where TCCC expanded, retailers experienced a change in the distributor they were dealing with. Particularly, national retailers with stores in both regions affected and not affected by the consolidation, started negotiating with one distributor instead of two. In this paper, I aim to address whether the expansion of regions supplied shifts the bargaining positions of retailers and the newly consolidated distributor, TCCC, and the mechanism under which this happens.

I study a setting where both retailers and distributors are present in multiple regions. I show that as regional distributors expand into new regions, their bargaining position weakens in comparison to national retailers. This benefits retailers in securing better deals. Then, a consolidation of distributors acts as a downward pressure force on prices. This result holds true when negotiations span multiple markets simultaneously, and not when they are conducted independently for each market. I call these negotiation protocols *multi-market bargaining* (MMB) and *single-market bargaining* (SMB) respectively. The distinction lies in the outside option of a negotiation: SMB stops supply in one market if negotiations fail, while MMB withholds the supply across all markets. Whether MMB or SMB are used depends on the institutional arrangements of each industry and is not always observed by the researcher.

In this paper, I develop a new structural model of bargaining to evaluate the impact on prices and consumer surplus under alternative negotiation protocols. First, I employ a theoretical model of bargaining where after a consolidation of distributors, the MMB protocol predicts a retail price change in every region and not only those directly affected by the consolidation. Then I test this prediction using a reduced form approach. I take advantage of the regional change of distributors and how it affected retailers differently to identify the price effects. National retailers reduced their prices by 1.5% in the regions directly affected by the consolidation, and by 1.6% in the regions indirectly affected. The price change in both groups of regions suggests that the observed data is likely to come from MMB mechanism. However, the stores used as base group may have also changed their prices, as they were competing with firms in the indirectly affected regions. Results coming from the reduced form model might capture the changes done in equilibrium by the firms in the comparison group, disabling obtaining the effects from the consolidation alone.

To further understand these effects, I use a structural model of bargaining, where I can specify if the firms follow a multi or single market negotiation protocol. I find that in the regions affected by a change in distributors, retailers, on average, increased their bargaining position. This is mainly explained by the change in the gains from trade. Although after the consolidation the gains from trade increased for both retailers and TCCC distributor, the increase for the distributor is higher; leading to a weakening of distributor's bargaining position. Using these results, I construct counterfactual scenarios to assess the effects on consumer surplus and prices. I find that compared to a benchmark counterfactual where there is the structure of the market, national retailers decreased their prices by 1.3% in the directly affected regions, and by 2.8% in the indirectly affected regions. For the group of regional retailers, the consolidation of distributors led to decrease their prices in 3.8%. Finally, while under the assumption of multi-market bargaining the model predicted a price decrease, the single-market bargaining model yields a price increase prediction. The contrasting predictions highlight the importance of the assumption on bargaining protocols in vertically-structured markets.

Although the studied setting is not a merger, it resembles the effects of an upstream merger between firms in different geographic markets. This paper shows that the entire vertical structure of the market must be considered when a merger involves firms in different geographic markets and the MMB is the selected bargaining protocol; even if they do not compete across markets. The importance of the previous findings lay on the fact that a consolidation of distributors might improve the bargaining position of the retailers. Even if the retail sector is highly concentrated, a price decrease might still arise from a consolidation of distributors.

The previous results can be useful for competition policy as well. Mergers or acquisitions between retailers that cover many regions change the bargaining position of the new entity against its distributors. While this could have a negative effect on prices by restricting competition, a stronger bargaining position could lead to a lower wholesale price and hence lower retail prices when distribution markets are highly concentrated. So, antitrust authorities must consider the full vertical structure when analyzing mergers between retailers.

This paper contributes to three strands of the literature. First, it complements the previous literature on upstream mergers in vertical relationships, by accounting for the importance of the geographical coverage of the upstream firms. In fact, some papers in the health literature (Gowrisankaran et al., 2015; Ho and Lee, 2017, 2019; Dafny et al., 2019) assume that after a merger, the negotiation for the price between hospitals and insurers is local, disregarding the possibility of multi-market bargaining. In this paper, I show that multi-market contracting is a possibility that must be considered both by academics and policymakers, since it can generate different price predictions. Naturally, whether multi-market contracting or single-market contracting happens will depend on each specific industry.

Similarly, Dafny et al. (2019) and Lewis and Pflum (2015) show that for mergers between hospital that are in the same state but not too close, price effects from the merger still can emerge. They show that this happens because consumers purchase in different markets. In this paper I complement their results by showing that a change in the bargaining positions after a consolidation of upstream firms can lead to a new equilibrium, even when consumer do not purchase in multiple markets. In that same line, other papers show that changes in the bargaining power parameter can be used as a source of price variations (Grennan, 2013; Lewis and Pflum, 2015; Gowrisankaran et al., 2015; Lewis and Pflum, 2017). Since in this paper I work in a setting with many markets, I study the changes in bargaining position and not only the variation in the bargaining power parameter of the firms.

Second, I contribute to the empirical literature on bargaining in markets with vertical structures (Villas-Boas, 2007; Draganska et al., 2010; Bonnet and Dubois, 2010, 2015). I develop a novel yet tractable way of modeling negotiation for market specific wholesale prices. Since I do not have access to wholesale data, I extend the model developed by Draganska et al. (2010) to include region specific wholesale prices and firms' margins and measure of relative bargaining power. In the same line, this paper contributes to the literature on merger simulation (Sheu and Taragin, 2021; Panhans and Taragin, 2022) by showing how bargaining for all the regions at the same time, can lead price effects; such that the inclusion of the entire vertical structure is necessary for estimation.

Lastly, I also contribute to the literature on retail pricing. While previous papers (Adams and Williams, 2019; DellaVigna and Gentzkow, 2019; Butters et al., 2022) focus on retail price variation to local demand or supply shocks, I study the price effects of a local shock to the upstream structure of the market. Other recent papers (Ganapati, 2018; Döpper et al., 2022) highlight that in the retail sector, the primary source of increase in markups comes from cost savings. I contribute to this literature by studying how changes in bargaining positions affect the retail prices. I show that for the energy drinks industry, part of that increase in retailers' markups comes from a strengthening of their bargaining power after a consolidation of distributors.

In the next section I describe the industry, the context in which this paper is placed, and the data sources used for the estimation. Section 3 presents the theoretical model that explains the observed reduced form evidence. Section 3.2 develops the structural model employed to get the results in section 4. In section 5, I compute the counterfactuals. Finally, in the last section, based on the previous results, I conclude.

2 The Industry

2.1 The Market

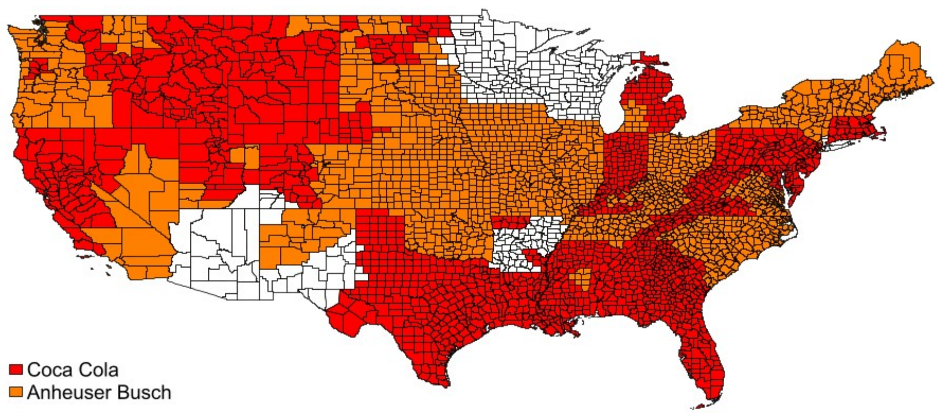
In the soft drinks industry, some brands only produce concentrate, the main ingredient of the beverages, and sell it at a linear tariff to local distributors. These last ones are in charge of the finalizing production by adding water, carbon dioxide, and additional sweeteners and flavors. After this process, the distributors pour the beverage into cans and take them to the retailers. In the US, distributors possess exclusive territories in which they are the only producers and distributors. Distribution regions are negotiated with the brand owner such that there are not two distributors for the same market. To get supplies of a beverage for a specific location, the retailer must negotiate with the authorized local distributor.[1][2]

[1] Additionally, distributors engage in some promotional activities (sales, shelf space, among others)

[2] According to their public contracts, Monster representatives can be present at the moment of the negotiation between the distributors and the retailers or even suggest prices

Not all firms are vertically integrated with their distributors. In the energy drinks market, the three leading brands Monster, Rockstar, and Red Bull captured around 70% of market share in 2014. From them, only this last one is vertically integrated with its distributors. Rockstar is distributed by PepsiCo, and Monster had distribution agreements with The Coca-Cola Company (TCCC) and Anheuser-Busch (AB). A common practice in this industry is that a distributor cannot produce or distribute a rival brand, i.e., TCCC cannot distribute products from Red Bull or Rockstar. Figure 1 shows the main distribution zones for TCCC (red) and AB (orange) distributors.

Figure 1: Distribution zones before consolidation



Note: Based on annual presentations to investors of Monster, US Securities and Exchange Commission. The map shows the territories in which TCCC and AB had the right to distribute the products of Monster. The areas in white, not colored, were under the distribution of third parties independent distributors and are not considered in this paper.

In March 2015, TCCC and Monster signed a partnership agreement by which TCCC became Monster's only distributor in the US, TCCC bought a 16.7% equity stake in Monster.[3][4] By having TCCC as its only supplier, there were gains from better coordination on sales, shelf space, and banners, among others.[5] The left panel in Figure 2 shows the original arrangement of distributors. The one on the right shows the situation after the agreement between Monster and TCCC.

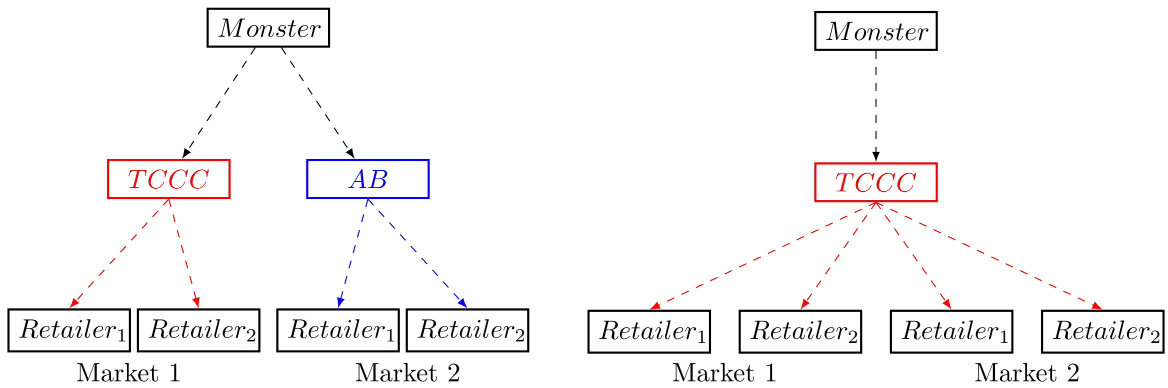
Since energy drinks contain legal stimulants such as taurine, caffeine, group B vitamins, guarana, and L-carnitine, they stand apart from conventional soft drinks. In this paper, I consider that soft drinks are not a close substitute for energy drinks. On the demand side, energy drinks are typically

[3]The agreement also involved other provisions. Mainly, Monster and TCCC also they switched their portfolios of each other's non-core products: Monster gave TCCC its non-energy drinks brands and TCCC gave Monster its energy drinks portfolio. Additionally, Monster must pay to TCCC to use its distributors' network. The exact amount of this linear tariff is confidential.

[4]Strategically, with this agreement TCCC secured its presence in a growing market. In 2015, the US energy drinks sector's sales were growing at 5.5%, while those of the soft drinks were growing at 1.9%

[5]According to the presentations to investors, Monster was getting access to more markets internationally, and by giving its non-energy portfolio to TCCC, it would benefit from focusing only on energy drinks.

Figure 2: Market Description



(a) Before Consolidation

(b) After Consolidation

consumed because of its effects on energy enhancement, reduction of fatigue, and mental alertness, characteristics that standard soft drinks do not have. On the supply side, firms' advertisement strategies and internal reports reflect that they consider only other energy drinks as competitors. In supermarkets, they are not typically on the same shelves as the soft drinks and are usually displayed in a separate section. Due to their composition, they are primarily sold in smaller units (8 to 16oz) compared to the popular soft drinks 20, 42.2, and 67.6oz of the traditional sodas. In this sense, since Monster and TCCC's products are not close substitutes, there are no reasons for TCCC to set prices for Monster products strategically.

Throughout this paper, I assume two crucial facts about this industry. The first is that distributors and retailers bargain for wholesale prices for different regions of the US. Given the size of the US and high transportation costs, it is reasonable to assume a regional wholesale price instead of a national one. Second, I assume TCCC negotiates on behalf of its franchisees. Since I do not observe any significant difference in prices among regions between TCCC and its franchisees, I consider this a valid assumption.[6]

Both Monster's distributors, TCCC and AB, have its own portfolio of products. TCCC distributes Coca-Cola products, and the Fanta and Sprite brands, among others. On the other hand, AB is the owner of many of the most important beer brands in the US like Budweiser and Busch Beer. Negotiating bundles of products emerges as a realistic possibility in the retail sector. However, it is more likely that being part of the TCCC portfolio affected Monster, but not the other way around. This trait should be captured by the bargaining power of the distributor. I will test

[6] Additionally, TCCC was the biggest Coca-Cola distributor during the analyzed period, 2012-2017.

if there were price effects on TCCC products.[7]

Finally, it is important to mention other structural changes that occurred in the soft drink market in the US close to the investigated period, 2012-2017. In 2009, TCCC vertically integrated with many of its distributors, becoming the major distributor in the US soft drinks market. However, in 2018 TCCC gave back the property of the production facilities to local owners, who became the only TCCC distributors in the US, each with an exclusive territory. Further away from the analyzed period, in 2020, PepsiCo bought Rockstar for $3.85 billion.

