The Cost of an Inefficient Vertical Contract*

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Abstract

Vertical contracts govern firms' incentives along the supply chain. Contracts such as revenue-sharing agreements are used to satisfy incentive constraints but may be inefficient, leading to profit losses relative to vertical integration. We leverage variation in vertical structure and institutional knowledge to estimate the parameters of a revenue-sharing agreement used in the U.S. yogurt industry. Using these estimates in conjunction with an empirical model of supply and demand, we quantify the profit losses of an inefficient vertical contract relative to vertical integration. Our findings speak to incentive issues along the supply chain and the benefits of vertical integration.

Keywords: Boundaries of the firm, vertical contracts, revenue-sharing agreement, vertical integration

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1 Introduction

Firms face the challenge of designing contracts to align incentives along the vertical supply chain. Monitoring problems, asymmetries of information, or incentive issues more broadly may prevent vertically independent firms from replicating the outcomes of a vertically integrated supply chain. Vertical contracts that tackle these issues (e.g., revenue-sharing agreements) may be chosen by supply chains despite distortions in pricing incentives (or decision making more broadly), which lead to inefficient prices, profits, and other supply chain outcomes—see, e.g., Gil (2009) for evidence from the movie industry. These inefficiencies may create a tradeoff between addressing incentive issues and profitability. Is the impact of an inefficient vertical contract on market outcomes economically significant? What are the gains of vertical integration?

In this paper, we tackle these questions by exploiting variation in vertical structure—a supply chain's transition from a revenue-sharing agreement to vertical integration—to measure the cost of an inefficient vertical contract, relative to vertical integration. We consider several market outcomes (prices, quantities, profits) and analyze changes at the supply chain level as well as by individual firms. More broadly, we contribute new evidence to the discussion on the impact of firm boundaries on market outcomes (see, e.g., Mullainathan and Scharfstein, 2001; Hortaçsu and Syverson, 2007; Lafontaine and Slade, 2007) as well as the discussion on the economics of vertical practices (see, e.g., Shaffer, 1991; Asker and Bar-Isaac, 2014).

Why do revenue-sharing agreements distort market outcomes? Consider a revenue-sharing agreement between an upstream and downstream firm in which the downstream firm keeps a fraction $\mu \in (0, 1)$ of the downstream revenue, with the rest going to the upstream firm. For simplicity, assume that the upstream firm transfers intermediate inputs to the downstream firm at marginal cost (i.e., no double marginalization). Under the revenue-sharing agreement, the downstream firm will maximize profits by setting $\mu \times \text{MR} = \text{MC}$, whereas a vertically-integrated supply chain would set MR = MC (where MR and MC are the marginal revenue and marginal cost functions of an integrated supply chain, respectively). In particular, the revenue-sharing agreement affects marginal incentives as though marginal costs were scaled up, $\text{MR} = \text{MC}/\mu > \text{MC}$, creating an upward pressure on prices that may lead to a lower quantity demanded and profits.[1]

[1]In an oligopoly setting, revenue-sharing agreements may also relax the intensity of price competition. The upward pressure on prices just described creates an incentive for rivals to increase prices due to strategic complementarities, even when these rivals are not subject to a revenue-sharing agreement. These equilibrium effects may lessen (or even reverse) the negative impact of a revenue-sharing agreement on the profits of a supply chain.

Our contributions are threefold. First, we contribute new evidence to the question of the impact of firm boundaries on market outcomes. Second, we exploit variation in vertical structure and institutional knowledge to identify the parameters of a revenue-sharing agreement, which is typically confidential information unavailable to researchers. Lastly, we use the estimates of the revenue-sharing agreement, in conjunction with an equilibrium model of demand and supply, to show that an inefficient vertical contract can significantly impact supply chain outcomes.

Our setting is the U.S. yogurt industry. The supply chain of top-selling Yoplait products in the U.S. has featured a stable structure over several decades. General Mills and Société de Diffusion de Marque (Sodima/Sodiaal, hereafter) signed a contract in 1976 that, though it has been amended several times, lasted until 2011.[2] Between 1976 and 2011, General Mills sold Yoplait in the U.S. under a licensing contract that featured a revenue-sharing agreement. General Mills then acquired the Yoplait brand in July 2011. Before the transaction, Sodima/Sodiaal was a supplier of intangible inputs (e.g., brand or image rights) to General Mills; after the transaction, the supply chain became vertically integrated, terminating the revenue-sharing agreement.

The U.S. yogurt industry is ideal for our analyses for two reasons. First, public documents describe the structure of the vertical contract between General Mills and Sodima/Sodiaal (though the exact contract terms are not disclosed). Second, the industry features a change in vertical structure caused by General Mills' acquisition of a controlling interest in Yoplait in 2011. The 2011 acquisition impacted General Mills' pricing incentives directly, while all other firms' pricing incentives were impacted in equilibrium.

To quantify the impact of the revenue-sharing agreement on market efficiency, we use weekly scanner data from 47 metropolitan areas in the U.S. from the IRI Marketing Data Set (Bronnenberg et al., 2008). We focus on the largest three yogurt manufacturers in the U.S., covering 75.6% of the category revenues between 2010 and 2012. We complement these data with public documents that reveal the structure of the revenue-sharing agreement between General Mills and Sodima, as well as demographic information from the 2011 American Community Survey (Ruggles et al., 2025).

In our work, we follow a two-step research design. First, we exploit variation in vertical structure to measure the equilibrium price effects of revenue-sharing agreements. Specifically, we compare within-product price changes among products that were subject to the revenue-sharing agreement, with those of products that were not subject to the agreement (e.g.,

[2] As we describe in Section 3.1, Sodima was restructured in 1989 and it became Sodiaal (for "Société de diffusion internationale agro-alimentaire"), and in 2002 Sodiaal established a 50/50 partnership with PAI Partners, a private equity firm. Across all these years, Yoplait remained owned by Sodima, Sodiaal, and the Sodiaal-PAI partnership.