2.2 Data Sources and data preparation

I use two primary data sources in this project; one related to sales and prices and another one associated with distribution zones and plant locations. Product characteristics come from the Retail Scanner and Consumer Panel Data of Kilts NielsenIQ for 2012 - 2017. This dataset contains detailed information regarding prices, quantities sold, units, size, among other product characteristics for more than 35 thousand stores in the US each week. I use the period 2012 - 2017 because the change in bottler by Monster was in 2015, and in 2010 and 2018, there were other significant changes in this market, as detailed in the paragraph above.

In the NielsenIQ dataset, a store has a unique code associated with its parent company. Following other papers in the literature (DellaVigna and Gentzkow, 2019), I do not include stores that changed their parent company nor stores that were not in the sample for at least five of the six years. An equal time criterion is applied to retail chains. I exclude liquor stores from the sample since they do not appear during the whole period.

Each product is associated with a universal product code (UPC). Since a new UPC is created for any product variation, I aggregate products at the brand level.[8] A brand is defined as a specific product line of a firm, like Monster Energy Ultra Blue Sugar-Free. Products are generated by combining the brand with one of the possible sizes 8oz, 12oz, and 16oz, like Monster Energy Ultra Blue Sugar-Free 16oz. The price of a product is defined as the revenues over all the units sold (Nevo, 2001; Miller and Weinberg, 2017). Following Nevo (2001), the time scope used is at the month level to avoid the effects of sales and stockpiling. Since meeting to negotiate weekly can be costly to firms, monthly aggregation becomes a reasonable assumption.

[7]During a dispute between TCCC and the wholesaler Costco the Associated Press reported that the beverage brands no longer being sold at Costco include *"Coke Classic, Cherry Coke, Black Cherry Vanilla Coke, Diet Coke, Coke Zero, Sprite and Squirt, Dasani Water and Vitamin Water along with several energy drinks."*

[8]The change of UPC includes not only changes in the size or number of units, but also minor changes like the variations in the packaging.

I restrict the sample to 29 DMA (Designated Market Area) that have more than 500 household participants yearly in the consumer panel dataset. I combine DMAs with the distribution regions of the bottlers to generate 40 unique regions. For each of these markets, I generate consumer-specific demographic draws from the Consumer Panel Data by sampling with replacement 300 consumers monthly using NielsenIQ's projection weights. From this, I get the average income of the households by retail chain, the age of the household's head, the number of kids, and some additional statistics on the income distribution.

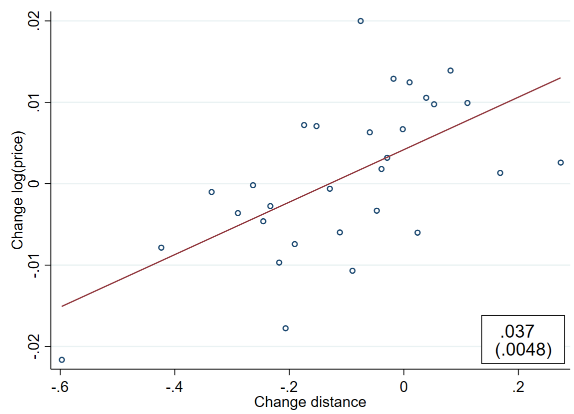
Table 1: Distributors market coverage

Distributor	Stores	Chains	Counties	States
TCCC	7,362	51	313	20
AB	5,851	38	233	16

The second dataset I employ is related to distribution areas. I get the information about the distribution zones from the annual presentations to investors that Monster held during the analyzed period, 2012-2017. These presentations must be submitted to the US Securities and Exchange Commission (henceforth SEC) and are public information. I complement this data with additional documentation submitted to the SEC when TCCC and Monster signed their new distribution agreement, where changes to the distribution areas were introduced.

The change in plan location when the production passed from AB to TCCC changed the driving distances from the plant to the stores. I assume energy drinks are shipped by truck to each store from the nearest brewery. Likewise, I construct a dataset with the plant locations for the bottlers in this industry. I only consider the production facilities that were operating from the year 2012 to 2017. Figure 3 shows the distribution of changes in prices and driving distances (in 100 of miles) for Monster 16oz products. For AB, I consider the facilities reported on its webpage. I obtain the latitude and longitude of the plants for both sets of production facilities using Google Maps. Then, using the API from TomTom, I obtain the driving distance between the center of the county where each store is located and the exact location of the production facility. I assume the only time with a change in the production facility is at the time of the agreement between TCCC and Monster. For the other energy drinks in the market, I assume that there are no new production facilities, such that changes in driving distance are equal to zero.

Figure 3: Relation between distances and price variation - Monster (16oz)



3 The Model

In this section I present a model where wholesale prices are negotiated between distributors and retailers. Distributors have non-overlapping distribution territories and retailers supply multiple markets. I assume the negotiation process follows a Nash bargaining protocol, where firms negotiate for market specific prices. When an upstream distributor supplies multiple market; the new negotiation includes the wholesale price for all the new markets. The question in this section is whether changes in the upstream structure of the market can change equilibrium and under which mechanism.

I assume that firms negotiate either for all the market at the same time or for each one independently.[9] I term these alternative negotiation protocols multi and single market bargaining, respectively. Whether the inclusion of more regions in the negotiation process affects firms' bargaining power, depends on the bargaining protocol followed by them. The model predicts that, everything else constant, only under multi-market bargaining a consolidation of upstream distributors affects prices in all the regions where the retailer has stores. Under the alternative single-market bargaining, a national retailer only changes its prices in the areas directly affected by the consolidation.[10]

First I introduce the theoretical model to be followed in the rest of the paper. Second, using this model I state some hypothesis to be tested in the data. Finally, at the end of this section, I

[9] Although contracts are not observed, anecdotal evidence suggests that under a negotiation breakdown, all the stores from a retail chain stop getting supplies from the distributor.

[10] When demand considers goods or services in different locations as substitutes, bargaining over wholesale prices for a higher number of markets can change the outside options of the firms (Dafny et al., 2019; Vistnes and Sarafidis, 2013). In the retail sector, it is not a suitable assumption to think that consumers consider stores in different regions as close substitutes.

generalize the theoretical model to build an empirical structural model of bargaining.

3.1 A model of Multi-Market Bargaining

Consider a setting with two markets $m = \{A, B\}$ and one retailer r that has stores in both markets. There is only one product that is distributed by a different distributor in each market. The retailer, which has no retail costs, negotiates the supply of the product for each store with each local distributor. Upon reaching an agreement with the distributor in market m, retailer's profits are $\pi^r_m = (p_m - w_m)D_m(p_m)$; where p_m, w_m and $D_m(p_m)$ are the retail price, wholesale price and demand for the good in market m, respectively. Distributors' profits when arriving to an agreement with the retailer are $\pi^d_m = (w_m - \mu_m)D_m$, where μ_m is the marginal cost of production.

Following Horn and Wolinsky (1988), I assume that each wholesale price negotiation between the two distributor and the retailer solves a bilateral Nash-in-Nash bargaining, and all the negotiations are carried out simultaneously and independently. The bargaining power weight of retailer r when negotiating with distributor d is, β_{rd}; and its complement, $1 - \beta_{rd}$, represents the bargaining power weight of distributor d. Retail price setting takes place at the same time as the wholesale negotiation. In case of a negotiation breakdown for market m, retailer and distributor gain no profits in that market.

First consider, consider the negotiation process of the retailer with each individual distributor.

Single Market Bargaining (SMB): When the retailer negotiates for the wholesale price of each market m separately, w_m maximizes the weighted profits:

$$w_m = \arg\max_{w} \left[(p_m - w_m)D_m\right]^{\beta_{rd}}\left[(w_m - \mu_m)D_m\right]^{1-\beta_{rd}}, \tag{1}$$

which yields the equilibrium wholesale price $w^*_m = (1 - \beta_{rd})p^*_m + \beta_{rd}\mu_m$.

Now consider a consolidation of the two distributors into one monopolist distributor that covers both regions. Under this new market structure, the retailer needs to negotiate with the consolidated distributor for the supply of the product for both markets. If the retailer and the distributor decide to negotiate for each market independently, *single-market bargaining*, wholesale prices still solves equation 1. Everything else constant, the equilibrium prices are the same before and after the consolidation. Instead, if they decide to negotiate for all the markets at the same time, *multi-market bargaining*, wholesale prices solves equation 2.

Multi Market Bargaining (MMB): Firms negotiate for both w_A and w_B at the same time,

$$\{w_A^{**}, w_B^{**}\} = \underset{w_A, w_B}{\arg\max} \left[\sum_{m \in \{A,B\}} (p_m - w_m) D_m\right]^{\beta_{rd}} \left[\sum_{m \in \{A,B\}} (w_m - \mu_m) D_m\right]^{1-\beta_{rd}} \tag{2}$$

The solution to equation 2 for market A, alongside retailer's first order conditions, can be expressed as:

$$\begin{aligned} w_A^{**} &= w_A^*(p_A^{**}; \beta_{rd}, \mu_A) + \left(\frac{p_B^{**}}{\varepsilon_B^{**}} - (p_B^{**} - \mu_B)\beta_{rd}\right) \frac{D_B^{**}}{D_A^{**}} \\ &= w_A^*(p_A^{**}; \beta_{rd}, \mu_A) + f_w(p_B^{**}, D_A^{**}, D_B^{**}; \beta_{rd}, \mu_B), \end{aligned} \tag{3}$$

where w_A^{**} is the MMB equilibrium wholesale price and $w_A^*(p_A^{**}; \beta_{rd}, \mu_A)$ denotes the solution under SMB at the MMB equilibrium conditions. The term $f_w(p_B^{**}, D_A^{**}, D_B^{**}; \beta_{rd}, \mu_B)$ in the second line of equation 3 is an increasing function in p_A, D_B and μ_A; and decreasing in p_B^{**}, D_A and β_{rd}. A similar expression can be found for w_B. The retail price elasticity of demand $\varepsilon_B(p_B) = -(\partial D_B/\partial p_B)(p_B/D_B)$ evaluated at equilibrium values is $\varepsilon_B^{**} = \varepsilon_B(p_B^{**})$; and the equilibrium level of demand is $D_A^{**} = D_A(p_A^{**})$. A similar expression can be found for retail prices[11]:

$$p_A^{**} = p_A^*(w_A^{**}; \beta_{rd}, \mu_A) + f_p(p_A^{**}, p_B^{**}, D_A^{**}, D_B^{**}; \beta_{rd}, \mu_B), \tag{4}$$

where p_A^{**} is the MMB equilibrium retail price and $p_A^*(w_A^{**}; \beta_{rd}, \mu_A)$ denotes the price in market A under SMB at the MMB equilibrium conditions. The function $f_p(p_A^{**}, p_B^{**}, D_A^{**}, D_B^{**}; \beta_{rd}, \mu_B)$ is the net change in bargaining positions that arises only under MMB, that is shaped by other region's market conditions. The arguments of $f_p(\cdot)$ affect it in the same direction as they influence $f_w(\cdot)$. Both $f_w(\cdot)$ and $f_p(\cdot)$ show up only under MMB and represent the net effect of the gains from trade for the retailer and distributor from including region B in the negotiations.

Everything else constant, if MMB is assumed to be the true negotiation process; after a consolidation between the two distributors, it is possible to observe,

$$p_A^{POST} - p_A^{PRE} = f_p(p_A^{**}, p_B^{**}, D_A^{**}, D_B^{**}; \beta_{rd}, \mu_B), \tag{5}$$

where p_A^{POST} and p_A^{PRE} describe the prices after and before the consolidation, respectively.

The model predicts that after a consolidation of distributors, if a retailer has stores in both

[11] In Appendix A.4 I solve for the $\{w_A, w_B\}$ that solve Equation 3. After rearranging and using retailer's first order conditions I get the expressions for w_A^{**} and p_A^{**}.

markets, price effects are expected in both regions, everything else constant, only under MMB. Henceforth, the necessary conditions to observe price changes after a consolidation of distributors are (i) to have a retailer with stores in multiple markets, and (ii) the negotiation protocol followed is MMB. Instead, under SSM, only the market with the change in distributors observes a price variation if β_{rd} or μ_m change and the price in the other market remains unchanged. [12]

3.2 Structural Model

A. The Demand Model

I use a random coefficient logit model as in Berry et al. (1995) to represent the demand side. Each product is defined as the combination of a retail chain and a brand. Consumers buy one of the observed products in market m at time t or selects the outside option (j=0), $j = 1, \ldots, J_{mt}$. I assume can switch stores within the same region. Products are aggregated up to the brand level, such that each retailer sells three products; Monster, Red Bull and Rockstar in market m at time t. The conditional indirect utility that consumer i receives from purchasing good j in region m at month t is:

$$u_{ijmt} = \delta_{b(j)} + \delta_{r(j)} + \alpha_i p_{jmt} + \xi_{jmt} + \varepsilon_{ijmt}, \tag{6}$$

where p_{jmt} is the retail price, ε_{ijt} is distributed according to a Type I extreme value distribution, $\delta_{b(j)}$ and $\delta_{r(j)}$ are product j's brand and retailer fixed effects, and ξ_{jmt} is the unobserved demand shock. The indirect utility of the outside option is ε_{i0rt}. I assume that the consumer part of the utility is $[\Sigma\nu_{imt} + \Pi\mathcal{D}_{imt}] * [1, p_{jmt}]'$, where $\mathcal{D}$ contains the age of household's head and the log of income. The matrix Π measures how agent tastes vary with these demographic characteristics. Regarding the unobserved heterogeneity, I let ν_{imt} be independent draws from a standard normal distribution. These draws are scaled by the lower triangular matrix Σ, which denotes the Cholesky root of the covariance matrix.