Dannon products), before and after the transaction. We show that prices of Yoplait products decreased by 1.8 to 3 percent after General Mills acquired the Yoplait brand, relative to the prices of products that were not subject to the agreement. Importantly, we show that the price changes took place after the transaction was finalized and that these price reductions lasted through the end of our sample period.

Second, after establishing that the shift from a revenue-sharing contract to vertical integration impacted the prices of Yoplait products, as the theory predicts, we turn to quantifying the impact of the contract on market efficiency. We do this in three steps. First, we estimate demand for yogurt following the standard approach in the literature (Conlon and Gortmaker, 2020), including work in the U.S. yogurt industry (Villas-Boas, 2007; Hristakeva, 2022; Duarte et al., 2024b, among others). We then use the demand estimates, together with the first-order conditions of the pricing problem of yogurt manufacturers, to recover the firms' marginal costs and estimate a key parameter governing the revenue-sharing contract between General Mills and Yoplait.

We estimate this revenue-sharing agreement parameter using two complementary approaches. In the first one, we use the demand estimates to recover the ratio of marginal costs and the revenue-sharing parameter (i.e., the marginal cost mc_{jt} for products of other manufacturers, and the ratio mc_{jt}/μ for Yoplait products before July 2011, and mc_{jt} afterward). We then use this ratio as the dependent variable in a linear regression that allows us to identify μ under the assumption that there were no systematic changes in the marginal costs of Yoplait products around the time of the transaction. We estimate that Sodima received about 3 percent of General Mills' Yoplait revenues. As we mentioned above, and show in Section 4, because there were no changes in relative prices and in price levels prior to the transaction, we are reassured that these estimates were caused by the transition from revenue sharing to vertical integration.

In our second strategy to identify the revenue-sharing parameter, we follow an indirect inference approach. Specifically, we use our estimated model of demand and supply to compute equilibrium prices for different values of the revenue-sharing parameter. For each value of the revenue-sharing parameter, we replicate our price comparison exercise above: we compare within-product price changes among products that were subject to the revenue-sharing agreement, with those of products that were not subject to the agreement, before and after the transaction. If the only factor that impacted Yoplait products through July 2011 was the termination of the revenue-sharing contract, the true value of the revenue-sharing parameter would induce a null effect in prices. Using this approach, we estimate that Sodima received about 3 to 5 percent of General Mills' Yoplait revenues (i.e., these are the values that induce a null effect in different subsamples).

With these estimates of the revenue-sharing parameter in hand, we turn to quantify the impact of the revenue-sharing contract on the entire market. To do this, we first compute market outcomes when the revenue-sharing contract was in place. Then, we compare these outcomes with the market outcomes under vertical integration (i.e., when the revenue-sharing contract is no longer in effect).

Replacing the revenue-sharing contract with vertical integration led to price decreases for Yoplait products of between 1.95 to 3.3 percent, depending on which estimate of the revenue-sharing parameter we consider. The price decreases in Yoplait products led to an increase in Yoplait's market share of between 6.3 and 10.5 percent. We also find that General Mills' profits increased by 9.3 to 15.7 percent when eliminating the revenue-sharing agreement. Finally, we find that the presence of downstream competitors lessens General Mills' gains of implementing an efficient vertical contract, but the effect is of second order.

Our estimates imply that General Mills' annual profits increased by between \$103 million and \$173 million after eliminating the revenue-sharing agreement. Overall, our findings show that vertical integration led to lower prices, higher quantities, and higher profits, showing that inefficient vertical contracts can impact supply chains.

Literature Review

Given the impact of revenue-sharing agreements on pricing incentives and profits, a natural question is, 'Why do firms use them?' The literature has identified benefits to revenue-sharing agreements that may outweigh the above-mentioned costs.

Gallini and Wright (1990) consider the problem of a seller transferring a technology to a buyer in the presence of asymmetric information and the possibility of imitation. The uninformed buyer may refuse to make relationship-specific investments if not reassured about the value of the technology.[3] The authors show that in equilibrium, the informed seller will use a contract with output-related royalty to signal the value of a technology, which is not possible using only lump-sum payments. Beggs (1992) makes a similar point. Revenue-sharing agreements (where compensation increases with output) can also be profitable to use as a tool to incentivize costly effort (Bhattacharyya and Lafontaine, 1995; Lazear, 2000).

Mortimer (2008) considers the vertical relationship between the movie distributor and the downstream video rental firms, where the latter purchase video cassettes from the former. In particular, the author considers a transition from linear contracts (a lump sum payment for every cassette) to revenue-sharing agreements, in which the rental revenue of a video cassette was shared between the movie distributor and the downstream video rental firm. The author shows that a revenue-sharing agreement can improve the profits of the supply

[3] Gil and Lafontaine (2012) make a similar point in the context of movie exhibition contracts.

chain, as it leads to more efficient inventory choices. Unlike ours, Mortimer (2008) considers a setting where the revenue-sharing agreement does not distort output decisions (for a given inventory choice).

As discussed, profit-sharing and revenue-sharing agreements can signal the value of a technology, incentivize effort, or coordinate investments in some cases. A key difference between profit-sharing and revenue-sharing agreements, however, is that the latter distorts pricing incentives, which impacts the profits of the supply chain. Although pricing incentives are not distorted when using a profit-sharing agreement, economic profits are harder to monitor than revenue. When monitoring costs are greater than the profit loss due to distorted pricing incentives, a revenue-sharing agreement will be preferred.

Rather than analyzing the reasons for using a revenue-sharing agreement in the U.S. yogurt industry, our contribution lies in uncovering the details of a revenue-sharing agreement and quantifying its impact on market outcomes. More broadly, we contribute to the literature studying the economics of vertical mergers and vertical relationships.[4]

Our work also relates to the literature on strategic delegation (Spencer and Brander, 1983; Vickers, 1985; Fershtman and Judd, 1987; Sklivas, 1987; Bonanno and Vickers, 1988), which studies the problem of the firm owner in designing a managerial contract for the manager who chooses prices or quantities in an oligopoly game. While our focus is on a supply chain rather than a decentralized firm, similar insights arise in both cases. For example, Fershtman and Judd (1987) show that a firm owner may choose a managerial contract that distorts managers' incentives away from profit maximization so as to relax the intensity of product market competition. As mentioned above, revenue-sharing agreements induce a similar result in a supply chain, as these distort the downstream firm's pricing incentive in ways that may lead to less aggressive pricing. Our contribution is to empirically quantify the impact of an incentive distortion of this type (i.e., a revenue-sharing agreement) on supply chain outcomes.

2 The Impacts of Revenue-sharing Agreements

To examine the impact of a revenue-sharing agreement on supply chain outcomes, consider the following Hotelling-style example (Hotelling, 1929). Two downstream firms compete with each other selling one product each: firm A and firm B. Firm A's product requires an input product supplied by an upstream firm (for simplicity, firm B's product does not).

[4] See, for example, Villas-Boas (2007); Hortaçsu and Syverson (2007); Gil (2009); Bonnet and Dubois (2010); Crawford and Yurukoglu (2012); Houde (2012); Asker (2016); Crawford et al. (2018); Luco and Marshall (2020); Chen et al. (2024); Gil et al. (2024).

Firm A compensates the upstream firm by paying a fraction $1-\mu$ of its downstream revenue, where $\mu \in [0,1]$.[5] We assume that the marginal cost of the input product is zero, which, for example, may capture that the input is intangible (e.g., brand or image rights). The marginal cost of production of firms A and B is given by c.

The products of firm A and B are horizontally differentiated, and a consumer with a preference parameter x will choose firm A's product if and only if:

$$v + \delta - p_A - \tau \cdot x \geq v - p_B - \tau \cdot (1-x),$$

where v, δ, and τ are preference parameters, δ captures the asymmetry between products, and p_A and p_B are the prices of firms A and B, respectively. We assume x is uniformly distributed on the unit interval.[6] The demand for firm A and firm B's products are given by $x(p_A, p_B)$ and $1 - x(p_A, p_B)$, respectively, where

$$x(p_A, p_B) = \frac{1}{2} + \frac{\delta + p_B - p_A}{2\tau}.$$

The firms simultaneously choose their prices by maximizing $\pi_j(p_A, p_B)$. Firm A's problem is given by $\max_{p_A} \pi_A(p_A, p_B) = (\mu \cdot p_A - c)x(p_A, p_B)$, where μ is the coefficient of the revenue-sharing agreement.

How does the revenue-sharing agreement impact profits and pricing incentives? On the one hand, the revenue-sharing agreement creates inefficiency. To see this, divide $\pi_A(p_A, p_B)$ by μ, and the objective function becomes $\tilde{\pi}_A(p_A, p_B) = (p_A - c/\mu)x(p_A, p_B)$. One can immediately notice that a revenue-sharing agreement (i.e., $\mu < 1$) is equivalent, from an incentive perspective, to scaling up the marginal cost by $1/\mu$, which creates upward pressure on prices that induces inefficiency and distorts profits.

The profit of firm A's supply chain is given by $\pi_A^{SC}(p_A, p_B; \mu) = (p_A - c)x(p_A, p_B)$ since the production cost of the input is zero and the upstream and downstream firms share the revenue. Whenever $\mu < 1$, the downstream firm chooses $p_A^*(\mu, p_B) = \arg\max(p_A - c/\mu)x(p_A, p_B)$, which does not equal the price that solves $\max_{p_A}(p_A - c)x(p_A, p_B)$. That is, the revenue-sharing agreement decreases the profit of the entire supply chain relative to what it would earn without a revenue-sharing agreement, holding the prices of the rival fixed.[7]

[5]We abstract away from lump-sum payments, as they do not impact marginal pricing incentives.

[6]We assume v is sufficiently large that every consumer is served by one of the firms.

[7]Cachon and Lariviere (2005) argue that a revenue-sharing agreement where the downstream firm pays the upstream firm a particular wholesale price for each unit sold, w, in addition to a fraction $1-\mu$ the revenue can lead to supply chain coordination (i.e., outcomes that equal those of a vertically-integrated supply chain). Setting $w = \mu c - c < 0$ in the example above would imply that the profit function of the downstream firm equals $\pi(p; \mu) = \mu \cdot p \cdot q(p) - (c + w) \cdot q(p) = \mu \cdot (p - c) \cdot q(p)$, effectively converting the revenue-sharing agreement into a profit-sharing agreement, aligning pricing incentives along the supply chain.

On the other hand, the revenue-sharing agreement relaxes the intensity of price competition. The Nash equilibrium of the game features

$$p_A^* = \tau + \frac{\delta}{3} + \frac{2}{3}\frac{c}{\mu} + \frac{c}{3} \quad \text{and} \quad x^* = \frac{1}{2} + \frac{\delta - c/\mu + c}{6\tau},$$

which shows that the price of firm A decreases in μ.[8] Note that the effect of the revenue-sharing agreement on profits is different than that of a higher marginal cost, as the revenue-sharing agreement changes pricing incentives (of all downstream firms) but does not impact the actual marginal cost of production of firm A.[9]

Using these equilibrium values, we can compute the profit of the supply chain, $\pi_A^{*,SC} = (p_A^* - c)x^*$, and derive the impact of the revenue-sharing agreement on the profits of the supply chain:

$$\frac{\pi_A^{*,SC}}{\partial \mu} = \frac{\mu^2 6\tau}{c}\left(-\tau - \frac{\delta}{3} + \frac{4}{3}\frac{c}{\mu} - \frac{4}{3}c\right),$$

which can be positive or negative. That is, a revenue-sharing agreement may increase supply chain profits despite causing inefficiency.