Regarding the demographics, as income increases, people are expected to consume fewer energy drinks. At the same time, the age of the household's head is also informative about energy drinks consumption. The high content of caffeine, sugar, and taurine in energy drinks leads to a decrease in the consumption of energy drinks as age increases. As explained in detail in Section 2.2, de-

[12] It is realistic to think that different distributors have different bargaining power parameters β and costs. These changes not only affect directly the price through the direct negotiation process, $w^*_A(p_A; \beta, \mu_A)$, but also through the indirect effect of the change in bargaining positions terms $f_p(p^{**}_A, p^{**}_B, D_A, D_B; \beta_{rd}, \mu_B)$ and $f_w(p^{**}_B, D_A, D_B; \beta_{rd}, \mu_B)$. To gain additional insight, a simulation can be found in Appendix A.1.

mographics are obtained from the NielsenIQ Panel data and are drawn at the region month level using the expansion factors provided by NielsenIQ.

The instruments used shift supply but not demand. I do not use the standard BLP instruments based on product characteristics since there is not much variation in the observed characteristics of the products. Instead, I use three sets of instruments. The first set of instruments I employ is related to idiosyncratic events (Miller and Weinberg, 2017). I consider the number of competitors a particular retail chain faces in the markets affected by the consolidation. The second set of instruments I use are cost shifters (Nevo, 2001). I use the price of fuel interacted with the average reduction in driving distances for each retail chain between the nearest production facility and the center of the region. The advantage of using this instrument is that there is variation after the consolidation. Prices of sugar, coffee, and aluminum are also used, since these are the main components in the production of energy drinks. The drawback is that input prices may vary in time and not by region.

The third group of instruments is composed by the interactions of the idiosyncratic events instruments with moments of the distribution of demographic variables. As in Backus et al. (2021), I use the 10%, 50%, and 90% quantiles of the income distribution and age of the head of the household.

I estimate the parameters of the demand model as in Berry et al. (1995).

B. Supply Side Model : Multi and Single Market Bargaining

As previously stated, each of the J products in the market is a unique combination between brands and retailers. As in section 3.1, the negotiation process follows a Nash-bargaining protocol. I keep the assumption of simultaneous determination of wholesale and retail prices. Sheu and Taragin (2021) highlight that simultaneous downstream pricing can be a suitable assumption when the upstream firm does not have a first-mover advantage in pricing. Since there is no evidence about distributors having a first mover advantage, I maintain this assumption.

There are D distributors and R retailers who negotiate for the wholesale price of good j in market m at time t, w_{jmt}. Distributors and retailers send representatives to bargain simultaneously and separately in a Nash-in-Nash fashion. Parts in the negotiation believe that under a disagreement in the negotiation, all the other negotiated wholesale prices remain unchanged. Consumers can always substitute one product for another in the same store or switch to another retailer in the same market.

The profit in market m at time t of retailer $r \in R$ is written as follows:

$$\pi_{rmt}(\mathcal{J}_{mt}, \boldsymbol{p_{mt}}, \boldsymbol{w_{mt}}) = \sum_{j \in \mathcal{J}_{rmt}} (p_{jmt} - c_{jmt} - w_{jmt}) L_{mt} s_{jmt}(\boldsymbol{p_{mt}}; \boldsymbol{\theta}^l), \tag{7}$$

where L_{mt} is the potential size of market m at time t and p_{jmt} and c_{jmt} are the retail price and retailer's cost for good j, respectively. The set of products sold by distributor d and retailer r in market m at time t is $\mathcal{J}_{dmt}$ and $\mathcal{J}_{rmt}$. On the other hand, the profit of distributor $d \in D$ in market m at time t:[13]

$$\pi_{dmt}(\mathcal{J}_{mt}, \boldsymbol{p_{mt}}, \boldsymbol{w_{mt}}) = \sum_{j \in \mathcal{J}_{dmt}} (w_{jmt} - \mu_{jmt}) L_{mt} s_{jmt}(\boldsymbol{p_{mt}}; \boldsymbol{\theta}^l), \tag{8}$$

and μ_{jmt} and production cost for good j. The set of products sold by distributor d in market m at time t are, respectively, $\mathcal{J}_{dmt}$ and $\mathcal{J}_{rmt}$. The bargaining power parameter, β_{rd}, denotes the bargaining weight of retailer r relative to distributor d when negotiating and is between 0 and 1. The closer this parameter gets to one of its limits it means one of the parts is making a take it or leave offer. Setting a value of 0.5 defines a symmetric Nash Bargaining. I assume this parameter remains constant in time.

As previously discussed, it is possible to assume that distributors and retailers bargain for good j for several regions at the same time or, on the contrary, region by region independently. Under the former case, multi-market bargaining, if negotiations fail the retailer stops getting supplies j in all the locations where the distributor distributes the goods.[14] If single market bargaining is assumed, under a negotiation breakdown the retailer stops getting the supplies in one location only, and they continue negotiating for the wholesale price in other regions.[15] Next, I illustrate both negotiation protocols.[16]

Single Market Bargaining (SMB): Under SMB, failing to reach an agreement in one market does not affect the negotiation in other markets. For the wholesale price of product j, firms solve following Nash Product for each market m independently,

[13]See Appendix A at the end of the paper for the complete set of steps taken to obtain the potential market size.

[14]Under this setting, firms send representatives to negotiate one contract for the wholesale price for many regions.

[15]Under this setting, firms involved in many contracts treat them separately by simultaneously sending different representatives to each negotiation. Once the bargaining process starts, the representatives do not communicate with each other, even if they belong to the same firm. While this assumption can be restrictive, it allows tractability in cases with limited data.

[16]The intermediate case about bargaining for a subset of regions is not studied in this paper. That is similar to disentangling the decision of bargaining by TCCC from the one of its franchisees. As previously discussed, there are no significant price differences between TCCC and its franchisees' regions.

$$w_{jmt} = \arg\max_{w} [\pi_{rt}(w_{jmt}, \boldsymbol{w}_{-jmt}) - \pi_{rt}(\infty; \boldsymbol{w}_{-jmt})]^{\beta_{rb}} \times [\pi_{bt}(w_{jmt}, \boldsymbol{w}_{-jmt}) - \pi_{bt}(\infty; \boldsymbol{w}_{-jmt})]^{1-\beta_{rb}}, \tag{9}$$

where $\boldsymbol{w}_{-jmt}$ represents the vector of wholesale prices of all the other products but j in market m at time t. The solution to this Nash Product, coming from single-market negotiations can be expressed as:

$$w^*_{jmt} s_{jmt} = \underbrace{\mu_{jmt} s_{jmt}}_{\text{Production Costs}} + \underbrace{\sum_{g \in \mathcal{J}_{bmt} \setminus j} \Gamma_{gmt} \Delta_j s_{gmt}}_{\text{Disagreement payoff of distributor}} + (1 - \beta_{rb}) \left[GFT^R_t(m) + GFT^B_t(m) \right], \tag{10}$$

where $GFT^R(m)$ and $GFT^B(m)$ are the gains from trade for reaching an agreement in market m for the retailer and the distributor, respectively; and $\Gamma_{jmt} = w_{jmt} - \mu_{jmt}$ is the distributor's margin in market m. In equation 10, the wholesale price has by three components. The first is the total production cost for distributor d of the goods sold to retailer r, so changes in this factor have a direct impact on the wholesale price. The second component is the profit of distributor d. This is the 'recapture' of consumers that go to other retailers when they do not find product j at their usual retailer. The third term represents the total surplus generated by both parties, from where the distributor takes $(1 - \beta_{rd})$ of this quantity. The lower the β_{rd}, the higher the surplus that the distributor captures. Finally, notice that all these expressions only depend on the market conditions of market m.

Multi-market Bargaining (MMB): Retailer r and distributor d bargain over j for the set of markets $\mathcal{M}_{rdt}$ such that $\boldsymbol{w}_{rdt} = \{w_{jmt}\}_{m \in \mathcal{M}_{rdt}}$ is a vector containing the wholesale prices for product j for all the markets for which r and d negotiate. Consider $\mathcal{J}^R_{mt}$ and $\mathcal{J}^D_{mt}$ as the sets of retailers and distributors, respectively, operating in market m at time t, such that $\mathcal{J}_{mt} = \bigcup_{r \in \mathcal{J}^R_{mt}, d \in \mathcal{J}^D_{mt}} \mathcal{J}_{rdmt}$ is the set of all the products sold in market m at time t. Denote by $\boldsymbol{W}_{-rdt} = \{w_{gmt}\}_{g \in \mathcal{J}_{mt} \setminus \{j\} \text{ and } m \in \mathcal{M}_{rdt}}$ the set of all products except j in markets for which r and d negotiate. Finally, if negotiations for good j breakdown, this gets out of the market and the demand for any other goods k in market m at time t changes by $\Delta_j s_{kmt} = s_{kmt}(\mathcal{J}_{mt}) - s_{kmt}(\mathcal{J}_{mt} \setminus j) > 0$. This happens in every market where j is being sold.[17]

When bargaining, the negotiated wholesale price maximizes the following Nash product,

$$\boldsymbol{w}_{rdt} = \arg\max_{\boldsymbol{w}} [\Pi_{rt}(\boldsymbol{w}_{rdt}, \boldsymbol{W}_{-rdt}) - \Pi_{rt}(\infty; \boldsymbol{W}_{-rdt})]^{\beta_{rd}} \times [\Pi_{dt}(\boldsymbol{w}_{rd}, \boldsymbol{W}_{-rdt}) - \Pi_{dt}(\infty; \boldsymbol{W}_{-rd})]^{1-\beta_{rd}}, \tag{11}$$

where $\Pi_{rt}(\boldsymbol{w}_{rdt}, \boldsymbol{W}_{-rdt}) = \sum_m \pi_{rmt}(\boldsymbol{p}_{mt}, \boldsymbol{w}_{mt})$ and $\Pi_{dt}(\boldsymbol{w}_{rdt}, \boldsymbol{W}_{-rdt}) = \sum_m \pi_{bmt}(\boldsymbol{p}_{mt}, \boldsymbol{w}_{mt})$. The profits under a disagreement are $\Pi_{rt}(\infty; \boldsymbol{W}_{-rdt}) = \sum_{\substack{k \in \mathcal{J}_{rmt} \setminus j, \\ m \in \mathcal{M}_{rdt}}} (p_{jmt} - c_{jmt} - w_{jmt}) L_{mt} \Delta_j s_{kmt}$ and $\Pi_{dt}(\infty; \boldsymbol{W}_{-rdt}) = \sum_{\substack{g \in \mathcal{J}_{dmt} \setminus j, \\ m \in \mathcal{M}_{rdt}}} (w_{jmt} - \mu_{jm}) L_{mt} \Delta_j s_{gmt}$, for the retailer and the distributor, respectively. Each term in brackets represents the gains from trade (GFT) of reaching an agreement; the first one being retailer's, whereas the second one to those of the distributor. The higher the GFT for a firm, the higher the reliance on the other firm and the lower his bargaining power. Additionally, since negotiations are carried for all the markets at the same time, the GFT is a function of the number of regions included in the negotiation. Since negotiations are simultaneous and independent, the vector of wholesale prices of all other products $\boldsymbol{W}_{-rdt}$ does not change in the event of a disagreement between r and d. The solution to equation 11 for market m can be expressed as

$$w^{**}_{jmt} = w^{*}_{jmt} + g(s_{jmt}, \mathbf{s}_{-mt}, L_{mt}, \mathbf{L}_{-mt}, \mathbf{p}_{-mt}; \mathbf{c}_{-mt}, \mu_{-mt}, \beta_{rd}), \tag{12}$$

where $\boldsymbol{L}_{-mt} = \{L_{nt}\}_{n \in \mathcal{M}_{rdt} \setminus m}$ represents the set of potential market sizes for all markets except m where retailer r and distributor d negotiate. Similarly, $\boldsymbol{s}_{-mt} = \{s_{nt}\}_{n \in \mathcal{M}_{rdt} \setminus m}$, $\boldsymbol{p}_{-mt} = \{p_{nt}\}_{n \in \mathcal{M}_{rdt} \setminus m}$, $\boldsymbol{c}_{-mt} = \{c_{nt}\}_{n \in \mathcal{M}_{rdt} \setminus m}$, and $\boldsymbol{\mu}_{-mt} = \{\mu_{nt}\}_{n \in \mathcal{M}_{rdt} \setminus m}$ are the sets of market shares, retail prices, wholesale prices, retail costs, and distributor's cost for all goods in the markets where retailer r and distributor d negotiate, except m.[18]

The main difference between Equations 10 and 12 is that in the later wholesale prices not only depend on local market conditions, captured by w^{*}_{jmt}; but also depends on $g(\cdot)$, which captures how the inclusion of other markets in the negotiation changes the bargaining positions of the firms. Precisely, the function $g(\cdot)$ in equation 12 resembles function $f_w()$ in equation 3 in section 3.1,

[17] Where this last term is expressed as:

$$\Delta_j s_{kmt} = \int \frac{\exp(\delta_{kmt} + \mu_{ikmt})}{1 + \sum_{l \in \mathcal{J}_{mt}} \exp(\delta_{lmt} + \mu_{ilmt})} - \frac{\exp(\delta_{kmt} + \mu_{ikmt})}{1 + \sum_{l \in \mathcal{J}_{mt} \setminus \{j\}} \exp(\delta_{lmt} + \mu_{ilmt})} dF(\mu)$$

[18] The complete expression of equation 12 can be found in Appendix A.6.

which was a special case for two markets and only one retailer.