In summary, a revenue-sharing agreement distorts pricing incentives, making it an inefficient vertical arrangement and lessening downstream price competition's intensity.[10] Because these effects impact the supply chain's profit differently, a revenue-sharing agreement has an ambiguous effect on equilibrium supply chain profits.[11]

3 Industry and Data

3.1 Industry Overview

In 1964, in France, farmers of various co-ops formed the "Société de Diffusion de Marque" (Sodima, hereafter). In 1965, Sodima combined two of its brands to form Yoplait. In 1974, Michigan Cottage Cheese Co. acquired the rights to produce and market Yoplait in the United States. Yoplait was launched in the United States in 1976 (General Mills, 2015).

General Mills started exploring the possibility of producing yogurt in 1975. In 1977, upon discovering Yoplait in the United States, General Mills acquired the production and marketing rights for the United States, and it acquired the production facility built by

[8] The equilibrium price of product B is given by $p_B^* = \tau - \delta/3 + 2c/3 + c/(3\mu)$.

[9] This is, while firm A operates as if its marginal cost is c/μ, the effective marginal cost is still c.

[10] Krishnan and Winter (2011) argue that a revenue-sharing agreement can lead to coordination of a supply chain in dynamic settings with inventory carryover.

[11] In Appendix E we show that the same comparative statics arise in the context of a Logit model, and are not specific to the Hotelling-style mode that we presented in this Section.

Michigan Cottage Cheese Co. in Reed City, Michigan (General Mills, 2015).

In 1989, Sodima became Sodiaal (the acronym for "Société de diffusion internationale agro-alimentaire"). In 2002, PAI Partners (a French private equity firm) and Sodiaal established a 50/50 partnership based on the Yoplait brand.

The contractual relationship between General Mills and Sodima/Sodiaal The 1977 license agreement between Sodima and General Mills granted General Mills a license to manufacture, distribute, and sell Yoplait in the United States.

The agreement had two main financial components.[12] First, the contract established that General Mills had to pay Sodima an annual licensing fee. Second, General Mills also had to pay a royalty over its gross revenues of Yoplait products in the United States.[13] The values associated with these terms are redacted in the public records and, as is generally the case with this type of contract, are unknown to researchers. However, public records do allow us to learn the structure of the licensing agreement.

In addition to these financial terms, the licensing agreement required Sodima to assist General Mills in selecting and installing equipment and machinery, planning and adjusting the production process, conducting quality control, and developing products. Under the agreement, General Mills was responsible for production and promoting the Yoplait brand in the United States.[14]

The 2011 acquisition of Yoplait by General Mills In March 2010, media reports made public that PAI Partners was considering selling its stake in Yoplait, following a change in PAI's management and a decision to redesign its investment strategy. In July 2010, PAI Partners initiated the process to sell its share in Yoplait S.A.S (the operating company) and Yoplait Marques S.A.S., which held the Yoplait brand worldwide. In February 2011, it was announced that PAI Partners had received nine bids, including bids from General Mills, Nestlé, Grupo Lala, Bright Food Group, Bel, Lactalis, Axa Private Equity, Bain Capital, and Lion Capital.[15]

Around the time PAI initiated the sale process, Sodiaal announced its intention to renegotiate the royalty rate or terminate the contract with General Mills within two years. General

[12]See Yoplait Manufacturing and Distribution License Agreement. Accessed on January 29th, 2024.

[13]Though the 1977 licensing agreement was amended several times, it retained its basic structure with a licensing fee and a royalty rate. See Appendix C for the history of contract amendments.

[14]See footnote 12.

[15]See "Private equity crashes to earth," The Sunday Times, September 20, 2009; "PAI gets nine bids for Yoplait stake," Reuters, February 6, 2011; "Nine bids for Yoplait as PAI speeds up disposals," Financial News London, February 8, 2011. Last accessed on December 15th, 2025. These sources indicate that PAI's exit strategy was not specific to Yoplait and was driven by PAI's earlier management change.

Mills argued that termination was possible only upon breach of contract, which Sodiaal had not alleged. In September 2010, following Sodiaal's announcement, General Mills filed for arbitration over the contract. This announcement was followed by a new one in March 2011, in which General Mills announced it would acquire PAI's share in Yoplait S.A.S and 1.5 percentage points of Sodiaal's, and 50% of Yoplait Marques S.A.S., acquiring a controlling interest in Yoplait, with Sodiaal maintaining its remaining participation in both companies.[16] The agreement between General Mills, PAI Partners, and Sodiaal was signed in May 2011 and completed on July 1st, 2011, after securing regulatory approval.[17] The transaction amount was 1.1 billion (USD).[18] Henceforth, we assume that these transactions lead to an elimination of the revenue-sharing agreement between General Mills and Sodiaal—our empirical results substantiate this claim.

3.2 Data

We use price and sales information on the U.S. Yogurt industry at the store-week-product level from 2010 to 2012 from the IRI Marketing Data Set. The original IRI dataset covers 64 distinct geographical areas, which correspond to groups of counties, including, generally, large metropolitan areas or regions. IRI omits markets in which the largest retailer has a market share of 50% or more (because this could reveal the retailer's identity), reducing coverage to 47 markets (Bronnenberg et al., 2008). Because of IRI's market coverage, the dataset is naturally representative of larger metropolitan areas in which no retailer accounts for more than 50% of the grocery market, suggesting that coverage is more representative in urban areas than in rural ones.

We complement these data with the 2011 American Community Survey (Ruggles et al., 2025). Given knowledge of the 5-digit ZIP codes of the IRI stores, we match households in the ACS by county and draw demographic information within the geographic areas identified in the IRI dataset. Below, we use these data to draw 500 random households from the distribution of income per person that corresponds to the store's county. We include these in our demand system.

We define a product as a brand–size combination (e.g., Yoplait Original 0.375 lbs). We measure quantities sold (and market shares) in terms of servings (a serving is defined as

[16] See "General Mills nears $1.1 billion deal to buy half of Yoplait," The New York Times, March 18th 2011. Accessed on January 29th, 2024.

[17] See "General Mills Completes Yoplait Acquisition," BusinessWire, July 1st 2011. Accessed on January 29th, 2024.

[18] In Appendix D we show that the transaction led to minor changes in day-to-day stock returns, which is consistent with media articles that reported minor changes in General Mills' stock price (see, for example, Hughlett M. "General Mills buying biggest bite of Yoplait." Star Tribune (Minneapolis, MN). May 18, 2011. Accessed May 6, 2025.

0.375 lbs). That is, one 1 lb or one 1.5 lb product is equivalent to 2.67 and 4 servings, respectively. Prices are measured as total revenue divided by total servings sold, and these are measured for each product–store–week combination.[19] We define a market as a store–week combination, and define the market size as 1.5 times the maximum number of servings sold in that store across all weeks.

In our analysis, we restrict attention to three firms—General Mills, Groupe Danone, and Chobani—comprising 75.6% of the category revenue during our sample period. This leaves us with 22 brands (30 products). Table A.1 in the Online Appendix presents the list of products in our sample and product-level summary statistics.

Figure A.1 in the Online Appendix presents trends over time for three variables— average price per pound, average number of pounds sold per store, and in-store average number of promotional activity events per store—for the top five selling products during the sample period (in terms of revenue). The figure suggests that average prices were approximately flat across products prior to the transaction, a subject to which we return in the next Section. The plots also suggest that Chobani was growing in volume sold during this period, whereas the sales of Yoplait products were declining initially but stabilized after the transaction. Lastly, the figure shows no noticeable change in in-store promotional activity before or after the transaction.

4 Price Effects of Revenue-Sharing Agreements

How does the revenue-sharing agreement (RSA) impact prices? As a first approach to answering this question, we compare within-product price changes among products that were subject to the RSA (i.e., Yoplait products) and those that were not, before and after the RSA was discontinued. This analysis allows us to measure the impact of eliminating the RSA net of the competitive response of other firms (or, in other words, the equilibrium effect of eliminating the RSA).

The baseline specification is given by

$$\log(\text{price}_{jst}) = 1\{\text{RSA termination}\}_{jst}\beta + \eta_{js} + \phi_{ts} + \varepsilon_{jst}, \tag{1}$$

where price_{jst} is the price of product j at store s in week t, $1\{\text{RSA termination}\}_{jst}$ is an indicator that takes the value one for Yoplait products after the RSA was terminated, η_{js} and ϕ_{ts} are fixed effects at the product–store and store–week level, and ε_{jst} is an error term

[19] The contract between General Mills and Sodima/Sodiaal defines royalties over gross sales. These are defined as General Mills's sales minus credits and returns, quantity discounts, and taxes. Our data contain retail quantities sold and revenues before taxes and net of returns.

Table 1: The Impact of Revenue Sharing on Prices

	(1)	(2)	(3)	(4)
	Price (in logs)			
	Full sample		Excluding Q3/Q4 2011	
General Mills * Post July 2011	-0.026	-0.018	-0.038	-0.030
	(0.002)	(0.002)	(0.002)	(0.002)
Week FE	Yes	No	Yes	No
Week–Store FE	No	Yes	No	Yes
Product FE	Yes	No	Yes	No
Product–Store FE	No	Yes	No	Yes
N	3,213,191	3,199,520	2,671,343	2,659,893

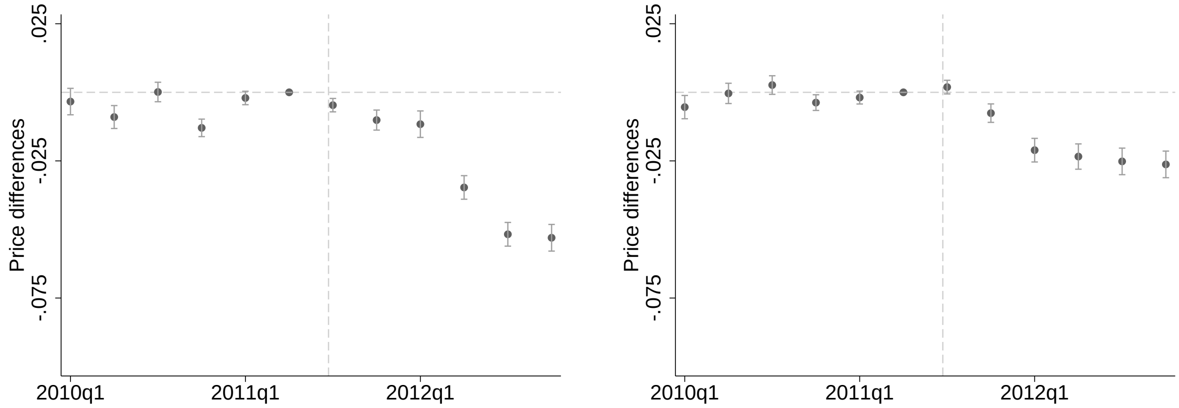
Notes: Standard error clustered at the store level in parentheses. An observation is a store–week–product combination. Columns 3 and 4 exclude quarters 3 and 4 of 2011.

clustered at the store level. Note that the product and time fixed effects are allowed to vary at the store level (i.e., we include fixed effects at the product–store and week–store level). This gives the model greater flexibility in capturing that the popularity of products can vary across locations and time-varying local demand factors that can affect prices. We also present estimates using a more parsimonious set of fixed effects (i.e., product and week fixed effects) and clustering standard errors at a different level (i.e., Metropolitan Statistical Area).