From equation 7, the first order conditions for all the retailers, in matrix form, can be expressed as,

$$\boldsymbol{\gamma}_{mt} = \boldsymbol{p}_{mt} - \boldsymbol{w}_{mt} - \boldsymbol{c}_{mt} = -\sum_{r=1}^{R} (\boldsymbol{\Omega}_{rmt} \boldsymbol{S}_{p_{mt}} \boldsymbol{\Omega}_{rmt})^{-1} \boldsymbol{\Omega}_{rmt} \boldsymbol{s}_{mt},$$

where $\boldsymbol{\Omega}_{rmt}$ is a $J_{mt} \times J_{mt}$ matrix, with $\boldsymbol{\Omega}_{rmt}[jm, km] = 1$ if products j and k are sold by the same retailer in market m; and $\boldsymbol{S}_{p_{mt}}$ is the $J_{mt} \times J_{mt}$ matrix of substitution effects, with $\boldsymbol{S}_{pmt}[jm, km] = \partial s_{jmt}/\partial p_{kmt}$ and $\boldsymbol{s}_{mt}$ is the $J_{mt} \times 1$ vector of market shares. The vector of retailer's markup for product j in each market m where is sold is denoted by $\boldsymbol{\gamma}_{mt}$.

Equations 10 and 12 can be expressed in matrix form, for all the distributors at time t as

$$\boldsymbol{\Gamma}_t(\boldsymbol{\beta}, \boldsymbol{p}_t, \boldsymbol{s}_t) = \boldsymbol{w}_t - \boldsymbol{\mu}_t = \sum_{d=1}^{D} \sum_{r=1}^{R} [\boldsymbol{\Omega}_{dt} \tilde{\boldsymbol{S}} \boldsymbol{\Omega}_{dt}]^{+} [\boldsymbol{\beta} \circ (\boldsymbol{\Omega}_{rt} \tilde{\boldsymbol{S}} \boldsymbol{\Omega}_{rt} \gamma_t)] \tag{13}$$

where the symbols + and $\circ$ represent, respectively, the generalized Moore-Penrose inverse and the Hadamar product operator for element by element multiplication. The vector of stacked $\boldsymbol{\gamma}_{mt}$ across markets at time t is denoted by $\boldsymbol{\gamma}_t$, and $\boldsymbol{\Omega}_{rt}$ and $\boldsymbol{\Omega}_{dt}$ are $J_t \times J_t$ ownership matrix for the retailers and distributors, respectively; with element $[j, k] = 1$ if products j and k are sold by the same firm and zero otherwise.

The rest of the terms depend on whether the bargaining is at multi or single market level. If it is the former, the matrix of market shares and changes in market shares, $\tilde{\boldsymbol{S}} = s_{jmt} L_{mt}$ if j is a product distributed in each market m by distributor b, and $\tilde{\boldsymbol{S}}[j, k] = \Delta_j s_{kmt} L_{mt}$ for good k in market $m \in \mathcal{M}_{rb}$. On the other hand, if the bargaining process takes place at the market level; $\tilde{\boldsymbol{S}}[j, j] = s_{jmt}$ and $\tilde{\boldsymbol{S}}[j, k] = \Delta_j s_{kmt}$ otherwise. The rest of the elements are defined as before, they just accommodate to the type of bargaining taking all the markets by time t or only at the market level.

Assuming MMB is the right model accounts for studying the price effects when $\tilde{\mathcal{M}}_{rdt} = \mathcal{M}_{rd,t<t^*} \bigcup \mathcal{M}_{rd,t>t^*}$, where t^* is the date of the consolidation. To obtain those effects it is necessary to get the prices if $\mathcal{M}_{rdt}$ had remained constant over time. With that aim, in the next section I first introduce a reduced form model to assess whether MMB is the right model. Then, I estimate both demand and supply models to later calculate the counterfactual outcomes.

4 Estimation and Results

In this section I test the predictions obtained in the theoretical model by studying the consolidation of distributors in the US energy drinks market. Since wholesale prices are not observable, I rely on changes in retail prices as an indicator of the effects of the consolidation, as shown in equation 5. I take advantage of AB and TCCC's non-overlapping distribution territories and use this the regional shift in distributors in the estimation procedure. Although all the stores in affected areas were influenced, stores outside this area that belonged to affected retail chains were also potentially affected. If they do, this is a clear sign that SMB is not the mechanism generating the data.

The first step involves employing a reduced-form approach to assess whether the observed price fluctuations align with the predictions of either the SMB or MMB models. Under MMB, the theoretical model predicts price effects in both affected and not affected regions by the consolidation. Then, I apply the structural model developed in the previous section to assess the origins of the observed price variation.

4.1 Reduced form Evidence

As pointed out at the end of section 3.1, the consolidation only generates price effects if (i) prices are negotiated through an MMB protocol, and (ii) retailers had stores in both AB and TCCC distribution territories. This last group of retailers is called 'national retailers', because of their presence in both regions. Retailers with stores in only the AB territories are called 'regional retailers'. Regional retailers with stores only in TCCC territories did not change distributors after March 2015. Instead, national retailers were getting supplies from both AB and TCCC, each for a different territory. So, national retailers have stores in regions affected and not affected by consolidation. Taking this into account, in Table 2 I classify the stores according to which potential bargaining protocol affected their prices.

Table 2: Classification of Stores

Group	Change of Distributor	Chain affected by Consolidation	Store affected by Consolidation	Possible Price Effects
Group 1	Yes	Yes	Directly	Under SMB or MMB
Group 2	No	Yes	Indirectly	Under MMB
Group 3	No	No	Not	In equilibrium and MMB

The first group of stores are those located in the regions affected by the consolidation, so their prices are likely to change regardless the bargaining protocol used by the firms. Following Equation 4, the change in prices could have come from changes in the bargaining power parameter of the firms or difference in distributors' production costs. The second group of stores is composed by those that are not in the regions affected by the consolidation, but belong to a retail chain that was. Price effects arise for this group only if MMB is the true model; i.e., through $f_p(\cdot)$. Finally, the third group of stores belongs to regional retailers exclusive to TCCC territories, adjusting prices only in response to Group 2 price changes.

To assess whether the consolidation generated effects, I test if national retailers changed their prices in the regions not affected by the consolidation. As discussed before, this cannot happen under SMB. I use the third group of stores as comparison group, given that they only changed their prices after the consolidation of distributors as response to Group 2. As a consequence, comparisons between Group 1 or Group 2 against Group 3 are a difference between the effects of the consolidation and the effects of adjustment of prices in equilibrium. I estimate separately for each $k \in$ {Monster, Red Bull, Coca-Cola} the logarithm of the price of product j in store s at time t:

$$\begin{aligned} \log(price_{jst}) = \alpha_{1k}\mathbb{1}\{CONS\}_{js} \times \mathbb{1}\{t > t^*\} + \alpha_{2k}\Delta MILES_s \times \mathbb{1}\{t > t^*\}_t \\ + \zeta_{jt} + \zeta_{js} + \boldsymbol{x}_{st}\boldsymbol{\delta} + \varepsilon_{jrt}, \end{aligned} \tag{14}$$

where $\mathbb{1}\{CONS\}_{js}$ takes the value of one for national retailers whether the store is affected or not by the consolidation and zero otherwise, $\mathbb{1}\{t > t^*\}$ takes the value of 1 after the change in distributors by Monster in $t^* = 2015$; and, ζ_{jt} and ζ_{js} are to product time and product store fixed effects. Store's county variables weather, population, and median income are represented by $\boldsymbol{x}_{st}$. $\Delta MILES$ measures the variation in the number of miles (in thousands of miles) of driving distances from the center of the county to the nearest production facility.[19] The interaction $\Delta MILES \times \mathbb{1}\{t > t^*\}$ is an approximation of the possible cost efficiencies after the consolidation of distributors. This variable can serve as a conservative estimate for the efficiencies resulting from the consolidation of distributors, considering that additional efficiencies may emerge post-consolidation. The overall price effects are captured by α_{1k}, which represents the difference between consolidation effects and equilibrium effects.

[19]Similar results are obtained when using driving time instead.

For national retailers' stores from the not affected regions, Group 2, the price effects are:

$$\log(p_{jst}^{POST}) - \log(p_{jst}^{PRE}) = \mathbb{1}\{CONS\}_{js} \times \mathbb{1}\{t > t^*\} = \begin{cases} f_p(\cdot), & \text{under MMB} \\ 0, & \text{otherwise,} \end{cases} \tag{15}$$

which aims to capture variations in retail prices based on the type of bargaining protocol. If the single-market bargaining is the used bargaining protocol, this difference should be not significant. However, under MMB the difference should capture the change in firms' bargaining positions, or $f_p(p_m, p_{-m}, D_m, D_{-m}; \beta, c_{-m})$. On the other hand, for the group of directly affected stores, Group 1, $\mathbb{1}\{CONS\}_{js} \times \mathbb{1}\{t > t^*\}$ could emerge from either MMB through $f_p(\cdot)$ or from SMB through changes in β and c.

Table 3: Effects of Consolidation on retail prices

	log(*price*)			
	Monster		Red Bull	
	Affected (i)	Not Affected (ii)	Affected (iii)	Not Affected (iv)
$\mathbb{1}\{CONS\} \times \mathbb{1}\{t > t^*\}$	-0.015**	-0.016***	0.004	0.003
	(0.006)	(0.004)	(0.003)	(0.003)
$\Delta MILES \times \mathbb{1}\{t > t^*\}$	0.010	-	-0.004	-
	(0.008)	-	(0.005)	-
Observations	863,567	993,524	1,351,315	1,572,325
R^2	0.983	0.983	0.986	0.984
Prod-Store, Prod-Region FE	Yes	Yes	Yes	Yes
Controls, trend	Yes	Yes	Yes	Yes

Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Results are shown in Table 3. Column (i) shows a significant price effect of -1.5% for Monster products for stores in Group 1. A close price effect, -1.6%, is depicted in Column (ii). This means that in average, for stores in Group 2, the average price of Monster products went down by 1.6%, compared to the stores in Group 3. From Table 2, and as discussed before, significant changes in Group 2's prices only arise under multi-market bargaining and not under single-market bargaining. The last result suggests that in the retail sector the negotiation for products is not market by market, but for all the markets where retailers are present, at the same time.

Notice also that the price decrease in national retailers' stores in regions affected and not affected by the consolidation are not significantly different. This goes in line with the theory of uniform pricing, that claims that, everything else constant, the price variation retail chains are homogeneous after a shock. Also, in absolute value these results are close to the one obtained by Luco and

Marshall (2020) (1.5%) from a price increase by TCCC distributors when selling a competitor's product. So, these results are in line with previous price variations in the literature. Regarding Monster's main competitor, columns (iii) and (iv) show the effects for Red Bull products. Since they are under equilibrium effects in the all the stores, there are no expected effects for this product. Finally, it seems that the cost efficiencies captured by $\Delta MILES \times \mathbb{1}\{Post\}_t$ do not significantly affect prices. They do not exhibit a significant price effect after the change in distributors. Overall the results show that the distributors' consolidation in the energy drinks market decreased prices. An opposite effect is shown for the quantities. The increase in quantities sold is shown in the next table.

Table 4: Changes in retail quantities

	Monster		Red Bull	
	Directly	Indirectly	Directly	Indirectly
$\mathbb{1}\{CONS\} \times \mathbb{1}\{t > t^*\}$	0.210***	0.103***	-0.003	-0.026
	(0.023)	(0.019)	(0.024)	(0.022)
$\Delta MILES \times \mathbb{1}\{t > t^*\}$	-0.018	-	-0.018	-
	(0.049)	-	(0.029)	-
Observations	863,567	993,524	1,351,315	1,572,325
R^2	0.855	0.853	0.856	0.846
Prod-Store, Prod-Region FE	Yes	Yes	Yes	Yes
Controls, trend	Yes	Yes	Yes	Yes

Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

So far I have assumed that the consolidation only affects prices through a change in the bargaining positions of the firms, which are incorporated into prices through the multi-market bargaining. However, it is important to consider other possible sources for the observed price decrease. First, Butters et al. (2022) show that local cost shocks do not lead to price effects in other regions. As a result, price changes in national retailers' stores in not affected territories cannot be attributed to cross-subsidization of local costs shocks among stores. Second, another possibility is that distributors and retailers re-negotiate contracts nationally based on the new scale of their agreement. While this might be a reasonable explanation for the price changes, this mechanism is implicitly included in the multi-market bargaining mechanism previously described. On the contrary, single-market bargaining will not be able to include the scale of the amount traded, since the bargaining is taken for each region independently and separately.

Third, regarding costs and scale, the regions that changed distributors from AB to TCCC experienced a change in production costs. Results in Table 4 show that variations in driving distances did not translate in lower prices. TCCC's production facilities are spread across the US. The decrease in the number of distributors for Monster was not translated into an overload of production for the existing production facilities. Instead, the production for the new territories was carried by the TCCC facilities in those territories. It is possible that some production facilities in the regions not affected by the consolidation increased the production to supply the regions affected by the consolidation, but this variation is expected to be marginal. [20]

The previous results show that a regional expansion of a distributor can have price effects and this is only possible when wholesale prices are negotiated for all the regions at the same time. Nonetheless, since the parameter α_{1k} captures both the consolidation and equilibrium effects, it is not possible to claim that the observed price variation is coming exclusively from the consolidation of distributors. This motivates the additional structure that I put into the model. In the next section, I estimate the structural model that can disentangle the different effects from the consolidation.