Table 1 shows estimates for Equation 1. Columns 1 and 2 make use of the full sample, whereas columns 3 and 4 exclude quarters 3 and 4 of 2011, to consider the possibility that the response to the change in incentives was delayed due to a transition period after the transaction. Column 1 shows that the prices of Yoplait products decreased by 2.6 percent relative to rival products *after* the RSA was terminated (i.e., the acquisition was completed). When using the more flexible set of fixed effects in column 2, we find that the average price effect drops to 1.8 percent. These results align with the theory suggesting that an RSA distorts incentives, leading to higher prices. Along these lines, when excluding quarters 3 and 4 of 2011 in columns 3 and 4 (to consider the possibility of a delayed change in pricing incentives), we find that the prices of Yoplait drop by 3 to 3.8 percent relative to other products after the termination of the RSA, with the smaller estimate coming from the specification with more flexible fixed effects (column 4).[20]

[20] Table A.2 in the Online Appendix replicates Table 1 with standard errors clustered at the Metropolitan Statistical Area instead. Clustering at this level allows for prices to be correlated across products and stores within the same metropolitan area. Although standard errors increase in magnitude, the estimates remain

Figure 1: The Impact of Revenue Sharing on Prices (in Logs)



Panel A: Full sample *Panel B*: No price promotions

Notes: Standard error clustered at the store level in parentheses. An observation is a store–week–product combination. All columns include product–store and store–week fixed effects.

We also estimate a version of Equation 1 that allows for Yoplait-specific time-varying effects to examine when the price effects occurred and whether there were differential trends before the RSA was terminated. We use July 2011 (actual acquisition date) as the date for the RSA termination. Figure 1 presents the results.

Panel A of Figure 1 considers the full sample, while Panel B restricts the sample to product–store–week combinations flagged as *not* having a price promotion.[21] The vertical lines identify July 2011, when the Yoplait acquisition was completed. Both panels are aligned with Table 1 in showing an immediate price decrease in Yoplait products following the RSA termination, with the estimates reaching close to 5 or 2.5 percent by the end of the sample in panels A and B, respectively. Both panels of Figure 1 also show no evidence of differential price trends before July 2011.

That we find an immediate price decrease in Yoplait products following the RSA termination and no differential price trends gives support to the idea that the RSA termination drove the price changes and not other factors. For instance, our sample period is one where Chobani's market share is increasing over time, but Chobani's growth is gradual rather than abrupt (see Figure A.2 in the Online Appendix). While Yoplait has an incentive to lower its price to counter Chobani's growth, this incentive would manifest gradually, tracking Chobani's gradual growth, rather than abruptly. In contrast, we see no systematic changes

statistically significant at conventional levels.

[21] The price promotion flag is a variable included in the IRI dataset and takes the value one when a temporary price discount of five percent or greater is in effect for a given product–store–week combination.

in Yoplait prices relative to other products before the RSA termination and a sudden price drop after, making the RSA termination rather than Chobani's growth a more plausible explanation for the price effects we observe.

Lastly, we replicate Table 1 using promotional activity as the outcome variable. We do this because the RSA termination may impact incentives along other dimensions such as advertisement. Specifically, we use an indicator for whether the producer paid for an in-store advertisement display for a given product in a given store on a given week, which is the measure of promotional activity in our dataset. We report the results in Table A.3 in the Online Appendix and find no significant effect of the RSA termination on promotional activity for Yoplait products relative to other products. This result may be an artifact of measurement error or may reflect that firms do not compete aggressively in advertising in this industry.

5 Model

5.1 Demand

We model consumers' preferences following Berry et al. (1995), Nevo (2001), and the literature that followed. We consider a market to be a store–week combination, and we model consumers' preferences in the product characteristics space and specify the indirect utility function as

$$u_{ijst} = -\alpha_i p_{jst} + \beta_i + \gamma_{js} + \gamma_t + \xi_{jst} + \varepsilon_{ijst}, \tag{2}$$

where p_{jst} and ξ_{jst} are the price and unobserved characteristics of product j at store s in week t, respectively, and γ_{js} and γ_t are product–store and time fixed effects. The consumer-specific parameter α_i is consumer i's price coefficient, whereas β_i is consumer i's taste for the inside goods (i.e., a random coefficient on the constant). Finally, we assume that ε_{ijst} is an i.i.d. extreme value type 1 idiosyncratic taste shock.

We model α_i and β_i as

$$\alpha_i = \exp\{\alpha + \sigma_p \cdot v_i^\alpha + \pi_p \cdot \text{income}_i\} \quad \text{and} \quad \beta_i = \beta + \sigma_0 \cdot v_i^\beta + \pi_0 \cdot \text{income}_i,$$

where income_i is consumer i's income (normalized to be in the unit interval) and both v_i^α and v_i^β are drawn from a standard normal distribution.[22]

[22] We specify the random coefficient on price to be log-normally distributed to lessen ex-ante restrictions on the model's cost pass-through (Miravete et al., 2023). In the case of the draws v_i^α and v_i^β, we use 500 scrambled Halton draws per market.

5.2 Supply

To model the supply side of the market, we assume that firms compete à la Bertrand-Nash and choose the prices of their portfolio of products to maximize their profits at the market level. Specifically, we assume that firm f, selling product portfolio $\mathcal{J}_{fst}$ at store s in week t, solves

$$\max_{p_{jst} \forall j \in \mathcal{J}_{fst}} \sum_{j \in \mathcal{J}_{fst}} (p_{jst}\mu_{f(j)t} - c_{jst}) M_{st} s_{jst}(\mathbf{p}), \tag{3}$$

where $\mu_{f(j)t}$ corresponds to the share of revenues that firm f keeps (and $1-\mu_{f(j)t}$ corresponds to the share of revenues that f pays to the upstream firm), c_{jst} is the marginal cost of product j at store s in week t, and M_{st} represents the size of the market.

The first-order conditions for firm f are given by

$$s_{jst}(\mathbf{p}) + \sum_{k \in \mathcal{J}_{fst}} (p_{kst} - c_{kst}/\mu_{f(k)t}) \frac{\partial s_{kst}(\mathbf{p})}{\partial p_{jst}} = 0,$$

where we use that $\mu_{f(k)t} = \mu_{f(j)t}$ for all $j, k \in \mathcal{J}_{fst}$. We can also write the first-order conditions of market t in matrix form

$$\mathbf{s}_{st}(\mathbf{p}) - \Omega(\mathbf{p})(\mathbf{p}_{st} - \mathbf{c}_{st}/\mu_{st}) = 0, \tag{4}$$

where $\Omega(p)$ is a $J_t \times J_t$ matrix with the element-by-element product of the ownership matrix and the partial derivatives of demand with respect to prices (Nevo, 2001) and $\mathbf{c}_{st}/\mu_{st}$ is the element-wise division of $\mathbf{c}_{st}$ and μ_{st}.

Discussion In our supply-side model, we simplify the analysis by assuming that the manufacturer sets retail prices and sells directly to the end consumer. We discuss in Online Appendix B how the analysis can be extended by adding a retailer to the supply chain. As we note there, one can recover the ratios $\mathbf{c}_{st}/\mu_{st}$ (i.e., the ratios of the manufacturers' marginal costs and revenue share parameters) similarly as in Equation 4—the difference being that the equation will have extra terms to account for the retailer markup and retail price passthroughs. In our view, adding a retail sector does not enrich the economics of the analysis, which is why we choose to conduct our analysis with the parsimonious model. Other research has presented evidence suggesting that retailers play a passive role, which reassures us in our choice (see, for example, Villas-Boas, 2007; Bonnet and Dubois, 2010; Miller and Weinberg, 2017; De Loecker and Scott, 2024; Duarte et al., 2024a).

We also abstract away from the impact of the revenue-sharing agreement on advertising incentives. While we acknowledge this is a simplification, we make this choice largely because we do not find a change in General Mills's advertising intensity following the elimination of the revenue-sharing agreement (see Table A.3 in the Online Appendix).

6 Estimation

6.1 Demand

We estimate demand using `pyBLP` (Conlon and Gortmaker, 2020). In the estimation, we follow Nevo (2001) and include product–store fixed effects ξ_{js}, which absorb time-invariant product characteristics and time-invariant product-specific demand shifters at the store level. Further, we also include week fixed effects ξ_t. Our specification includes random coefficients on price and the intercept, which allows us to rationalize substitution to the outside option more flexibly.

We estimate our demand model using a 2-step GMM approach. In the first step, we use cost shifters and local differentiation instruments to address price endogeneity and to identify the random coefficients. In the first set of instruments, we include the interaction between diesel prices and the distance from production facilities to stores (Hristakeva, 2022), an indicator that equals one for General Mills' products after the transaction between General Mills and Sodiaal and zero before it, and the mean weekly temperature in the ZIP code of each store. We also include store–week counts of products featured and displayed. We construct the second set of instruments following Gandhi and Houde (2023) and include one based on the number of products with a Euclidean distance on price that is less than one standard deviation of the price distribution, and one that interacts a product's price with this distance, which helps in identifying the random coefficient on the intercept. Finally, in the second step of our GMM estimator, we construct approximated optimal instruments following Conlon and Gortmaker (2020).

We report our estimates in Table 2. In the first column, we report estimates for the model without customer heterogeneity (i.e., $\alpha_i = \alpha$ and $\beta_i = \beta$ for all consumers i). We report the estimates of the full model in columns 2 and 3. Column 3 incorporates consumer demographics (namely, household income) into the random coefficients, whereas column 2 does not. The estimates in column 2 reveal the existence of unobserved consumer heterogeneity in price sensitivity (σ_p) and near null heterogeneity on the intercept (σ_0). These patterns remain unchanged in column 3, which also shows that higher-income households are less price-sensitive and more willing to substitute toward the outside option (both effects are statistically significant). In the rest of the paper, unless noted otherwise, we report results for these two specifications.

Table 2: Demand Estimates

	(1)	(2)	(3)
Price RC (Log Normal)			
Constant (α)	1.578	1.521	2.100
	(0.033)	(0.003)	(0.013)
Normal draw (σ_p)		0.029	0.015
		(0.018)	(0.009)
Household income (π_p)			-17.156
			(0.532)
RC on Constant (Normal)			
Normal draw (σ_0)		0.006	0.037
		(0.085)	(0.025)
Household income (π_0)			-26.522
			(1.948)
Observations	3,199,520	3,199,520	3,199,520
Median own-price elasticity	-3.66	-3.45	-3.60

Notes: Standard error clustered at the store level in parentheses. An observation is a store–week–product combination. All specifications include product-store and week fixed effects.

Figure A.3 in the Online Appendix reports the cumulative distribution function (CDF) of the implied own-price elasticities across all the observations in our data, using the estimates in Table 2 (column 3). Table A.4 in the Online Appendix reports various percentiles of the distribution of own-price elasticities by the firm for the same specification. Overall, we find that own-price elasticities vary between -2 and -6. The median own-price elasticity is -3.6, while the mean is -3.65. These elasticities are in line with those reported in previous work but are smaller in absolute value (e.g., Villas-Boas, 2007 and Hristakeva, 2022 report mean own-price elasticity equal to -5.64 and -4.05, respectively, while Duarte et al., 2024b reports a mean own-price elasticity of -6.07 and a median of -5.58), which may be explained by our decision to estimate demand with products of the three most popular brands in this product category.