4.2 Demand

Table 5 presents the demand estimation results. The price coefficient is negative and significant for the logit and the RCL specifications. Since there is not much variation in product characteristics like t levels of caffeine or sugar intake, I do not include them in the regression. Instead, brand fixed effects are considered.

I also include demographics interacted with the price and the constant. Households with higher income are less price sensitive, but overall have a lower preference for energy drinks. On the other hand, older individuals are more price sensitive.

Although not significant, σ_1 and σ_{p_t} represent the diagonal terms of square root of the covariance matrix for the unobserved taste heterogeneity for prices.

4.3 Supply

Equation 13 depicts the margins of the distributors as a function of both the observed data and the unobserved bargaining power parameters and the retailer's margin (Draganska et al., 2010). Retailers' marginal costs, $w_t + c_t$, can be expressed as the sum of $w_t - \mu_t$ and $c_t + \mu_t$, where the first term is the distributors' margins and the second represents the total cost along the vertical chain. The nature of this total cost is industry specific. For example, Grennan (2013) assumes stent costs do not vary by the downstream firm (hospital) or in time, so there are no unobserved cost shocks.

[20] In the Appendix A.3 I discuss the possible causal interpretation of the results.

Table 5: Changes in retail prices

Variable	Logit	RCL
Price	-3.7844^{***}	-3.5930^{***}
	(0.9263)	(0.7359)
Income x Constant		0.2316
		(0.1415)
Age x Constant		0.09530^{***}
		(0.0090)
Income x Price		-0.0213
		(0.0456)
Age x Price		0.00068
		(0.0040)
σ_1		0.0012
		(0.0294)
σ_{p_t}		0.0106
		(0.0595)
Time fixed effects	Yes	Yes
Retailer fixed effects	Yes	Yes
Brand fixed effects	Yes	Yes

Standard errors in parentheses

Following other papers in the literature (Draganska et al., 2010; Gowrisankaran et al., 2015), I assume that total costs along the vertical chain, $c_t + \mu_t$, can be modeled as a function of cost shifters, $\boldsymbol{\eta}_t$, and an unobserved cost shock ω_t, such that $c_t + \mu_t = \boldsymbol{\eta}_t \boldsymbol{\kappa} + \omega_t$. I include in $\boldsymbol{\eta}_t$ distributor and retailer fixed effects, prices of sugar and caffeine interacted with the amount of sugar and caffeine, respectively, by brand; the price of aluminum interacted with the number of cans of 16oz; and, an index for the price of gasoline interacted with the change in miles from the production facilities to the center of the region. The structural error term is expressed as:

$$\boldsymbol{\omega}_t(\boldsymbol{\beta}, \boldsymbol{\kappa}) = \boldsymbol{p}_t - \gamma_t(\boldsymbol{\beta}, \boldsymbol{p}_t, \boldsymbol{s}_t) - \boldsymbol{\Gamma}_t(\boldsymbol{\beta}, \boldsymbol{p}_t, \boldsymbol{s}_t) - \boldsymbol{\eta}_t \boldsymbol{\kappa} \tag{16}$$

Where $[\boldsymbol{\beta}, \boldsymbol{\kappa}]'$ is the vector of nonlinear parameters to estimate. Given the absence of wholesale data, identification of $\boldsymbol{\beta}$ is based on downstream behavior. Since retailers and distributors' margins are based on retail data, I cannot separately identify the bargaining power from retailers' conduct. Retail prices could be high because of collusive retailers with low bargaining power or because of competitive retailers with high bargaining power. Since there is no evidence of collusive behavior in this industry, I assume that retail data comes from a competitive market.

The markup terms $\boldsymbol{\gamma}_t(\boldsymbol{\beta}, \boldsymbol{p}_t, \boldsymbol{s}_t)$ and $\boldsymbol{\Gamma}_t(\boldsymbol{\beta}, \boldsymbol{p}_t, \boldsymbol{s}_t)$ are endogenous because the unobserved cost shock, $\boldsymbol{\omega}_t$, enters implicitly through price. To tackle this issue, I use a GMM estimator based on the moment condition $\mathbb{E}[\boldsymbol{\omega}_t(\boldsymbol{\beta}, \boldsymbol{\kappa})|\boldsymbol{Z}_t] = 0$. The matrix of instruments $\boldsymbol{Z}$ includes a dummy for Monster products in the regions where there was a change in distributor after 2015. The power of the instrument comes from the reduced form evidence shown in the previous section, where a reduction in the retail price of Monster happened in the affected regions after the change in distributor. The validity of the instrument is based on its orthogonality to the unobserved cost shock. If the unobserved cost shock of producing Monster is not systematically different from those of Red Bull and Rockstar before and after the change in distributors, it is likely that the orthogonality condition holds. Product and time fixed effects should be able to capture the difference in levels between the different brands.

I also use as instruments variables that affect demand but not costs. Temporary feature and display of the products in the store make a good work seizing this effect. They affect both the demand for the featured or displayed product, and the other products, they do not affect production costs. This is a well-founded exclusion restriction when retail prices are set by retailers and display and feature are chosen by the distributor. This guarantees the price variation is not coming from a change in the retailer's costs, which could also affect the prices of competing products. [21]Anecdotal evidence suggests that distributors choose sales periods as a part of their negotiations with retailers. I also use the number of flavors of the competitors' brands in the same retail chain as another instrument. This is similar to the typical BLP instrument and follows the same relevance and exclusion restrictions. Finally, I include the time and region fixed effects.

Since $\boldsymbol{\kappa}$ is a function of $\boldsymbol{\beta}$, I concentrate it out before the minimizing the following GMM objective function,

$$\widehat{\boldsymbol{\beta}} = \arg\min_{\beta}(\boldsymbol{Z}\boldsymbol{\omega}(\boldsymbol{\beta}))'\boldsymbol{A}^{-1}\boldsymbol{Z}\boldsymbol{\omega}(\boldsymbol{\beta}), \tag{17}$$

where $\boldsymbol{A}$ is a weighting matrix and $\boldsymbol{Z}$ is a matrix of included and excluded instruments.[22]

Regarding the estimation of β, I choose a grid of initial values for the vector of bargaining power parameters. Since having bargaining power parameters outside the 0-1 interval does not have economic meaning, the search for possible solutions is constrained to the previously mentioned limits. With the results from the first step I get the residuals for the second step of the estimation,

[21] This is not going to be the case if retailers set feature and display because of spacing issues or close expiration dates of the products.

[22] In the first step this matrix is the initial one $\boldsymbol{A} = \boldsymbol{Z}'\boldsymbol{Z}$. Then, I compute the optimal weighting matrix using the residuals from the first stage.

where I use the same grid of initial values as in the first stage. I perform the previous two steps for different set of initial values, getting estimates that are close to each other each time. The fact that the results are numerically close to each other for all the range of possible initial values indicates that the observed results might be a global optimum rather than a local solution. Nonetheless, to guarantee these results are in fact global solutions, I also solve the GMM objective function by using the global optimizer dual annealing. The results using the global optimizer not only lead to results qualitatively identical to those found under the local optimizers, but also quantitatively closed. Although it is computationally more demanding than using a local optimizer, a dual annealing does not require initial values; just boundaries for the values of the parameters.

Before turning to the estimation results, recall that distributors keep other products in their portfolio. I assume that the importance of distributors' portfolio is partially captured by the bargaining power parameters and not by the number of products negotiated. As shown by Crawford and Yurukoglu (2012), negotiating for a bundle of products can affect the bargaining outputs. However, since this paper aims to account for the price effects of changes in market structure, I do not include other non-energy drinks products. Instead, I rely on the low substitution patterns between energy drinks and traditional soft drinks to justify the absence of additional price effects from working with just the category of energy drinks.[23]

Table 6: Supply Side results - Multi Market Bargaining

	Joint model		Cost model
β_{TCCC}	1.0000	Aluminium	-0.0363
	(0.0353)		(0.0083)
$\beta_{RedBull}$	0.8441	Coffee	-1.9498
	(0.1035)		(1.8259)
β_{Pepsi}	1.0000	Sugar	0.0097
	(0.1026)		(0.0131)
β_{AB}	0.3938	$\Delta MILES \times P_{gas}$	-0.0043
	(0.0297)		(0.0087)
Obs			66344
Retailer Fixed Effects			Yes
Bottler Fixed Effects			Yes

Standard errors shown in parentheses.

Results: Following Gowrisankaran et al. (2015), I parametrize the bargaining power parameters for the estimation by considering distributor-specific bargaining weights, instead of distributor-

[23]In Crawford and Yurukoglu (2012) negotiating for bundles affect the bargaining output to the extent that consumers demand some products negotiated as bundles. In this paper, consumers just get one energy drink and do not purchase other products together.

retailer specific. The reason lies in the need for using at least one instrument for each parameter. I employ the four instruments described in the previous section to estimate the four bargaining power parameters. With the results from the demand side, I recover retailer and distributor margins that solve the Nash-in-Nash bargaining process.

Recall that Rockstar only had Pepsi as unique national distributor and Red Bull had his own network of distributors. Instead, Monster had TCCC and AB as distributors before the consolidation and only TCCC after. Results are shown in Table 6.[24, 25]

Note that $\beta_b \approx 1.0$ for $b = \{\text{TCCC}, \text{Pepsi}\}$. Retailers' bargaining power when negotiating with the upstream distributor is a take-it-or-leave-it offer. The reason retailers' bargaining power is large might come from the large size they represent in the US or their importance due to their multi-product nature. On the other side, the fact that $\beta_{RedBull} = 0.84$ makes more likely to thinking about a powerful retailer bargaining for wholesale prices for the supply of one product. Recall that Red Bull is integrated with its distributors, and they only distribute Red Bull products, unlike their main competitors Monster and Rockstar. For the regions where there was a change in distributors, retailers passed from having a bargaining power of $\beta_{AB} = 0.39$ to one equal to $\beta_{TCCC} \approx 1.0$.

Finally, Table 7 shows the estimates under single market bargaining. The estimation procedure is the same that under multi-market bargaining. Although these results for β are different across bargaining models, the ranking of values is close in both estimations with the parameter for Red Bull being the exception. Under both models, however, retailers increased their bargaining power parameter vis-à-vis their distributor. The increase in retailers' bargaining power allowed them to get better deals, partially explaining the observed reduction in retail prices depicted in Table 3.

The reduced form evidence allowed to conclude that the best model generating the data was the MMB model. In this section I estimated both models with the aim of testing which one fits the data in the best way. In the next section I show the procedure and result to do this.

4.4 Model Fitness

Using the supply side estimates from the SMB and MMB model, I test which model fits best the data. To do this, I follow the methodology developed by Rivers and Vuong (2002), where they

[24] The details in the computation of the outside option can be found in Appendix A.1.

[25] To ensure finding a global optimum, I use the Dual Annealing algorithm to solve the GMM objective function. Dual Annealing is an optimization algorithm that combines the principles of simulated annealing and local search to efficiently search for the global optimum in complex optimization problems. By iteratively exploring the solution space and adapting the exploration rate, it can effectively navigate through potential local optima and converge to the best solution. This makes Dual Annealing a valuable tool for estimating models and finding optimal parameter values, especially in scenarios where traditional optimization methods may struggle to find the global optimum.

Table 7: Supply Side results - Single Market Bargaining

	Joint model		Cost model
β_{TCCC}	1.0000	Aluminium	-0.0335
	(0.2279)		(0.2279)
$\beta_{RedBull}$	1.0000	Coffee	-0.4489
	(0.2801)		(0.2801)
β_{Pepsi}	0.3920	Sugar	0.0106
	(0.2716)		(0.2716)
β_{AB}	0.1108	$\Delta MILES \times P_{gas}$	-0.0094
	(0.3339)		(0.3339)
Obs			66344
Retailer Fixed Effects			Yes
Bottler Fixed Effects			Yes

Standard errors shown in parentheses. Bootstrapped standard errors reported with data resampled at the month-market level. In this version I am using 57 samples.

compare among different models to assess which one satisfies best the moment restrictions. The benefit of using the Rivers-Vuong test is that it does not require any of the candidate models to be the true one, unlike the Cox test alternative. In that sense, when comparing models the test only tells which is one is preferred, but not which one is the true one.

Bonnet and Dubois (2010) started using the Rivers-Vuong test to compare different supply specifications. Recently, other papers like Backus et al. (2021) started using the Rivers-Vuong test for conduct testing. Starc and Wollmann (2022) used the Rivers-Vuong test to compare models of competition against collusion in the generic drug manufacturing market. Duarte et al. (2023) have shown that the Rivers-Vuong approach exhibits a superior performance compared to the model assessment alternatives like the Cox or Anderson-Rubin test. Following these previous papers, I use the non-nested algorithm employed in Backus et al. (2021) where for each candidate model h, with $C^h_{jmt} = \mu^h_{jmt} + c^h_{jmt}$, the following regression is applied,

$$C^h_{jmt} = g_V(V'_{jmt}; \varphi^h_j, \lambda^h) + \eta^h_{jmt} \quad \text{for } h \in \{\text{MMB, SMB}\},$$

where η^h_{jmt} is the error of a regression of marginal costs on the function $g_V(V'_{jmt}; \varphi^h_j, \lambda^h)$, V'_{jmt} is a matrix containing the prices of aluminum, coffee, sugar, and the price of gas times the change in distances from the center of the region to the plan location, φ^h_j is a product specific parameter specific to each model h, and λ^h is the vector of costs coefficients. Note that $g_V(V'_{jmt}; \varphi^h_j, \lambda^h)$ can be either linear or non-linear. Specifically, for the nonlinear case, I employ a random forest algorithm to perform a non-linear regression.

I follow the steps described on Backus et al. (2021). First, using the results of both models I get $\Delta\Gamma_{jt} = \Gamma^1_{jt} - \Gamma^2_{jt}$. Then, I regress $\Delta\Gamma_{jt}$ on $q_I(\mathbf{z}_t)$, such that $\Delta\hat{\Gamma}_{jt} = \hat{q}_I(\mathbf{z}_t)$. Third, regress C^h_{jmt} on $g_V(V'_{jmt}; \varphi^h_j, \lambda^h)$ to get $\hat{\eta}^h_{jmt}$. Fourth, I get the values of $\hat{Q}(\Gamma^h)$, where $\hat{Q}(\Gamma^h) = (n^{-1}\sum_{j,t}\hat{\eta}^h_{j,t} \cdot \hat{g}_I(\mathbf{z}_t))^2$for each model $h \in \{MMB, SMB\}$. Finally, I construct the test static $T = \sqrt{n}(\hat{Q}(\Gamma^1) - \hat{Q}(\Gamma^2))/\hat{\sigma}$ that I get from getting the values of $\hat{Q}(\Gamma^1)$ and $\hat{Q}(\Gamma^2)$ over 500 bootstrap samples. The T statistic follows a standard normal distribution. Finally, identification is based on the assumption that $\mathbb{E}[\eta^h_{jmt}A(\mathbf{z}_t)] = 0$ and $A(\mathbf{z}_t) = \mathbb{E}[\Delta\Gamma_{jt}|z^h_{jmt}] = 0$. The vector of instruments, $\mathbf{z}_t$, includes the number of stores affected by the consolidation in the region a particular firm faces and its interactions with demographics specifics to the region. Results can be found in Table 8.

Table 8: Non-nested Model Test

Specification	T	p-value
Costs - linear specification	346.15	0.0000
Log(Costs) - linear specification	553.60	0.0000
Cost - linear quadratic	318.58	0.0000
Log(Costs) - linear quadratic	514.14	0.0000
Costs - non linear specification	-442.66	0.0000
Log(Costs) - non linear specification	103.25	0.0000

Note: The test T statistic is distributed standard normal. The standard error of the difference between $\hat{Q}_1$ and $\hat{Q}_2$ is obtained via 500 bootstrap samples.

The T test compares the results for SMB versus MMB. A positive T favors MMB over SMB. Table 8 shows six specifications for the model, depending on whether the costs are in levels or in logs and if the functions, $g_V(V'_{jmt}; \varphi^h_j, \lambda^h)$ and $\hat{g}_I(\mathbf{z}_t)$, are linear, quadratic or non-linear. I assume $g_I(\cdot)$ follows the linearity or non-linearity assumption picked for $g_V(\cdot)$. When the costs are logarithmic, the residual η^h also takes a logarithmic form.

Table 8 shows the results. For almost all the specifications ,the values of T are positive, favoring multi-market bargaining over single-market bargaining. Only the non-linear specification with costs in levels rejects MMB in favor of SMB. The previous evidence suggests multi-market bargaining is the right model. The specification tests reject that SMB is the true model generating the observed data.

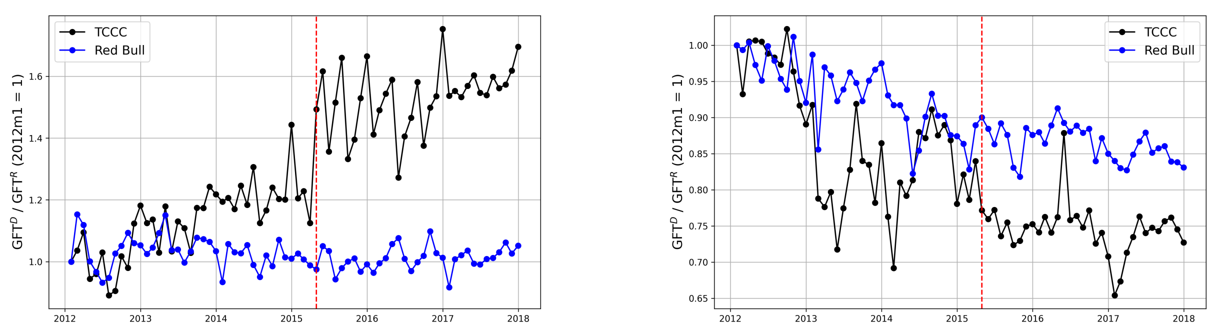
4.5 Evolution of the Relative Bargaining Positions

The reduced form evidence showed that national retailers decreased their prices everywhere, compared to the regional retailers that did not change distributors. The model developed in Section 3.1 predicts that, everything else constant, price variations after a consolidation of distributors comes from multi-market bargaining. Specifically, when both parts maximize the Nash Product, they maximize the weighted gains from trade. The gains from trade represent the relative bargaining power of one part against its trading partner. Higher gains from trade imply higher losses from not trading, increasing the bargaining power of the other part in the negotiation. After including more markets in the negotiation process as a result of the consolidation of distributors, the gains from trade changed for both retailers and distributors. In the following, using the previous result on demand and supply, I evaluate the evolution of the relative gains from trade, φ_{rdt}.

$$\varphi_{rdt} = \frac{\Pi_{dt}(\boldsymbol{w}_{rd}, \boldsymbol{W}_{-rdt}) - \Pi_{dt}(\infty; \boldsymbol{W}_{-rd})}{\Pi_{rt}(\boldsymbol{w}_{rdt}, \boldsymbol{W}_{-rdt}) - \Pi_{rt}(\infty; \boldsymbol{W}_{-rdt})} = \frac{GFT_t^D}{GFT_t^R} \tag{18}$$

The ratio φ_{rdt} shows the evolution in time of the gains from trade of the distributors over those of the retailers. A measure higher than one implies that the distributors have higher gains from trade compared to the retailers, and so a weaker bargaining power. The results from this ratio are shown in Figure 4. For comparing the results of TCCC and Red Bull, the ratios are shown using January 2012 as the base period.

Figure 4: Evolution of Ratio of Gains from Trade



(a) National Retailers

(b) Regional Retailers

The blue line panel (a) shows the results for Red Bull distributor against national retailers. The ratio tends to be stable during the period 2012 -2017, indicating no significant changes in the gains from trade for Red Bull. In the same panel, the black solid line shows the evolution of the relative gains from trade of TCCC with national retailers. In the period from January to March 2015, the ratio evolves steadily with a slight positive slope. Nonetheless, the consolidation of distributors happened in April 2015, and more regions were included in the negotiation problem between TCCC and the national retailers. The ratio makes a jump from 1.13 in March 2015 to 1.49 in April 2015, an increase in 33%. This means that the gains from trade increased more for TCCC than for the national retailers.

After an increase in the number of regions included in the negotiation, it is expected that the gains from trade increase. However, the increase was higher for TCCC, compared to the national retailers, by about 33%. The increase of 33% in the relative gains from trade was translated into a weaker bargaining power for TCCC relative to the national retailers. These last ones, after the consolidation, were in a better bargaining position and hence able to negotiate for a lower wholesale price, which was passed through as lower retail prices.

Finally, panel (b) also shows the evolution of the ratio of relative gains from trade for both distributors TCCC and Red Bull against regional retailers. The fall in the relative gains from trade for both distributors indicates that their bargaining power against smaller retailers was actually increasing. But the consolidation of distributors stopped the fall of the relative gains from trade, stopping at the same time the improvement in their bargaining position against regional retailers.

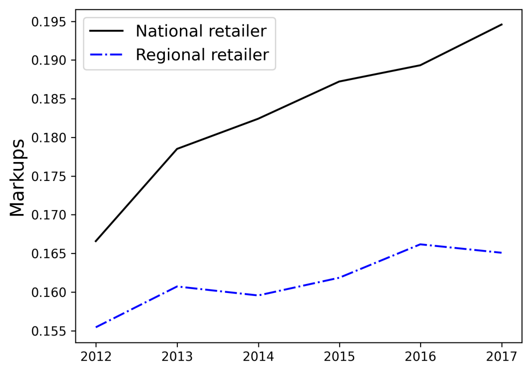
Overall, it seemed that the consolidation of regional distributors weakened the bargaining position of the distributors. Including more regions increased their dependency to trade with the retailers. While it is also true that retailers also increased their bargaining position, the relative increased of theirs was lower in comparison to the one of distributors.

4.6 Markups

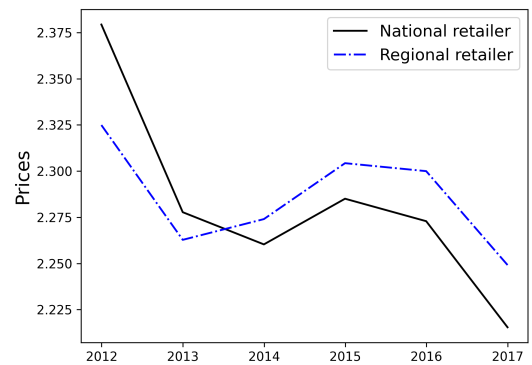
In this section I show how the consolidation of distributors had differentiated effects according to the type of retailer, focusing on prices and markups. The evolution of markups has been studied for other industries in the US, like the automobile sector, cement industry, retail sector, etc. I start by showing the evolution of the markup and the retail price. The markup is defined as the inverse of the Lerner Index, $(p_{jmt} - mc_{jmt})/p_{jmt}$. Figure 5 shows the monthly average markup by type of retailer. For regional retailers, which did not change distributors, the markups depict an almost constant pattern. For the national retailers a small positive trend can be noticed. This increase becomes more pronounced after the consolidation, whereas for the regional retailers the change in the markups happens one year after the consolidation, in 2016. On the other hand, while prices were increasing from one to two years before the consolidation, they start falling around the consolidation date, with the fall being more pronounced for the national retailers.

Comparing the results for both groups, national retailers have a clear increase in their markups

Figure 5: Evolution of Markups and prices



(a) Yearly evolution of markups



(b) Yearly evolution of prices

in the year of the consolidation. This is explained by the further decrease in marginal costs, relative to the price. As pointed out by Döpper et al. (2022), in the retail sector firms tend to keep most of the cost savings. On the contrary, the regional retailers showed a constant decrease in markups, that only stop decreasing at the end of the analyzed period.

Results from the reduced form model and the conduct testing model allow to conclude that multi-market bargaining seems to be a more reasonable data generating process than the single market bargaining protocol. Assuming that prices come from a negotiation process where distributors and retailers negotiate market by market could lead to biased results. To analyze this, in the next section I introduce counterfactual scenarios to disentangle the sources behind the observed variation in prices and compare the different outputs under different bargaining models.

5 Counterfactuals

Based on the estimation results, I conduct several counterfactual scenarios to uncover the individual impacts of cost efficiencies, bargaining power, and multi-market bargaining. To do so, I used the first-order condition equation $\mathbf{p}_t - \mathbf{\Gamma}_t - \gamma_t = \mathbf{C}_t$, where $\mathbf{C}_t = \mathbf{c}_t + \mu_t$ is the total cost. By varying the total costs, the producers' ownership matrix, or both, I am able to create different counterfactuals. In every scenario, the wholesale prices are the output of a Nash bargaining negotiation process as stated before. The different counterfactuals to be evaluated are summarized in Table 9. The baseline counterfactual where there is no change in distributor is denoted by (0). This scenario is obtained by keeping both TCCC and AB as Monster's distributors.

Next, to isolate the effects from cost changes, I simulate a scenario where there is only a change in the production costs but not a change in distributors. In this scenario, there is no change in the retailer's bargaining power. This counterfactual is denoted by (1). Counterfactual (2) is the observed situation, where there are both costs and bargaining power changes. Then, I compare the average monthly consumer surplus and prices for the two previous scenarios against the benchmark counterfactual (0).

Table 9: Counterfactuals

Counterfactual	Description
(0) No Changes	No change in distributor (nor in costs)
(1) Distributor only	TCCC gets the distribution but without cost savings
(2) Observed	TCCC becomes the only distributor of Monster with cost savings

Next I compute the change in prices as $\Delta p_t(x) = \sum_{t \in 2015}(p_t(x) - p_t(0))/p_t(0)$, where x represents the counterfactual.[26] Using the estimated results from Table 6, in Table 10 I show the results comparing the different scenarios with the baseline one for multi and single-market bargaining for the year 2015.

Table 10: Counterfactual Analyses

	No Changes	Distributor Only	Observed
	Prices - Multi Market Bargaining		
National Retailer - Affected areas	2.29	2.29	2.25
National Retailer - Not affected areas	2.24	2.30	2.26
Regional Retailer - Not affected areas	2.41	2.39	2.20
	Prices - Single Market Bargaining		
National Retailer - Affected areas	2.09	2.09	2.25
National Retailer - Not affected areas	-	-	2.2625
Regional Retailer - Not affected areas	-	-	2.2031
	Welfare Statistics		
ΔCS - Affected areas	-	0.02%	3.14%
ΔCS - Not affected areas	-	0.02%	2.82%
CCR Profit with National Retailers	-	1.81%	2.04%
CCR Profit with Regional Retailers	-	-0.17%	-0.58%

Averages shown for the year 2015.

In the first row of Table 10 prices are depicted for the all the scenarios for national retailers' stores in the affected areas. A scenario where there is only a change in distributors in the market, there is a reduction of 0.07%. Finally, when comparing the observed price variation to the baseline

[26]The algorithm I follow can be found in Appendix A.2.

scenario, there is a reduction of 1.3%. This last result represent a monthly average reduction of 2¢. On the other hand, the price variation for the national retailers in the areas not affected are shown in the second row. Comparing the observed price versus that one of the scenario (0) give a variation in prices of 0.8%, around 2¢.

For the regional retailers the results are shown in the third row. The most striking result is the price reduction when comparing scenarios (2) and (0), which is of around 8¢ (8.71%). This group of retailers reduce their prices further compared to the national retailers in the areas not affected by the consolidation of distributors. As a response in equilibrium, they have decrease their prices more to remain competitive. In data, the observed prices are 19¢ lower than those of the national retailer.

The results under single-market bargaining are show in the fourth row. Notice that under the assumption of single-market bargaining there are no indirect price effects. This is a direct consequence of the model. When the negotiations are done market by market the areas for which there were no changes were not affected at all. In every scenario, under SMB prices are higher than in the baseline scenario (0). The model predicts a price increase of 6.45%, almost 15¢. This represents a significant difference between the predictions of both models.

The last four rows describe the changes in surplus for consumers and producers. For consumers, there are positive effects from the average reduction in prices when comparing the observed prices to the baseline scenario. While small, these effects go in line with the prices variations described above.

Given that the price of the product moves between $2.0 and $2.5 in the analyzed period, the nature of these effects is small. However, the main lesson from the counterfactual exercise is that assuming multi-market bargaining leads to the price effects in the regions not directly affected by the consolidation. A similar conclusion cannot be supported under single market bargaining. This is relevant when evaluating mergers between upstream providers in different markets, like the case of mergers or acquisitions between hospitals in different regions. The impact of market structure change can lead to changes in the acquirer's market of origin.

Finally, a word of caution is in order here. Notice that the main efficiency gain employed in this paper are the decrease in transportation distances. Negotiating with fewer firms might entail other efficiencies that are not being captured by the model, because I do not have access to more detailed data. However, the decrease in transportation distances taken in this paper can be taken as a lower bound on the efficiency gains that occurred in the US energy drinks market.

6 Conclusion

This paper relies on a reduced form and a structural model of bargaining to show that the upstream structure of the market influences retail prices. When a retail chain is in multiple geographical markets, a consolidation of regional distributors leads to a reduction in the number of firms the retailer needs to negotiate over wholesale prices with. I show that the inclusion of new regions into the bargaining process shifts the bargaining positions of the firms. Precisely, bargaining positions shift only if firms engage in *multi-market bargaining*, i.e. they negotiate for all the wholesale prices for multiple regions at once; and not *single-market bargaining*, i.e. negotiating for each market independently. To test this, I evaluate the welfare effects of the consolidation of distributors by one of the leading brands in the US energy drinks market.

I show that retail prices went down after the consolidation of regional distributors. Using a reduced form approach, I find that prices went down, in average by 1.5% in the regions under consolidation in distributors. Reduced form model shows that contracts between retailers and distributors in the Energy drinks market are negotiated for all the regions at the same time and not region by region. To further understand the price decrease I build a structural model of bargaining. The results reveal that a consolidation of distributors weakened distributor's bargaining position against *national retailers* and stop the strengthening of it against *regional retailers*. While these results are related to the geographic market, the conclusions drawn in this paper can be easily extended to conclude about product market. In the retail sector, concentration at the upstream level either in the regions covered or in the products offered potentially lessens the bargaining position of distributors.

Assessing the importance of bargaining for multiple markets is not exclusive to the retail sector. In other industries, like the health sector, where there was a recent wave of mergers, is also important to consider the role of both types of alternatives ways of bargaining. The results from the counterfactual exercises highlight that using single or multi-market bargaining can lead to opposite predictions. Antitrust authorities need to consider firms' shifts in bargaining positions when adding more regions to the bargaining process as a result of upstream changes in the market structure. In particular, the results in this paper can be used to analyze mergers between retailers in different geographic markets. While a merger between competitors can decrease competition, the overall effects depend on the structure of the upstream market as well. If distributors are just regional firms, classical antitrust analyzes should be applied. However, if distributors are national firms or if the distribution market is highly concentrated, the bargaining position for the new merged retailer could increase, representing a potential source of downward pressure on prices.

Finally, although in this paper I study the energy drinks sector in the US, future research could consider expanding the analysis to other products. While the task seems daunting, it can improve the way policymakers understand vertical structures. Additionally, some assumptions used in this paper could be relaxed. Among them, I assume simultaneous determination of retail and wholesale prices. Considering sequential pricing, as in Bonnet et al. (2021), could be incorporated to the current analyses of market specific wholesale prices. However, multi-market bargaining in a sequential pricing context can be computationally cumbersome and is left as a potential area of research to improve.

References

Adams, B. and Williams, K. R. (2019). Zone pricing in retail oligopoly. American Economic Journal: Microeconomics, 11(1):124–56.

Backus, M., Conlon, C., and Sinkinson, M. (2021). Common ownership and competition in the ready-to-eat cereal industry. NBER Working Papers 28350, National Bureau of Economic Research, Inc.

Berry, S., Levinsohn, J., and Pakes, A. (1995). Automobile prices in market equilibrium. Econometrica, 63(4):841–90.

Bonnet, C., Bouamra-Mechemache, Z., and Molina, H. (2021). An empirical model of bargaining with equilibrium of fear: Application to retail mergers in the french soft drink industry. Working papers, Toulouse School of Economics (TSE).

Bonnet, C. and Dubois, P. (2010). Inference on vertical contracts between manufacturers and retailers allowing for nonlinear pricing and resale price maintenance. The RAND Journal of Economics, 41(1):139–164.

Bonnet, C. and Dubois, P. (2015). Identifying Two Part Tariff Contracts with Buyer Power: Empirical Estimation on Food Retailing. TSE Working Papers 15-575, Toulouse School of Economics (TSE).

Butters, R. A., Sacks, D. W., and Seo, B. (2022). How do national firms respond to local cost shocks? American Economic Review, 112(5):1737–72.

Crawford, G. S. and Yurukoglu, A. (2012). The welfare effects of bundling in multichannel television markets. American Economic Review, 102(2):643–85.

Dafny, L., Ho, K., and Lee, R. S. (2019). The price effects of cross-market mergers: theory and evidence from the hospital industry. The RAND Journal of Economics, 50(2):286–325.

De Chaisemartin, C. and d'Haultfoeuille, X. (2018). Fuzzy differences-in-differences. The Review of Economic Studies, 85(2):999–1028.

DellaVigna, S. and Gentzkow, M. (2019). Uniform Pricing in U.S. Retail Chains*. The Quarterly Journal of Economics, 134(4):2011–2084.

Draganska, M., Klapper, D., and Villas-Boas, S. (2010). A larger slice or a larger pie? an empirical investigation of bargaining power in the distribution channel. Marketing Science, 29(1):57–74.

Duarte, M., Magnolfi, L., Sølvsten, M., and Sullivan, C. (2023). Testing firm conduct. arXiv preprint arXiv:2301.06720.

Döpper, H., MacKay, A., Miller, N., and Stiebale, J. (2022). Rising markups and the role of consumer preferences. Working Paper 22-025, Harvard Business School.

Ganapati, S. (2018). The Modern Wholesaler: Global Sourcing, Domestic Distribution, and Scale Economies. Working Papers 18-49, Center for Economic Studies, U.S. Census Bureau.

Gowrisankaran, G., Nevo, A., and Town, R. (2015). Mergers when prices are negotiated: Evidence from the hospital industry. American Economic Review, 105(1):172–203.

Grennan, M. (2013). Price discrimination and bargaining: Empirical evidence from medical devices. American Economic Review, 103(1):145–77.

Ho, K. and Lee, R. S. (2017). Insurer competition in health care markets. Econometrica, 85(2):379–417.

Ho, K. and Lee, R. S. (2019). Equilibrium provider networks: Bargaining and exclusion in health care markets. American Economic Review, 109(2):473–522.

Horn, H. and Wolinsky, A. (1988). Bilateral monopolies and incentives for merger. RAND Journal of Economics, 19(3):408–419.

Lewis, M. S. and Pflum, K. E. (2015). Diagnosing hospital system bargaining power in managed care networks. American Economic Journal: Economic Policy, 7(1):243–74.

Lewis, M. S. and Pflum, K. E. (2017). Hospital systems and bargaining power: evidence from out-of-market acquisitions. The RAND Journal of Economics, 48(3):579–610.

Luco, F. and Marshall, G. (2020). The competitive impact of vertical integration by multiproduct firms. American Economic Review, 110(7):2041–64.

Miller, N. H. and Weinberg, M. C. (2017). Understanding the price effects of the millercoors joint venture. Econometrica, 85(6):1763–1791.

Nevo, A. (2001). Measuring market power in the ready-to-eat cereal industry. Econometrica, 69(2):307–342.

Panhans, M. and Taragin, C. (2022). Consequences of model choice in predicting horizontal merger effects. Working Paper 348, Federal Trade Commision.

Rivers, D. and Vuong, Q. (2002). Model selection tests for nonlinear dynamic models. The Econometrics Journal, 5(1):1–39.

Sheu, G. and Taragin, C. (2021). Simulating mergers in a vertical supply chain with bargaining. The RAND Journal of Economics, 52(3):596–632.

Starc, A. and Wollmann, T. G. (2022). Does entry remedy collusion? evidence from the generic prescription drug cartel. Technical report, National Bureau of Economic Research.

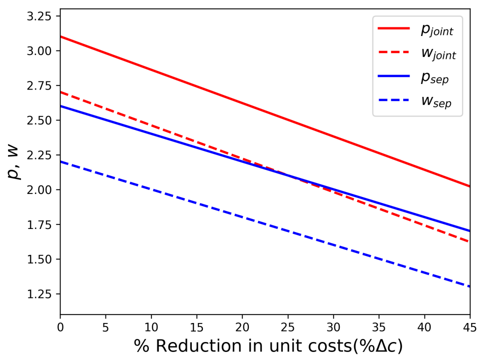
Villas-Boas, S. B. (2007). Vertical relationships between manufacturers and retailers: Inference with limited data. The Review of Economic Studies, 74(2):625–652.

Vistnes, G. S. and Sarafidis, Y. (2013). Cross-market hospital mergers: A holistic approach. Antitrust Law Journal, 79(1):253–293.

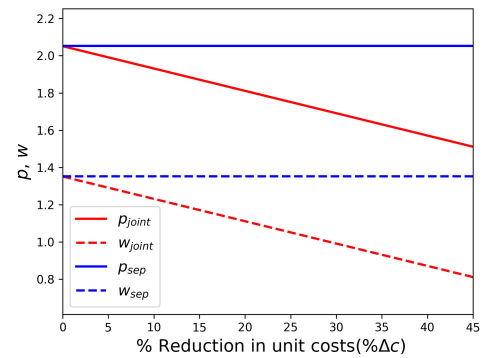
Figure 6: Price effects under different bargaining protocols and Cost Efficiencies

Scenario 1: Consolidation affects Large Market

(a) Large Market: Affected by consolidation

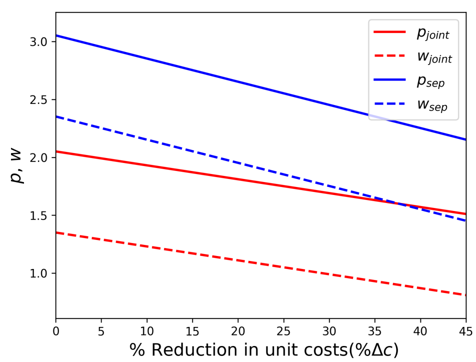


(b) Small Market: Not directly affected

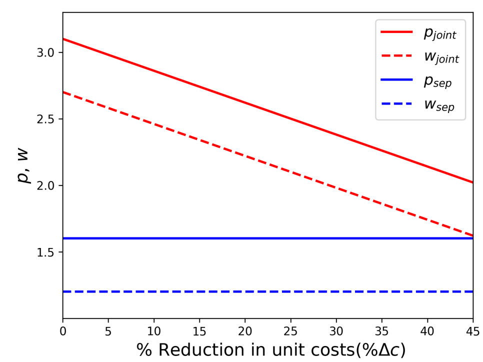


Scenario 2: Consolidation affects Small Market

(c) Small Market: Affected by consolidation



(d) Large Market: Not directly affected



Appendix

A Computational Issues

A.1 Simulation of the Model

Simulation. I start from a setting where the retailer negotiates separately with each distributor and then only with one after the distributor expands from one market to the next one. I show results under two scenarios. In the first one, the distributor from the small market expands to the large one. Scenario number two portrays the distributor from the large market expanding to the small market. Figure 6 illustrates the new equilibrium effects, comparing the results under *multi market bargaining* versus those under *single market bargaining*. The first row shows scenario one. The second one shows the effects when the distributor expands from the small to the large market.

Solid lines show retail prices, while the dotted ones do the same for wholesale prices. The red lines depict prices under joint bargaining, while the blue ones do it for region by region bargaining.

Panels (a) and (b) show that when the consolidation involves switching distributors in a large market, under joint bargaining there is an increase in retail prices in all the markets involved in the negotiation, even under cost deficiencies. Most notably, assuming that firms negotiate separately for each region predicts no effect in the market not directly affected by the consolidation. On the other hand, as shown in panels (c) and (d), when the consolidation affects directly a small market, prices are smaller under region by region bargaining. However, under *joint bargaining* prices in the large market increase. These effects are related to equation 3, such that the whole price in the large market will be a decreasing function of the price elasticity in the small market.

Although these results are shown for a fixed β, similar results are obtained under *small* changes in the bargaining power of the retailers, β. When the retailer is in both locations, price variations coming from changes in this parameter are not distinguishable from changes due to *multi market bargaining*. Finally, note that for a *single location* retailer the bargaining protocol has no effect, and he will always be negotiating using a *single market bargaining* protocol. If the retailer is in a large market, the blue line in figure 6 - panel (a) describes the price effects. Similarly, with panel (c) if the retailer has only one store, but it is located in the small market instead.

Overall, cost efficiencies alongside assumptions on the type of bargaining protocol followed by the firms have different effects depending on which market is directly affected by the consolidation of distributors:

1. When there is a *common retailer* in both affected and not affected markets by the consolidation, price effects will arise even in the region not directly affected by the consolidation.

2. Cost efficiencies can be distributed towards the regions indirectly affected by the consolidation.

3. Changes in the bargaining ability and changes in the redistribution are not distinguishable in the observed retail prices.

Although this simulation has been performed under no competition at the upstream or downstream level, similar conclusions hold when introducing competition to either market segment. When there is a consolidation of upstream firms such that it ends up covering more markets, cross-market effects will arise. As previously discussed, the level of cost efficiencies as well as the size of the market directly affected by the consolidation will determine the price effects.

A.2 Small retailers

The following table describes the results for those retail chains with stores only in the regions affected by the consolidation of bottlers.

Table 11: Changes in retail prices

	log(*price*)	
	Monster	Red Bull
$\mathbb{1}\{Treat\} \times \mathbb{1}\{Post\}$	0.009	0.002
	(0.007)	(0.005)
$\Delta MILES \times \mathbb{1}\{Post\}$	-0.014	-0.013
	(0.017)	(0.014)
Observations	115,236	180,182
R^2	0.981	0.991
Prod-Store, Prod-Region FE	Yes	Yes
Controls, trend	Yes	Yes

Standard errors in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

A.3 Causality in reduced form

In this section I address the possibility of giving a causal interpretation to the results shown in section 4.1. First, Group 3 in Table 2 can be considered as a control group and groups 1 and 2 can be taken as two different treatment groups. From these two groups, on the first it is possible to test the effects of the consolidation, while on the second one spillover effects are tested. Naturally the spillovers are possible to test only under the assumption that the data is generated by multi-market bargaining. However, there is endogeneity for the treatment. Retail chains with more stores across the US are more likely to receive the treatment, i.e., change in distributor. It is possible that the treatment is related to the observable firm's size. To incorporate this possible source of endogeneity, I follow De Chaisemartin and d'Haultfoeuille (2018) and run a fuzzy difference in difference regression. I take into account that the treatment is a function of the number of stores per region for each retail chain. I set 30 as threshold value for this ratio for possibly receiving the treatment. Using this alternative methodology, I find that prices also went down after the consolidation of distributors in the treated regions. This result is close to the one obtained using above, which could be considered as 'sharp difference in difference'.

A.4 Solution to Equation 2

$$\{w_A, w_B\} = \arg\max_{w_A,w_B} \left[\sum_{m\in\{A,B\}} (p_m - w_m)D_m \right]^{\beta_{rb}} \left[\sum_{m\in\{A,B\}} (w_m - \mu_m)D_m \right]^{1-\beta_{rb}} \tag{19}$$

Where the solution to the previous equation is:

$$\sum_{m\in\{A,B\}} w_m^{**} D_m = (1-\beta) \sum_{m\in\{A,B\}} p_m^{**} D_m + \beta \sum_{m\in\{A,B\}} \mu_m D_m \tag{20}$$

Re-arranging the last equation in terms for market A:

$$w_A^{**} D_A = [(1-\beta)p_A^{**} D_A + \beta\mu_A D_A] + [(1-\beta)p_B^{**} D_A + \beta\mu_B D_B - w_B^{**} D_B] \tag{21}$$

Note the first term in brackets is the solution to single-market bargaining for market A times D_A. The previous equation can be re-expressed as:

$$w_A^{**} = w_A^*(p_A^{**}; \beta, \mu_A) + \Big[(p_B^{**} - w_B^{**}) - (p_B^{**} - \mu_B)\beta \Big] \frac{D_B(p_B^{**})}{D_A(p_A^{**})} \tag{22}$$

The retailer that maximizes the profit function for each market: $\pi_m = (p_m - w_m)D_m$. From his first order condition it is possible to express the retail price as $p_m = -D_m \frac{\partial p_m}{\partial D_m} \frac{p_m}{p_m} + w_m$. This last expression can be re-arranged as $p_m = \frac{1}{\epsilon_m} p_m + w_m$, where $\epsilon_m = -\frac{\partial D_m}{\partial p_m} \frac{p_m}{D_m}$. Finally, the wholesale price can be expressed as $w_m = p_m - \frac{1}{\epsilon_m} p_m$, or equivalently, $p_m - w_m = \frac{p_m}{\epsilon_m}$. Replacing this expression in equation 22,

$$w_A^{**} = w_A^*(p_A^{**}; \beta, \mu_A) + \left[\frac{p_B^{**}}{\epsilon_B(p_B^{**})} - (p_B^{**} - \mu_B)\beta \right] \frac{D_B(p_B^{**})}{D_A(p_A^{**})} \tag{23}$$

Using the notation employed in the main text,

$$w_A^{**} = w_A^*(p_A^{**}; \beta, \mu_A) + f_w(p_B^{**}, D_A^{**}, D_B^{**}; \beta, \mu_B) \tag{24}$$

On the other side, the retail prices in market A are:

$$p_A^{**} = p_A^* + \left[\frac{p_B^{**}}{\varepsilon_B^{**}} - (p_B^{**} - \mu_B)\beta \right] \frac{D_B^{**}}{D_A^{**}} \frac{\varepsilon_A^{**}}{\varepsilon_A^{**}\beta - 1} = p_A^* + (w_A^{**} - w_A^*) \frac{\varepsilon_A^{**}}{\varepsilon_A^{**}\beta - 1}$$

Or equivalently,

$$p_A^{**} = p_A^* + f_w(p_A^{**}, p_B^{**}, D_A^{**}, D_B^{**}; \beta, \mu_B)\frac{\varepsilon_A^{**}}{\varepsilon_A^{**}\beta - 1} = p_A^* + f_p(p_B^{**}, D_A^{**}, D_B^{**}; \beta, \mu_B),$$

where $f_p(p_A^{**}, p_B^{**}, D_A^{**}, D_B^{**}; \beta, \mu_B) = f_w(p_B^{**}, D_A^{**}, D_B^{**}; \beta, \mu_B)(\varepsilon_A^{**}/(\varepsilon_A^{**}\beta - 1))$. A similar expression follows for the retail price in market B

A.5 Outside Option

In this section I describe the procedure employed in this paper to compute the outside option, based on Döpper et al. (2022). However, I adjust their procedure by computing the potential market size at the region level rather than at the retail chain level. The outside option is computed using the following steps,

1. Take the population of the region between 16 and 60 years as potential population at period t and market m, POP_{mt}.

2. Obtain the total quantities sold at market m at time t, $Q_{mt} = \sum_r q_{rmt}$. This represents the total size of the inside good.

3. Compute $\gamma_m = mean_{mt}(Q_{mt}/POP_{mt})$. This ratio will be used as the average ratio of quantity to population by market in time.

4. Finally, the market size is obtained by scaling the population size to have an average share of the inside good around 0.45.

$$M_{mt} = \left(\frac{1}{0.45}\right)\gamma_m POP_{mt} \tag{25}$$

The distribution of the distribution of inside goods can be seen in figure 7

A.6 Multi Market Bargaining equation

Equation 12 can be fully written in the following way

$$\sum_{m\in\mathcal{M}_{rbt}} w_{jmt}s_{jmt}L_{mt} = \sum_{m\in\mathcal{M}_{rbt}} \mu_{jmt}s_{jmt}L_{mt} + \sum_{\substack{g\in\mathcal{J}_{bmt}\setminus j,\\ m\in\mathcal{M}_{rbt}}} \Gamma_{gmt}\Delta_j s_{gmt}$$

$$+(1-\beta_{rb})\Bigg[\sum_{m\in\mathcal{M}_{rbt}} (\Gamma_{jmt}+\gamma_{jmt})s_{jmt}L_{mt} - \Bigg[\sum_{\substack{k\in\mathcal{J}_{rmt}\setminus j,\\ m\in\mathcal{M}_{rbt}}} \gamma_{kmt}\Delta_j s_{kmt}L_{mt} + \sum_{\substack{g\in\mathcal{J}_{bmt}\setminus j,\\ m\in\mathcal{M}_{rbt}}} \Gamma_{gmt}\Delta_j s_{gmt}L_{mt}\Bigg]\Bigg]$$

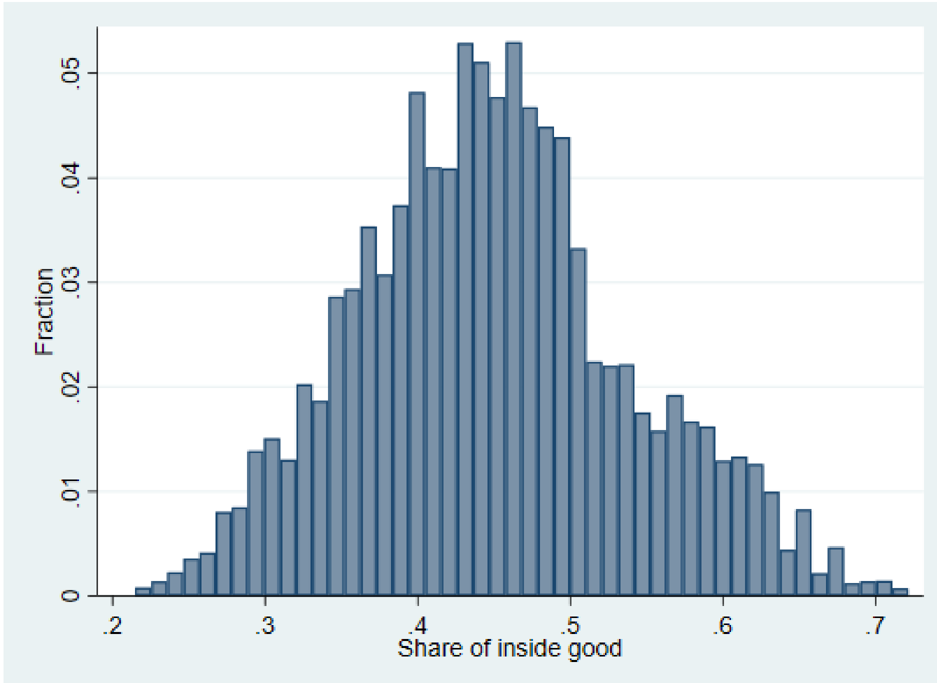


Figure 7: Distribution of Inside good

where $\gamma_{jmt} = p_{jmt} - w_{jmt} - c_{jmt}$ is the retailer's margin for product j in market m at time t.

This last expression can also be re-expressed as:

$$w^{**}_{jmt} s_{jmt} L_{mt} = w^{*}_{jmt} s_{jmt} L_{mt} + \sum_{\tilde{m} \in \mathcal{M}_{rbt} \setminus \{m\}} \mu_{j\tilde{m}t} s_{j\tilde{m}t} L_{\tilde{m}t} + \sum_{\substack{g \in \mathcal{J}_{b\tilde{m}t} \setminus j, \\ \tilde{m} \in \mathcal{M}_{rbt} \setminus \{m\}}} \Gamma_{g\tilde{m}t} \Delta_j s_{g\tilde{m}t} L_{\tilde{m}t} + (1 - \beta_{rb})[GFT^R_t(n \in \mathcal{M}_{rbt} \setminus m) + GFT^B_t(n \in \mathcal{M}_{rbt} \setminus m)], \quad (26)$$

where $GFT^R(n \in \mathcal{M}_{rbt} \setminus m)$ and $GFT^B(n \in \mathcal{M}_{rbt} \setminus m)$ are the gains from trade for the retailer and the distributor, respectively, for reaching an agreement in every market $n \in \mathcal{M}_{rbt} \setminus m$ where both parties trade.

A.7 Estimation

When implementing the search procedure for $\boldsymbol{\beta}$ that minimizes equation 17, I start by searching $\tilde{\beta}$ with a normalization of the parameter to search $\beta = \exp(\tilde{\beta})/1 + \exp(\tilde{\beta})$. In the second step, I perform a search process without limitations on $\boldsymbol{\beta}$.

A.8 Counterfactual Algorithm

1. Get the initial conditions $\boldsymbol{p_t}^*$, $\boldsymbol{\gamma_t}^*$, $\boldsymbol{\Gamma_t}^*$. Fix initial values for the iteration at $\boldsymbol{p_t}^* \times 1.05$

2. From the expression $p_t - \gamma_t = w_t + c_t$, and knowing that $w_t + c_t = c_t + \mu_t + w_t - \mu_t$ it is possible to express: $c_t + \mu_t = p_t - \gamma_t - \Gamma_t$. With this, I compute the solution to the problem:

$$(\boldsymbol{p_t}^{POST,i} - \boldsymbol{\gamma_t}^{POST,i} - \boldsymbol{\Gamma_t}^{POST,i}) - (\boldsymbol{p_t}^* - \boldsymbol{\gamma_t}^* - \boldsymbol{\Gamma_t}^*) = \mathbf{0}$$

   Before getting into the calculation of $\boldsymbol{p_t}^{POST,i}$, I take $\boldsymbol{p_t}^{POST,i-1}$ as the starting point.

3. The process continues until $\parallel \boldsymbol{p_t}^{POST,i} - \boldsymbol{p_t}^{POST,i-1} \parallel < 0$.

The following counterfactuals are calculated separately:

1. Scenario 1: Counterfactual 1 - base scenario - $\Delta C = \Delta\beta = 0$

2. Scenario 2: Counterfactual 2 - No Change in identity - $\Delta C \neq 0$, $\Delta\beta = 0$

3. Scenario 3: Counterfactual 3 - Change in identity - $\Delta C = 0$, $\Delta\beta \neq 0$

4. Scenario 4: Observed - Change in all - $\Delta C \neq 0$, $\Delta\beta \neq 0$

Where ΔC and $\Delta\beta$ are, respectively, change in costs and change in bargaining power. I consider that the change in bargaining power comes from a change in the bottler.