Finally, in Table A.5 and Table A.6 in the Online Appendix we report the full matrices of median own- and cross-price elasticities for all the products in our data.

6.2 Revenue Sharing Agreement and Marginal Costs

Given the demand estimates, we can recover marginal costs up to the revenue-sharing agreement parameter μ using

$$\frac{\mathbf{c}_{st}}{\mu_{st}} = \mathbf{p}_{st} - \Omega(\mathbf{p}_{st})^{-1}\mathbf{s}_{st}(\mathbf{p}_{st}), \tag{5}$$

where $\mu_{jst} = \mu$ for Yoplait products prior to July 2011 and $\mu_{jst} = 1$ otherwise.

The empirical challenge is separating $\mathbf{c}_{st}$ from μ_{st}. We propose two complementary approaches for doing so.

Marginal Cost Approach

Using Equation 5, we recover $\tilde{c}_{jst} \equiv c_{jst}/\mu_{jst}$ using our demand estimates. We model c_{jst} and we separate it from μ_{jst} leveraging the termination of the revenue-sharing agreement, which was specific to Yoplait products.

Specifically, we assume $c_{jst} = \exp\{\gamma_t + \kappa_j + \varepsilon_{jst}\}$, where γ_t and κ_j are week and product fixed effects, respectively, and ε_{jst} is an error term clustered at the store level. Taking the logarithm of $\tilde{c}_{jst} \equiv c_{jst}/\mu_{jst}$, and using that $\mu_{jst} = \mu$ for Yoplait products prior to July 2011 and $\mu_{jst} = 1$ otherwise, we obtain

$$\log \tilde{c}_{jst} = \gamma_t + \gamma_j - \log \mu \cdot 1\{\text{Yoplait, pre-July 2011}\} + \varepsilon_{jst}. \tag{6}$$

We assume that there is no systematic change in marginal costs except for a common trend. That is, the termination of the revenue-sharing agreement is the only systematic change in $\tilde{c}_{jst} \equiv c_{jst}/\mu_{jst}$ affecting Yoplait products.

We estimate this equation using the full sample and excluding quarters 3 and 4 of 2011. Table 3 reports the estimates for the revenue sharing coefficient. We find that when we exclude quarters 3 and 4 of 2011 to account for a possible transition period after the transaction, the coefficient is about 0.97 and does not vary across specifications, suggesting that General Mills was paying Sodima about 3 percent of its revenues while the revenue-sharing agreement was in place.[23] The table reports bootstrapped 95-percent confidence intervals to account for demand parameter uncertainty.[24]

[23] In all specifications, we reject the hypothesis that $\hat{\mu}$ is equal to 1.

[24] We construct these confidence intervals using a parametric bootstrap approach. Specifically, we take 200 draws from the distribution of demand parameter estimates (based on the asymptotic approximation) and recompute marginal cost estimates given each draw. For each bootstrapped vector of marginal costs, we re-estimate Equation 6. We then form a vector of estimates for Equation 6, one for each draw from the distribution of demand parameters, and construct the confidence intervals based on this vector.

Table 3: Estimating the Revenue Sharing Parameter: Marginal Cost Approach

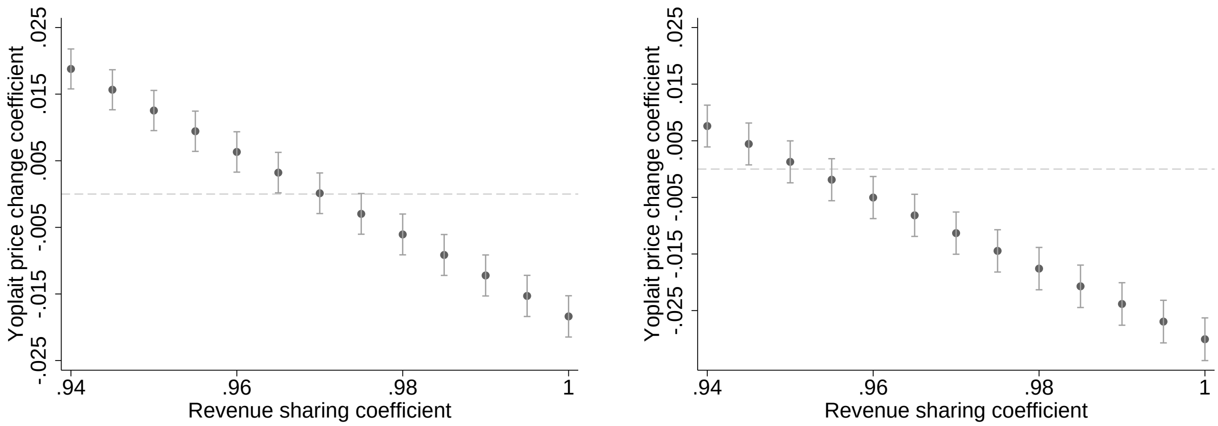
	(1)	(2)	(3)	(4)
	No demographics		Demographics	
	Full sample	Excluding Q3/Q4 2011	Full sample	Excluding Q3/Q4 2011
Yoplait * Pre July 2011	0.016	0.029	0.018	0.029
	[0.015,0.016]	[0.028,0.029]	[0.015,0.020]	[0.026,0.031]
N	3,197,702	2,658,172	3,198,599	2,659,056
Implied Rev. Sharing Coef.	0.984	0.972	0.983	0.972
	[0.984,0.985]	[0.971,0.972]	[0.981,0.985]	[0.969,0.974]

Notes: Bootstrapped 95-percent confidence intervals in brackets. An observation is a product–store–week combination. The 'no demographics' and 'demographic' specifications make use of the estimates in columns (2) and (3) of Table 2, respectively. In all specifications we reject the hypothesis that $\hat{\mu}$ is equal to 1.

Indirect Inference Approach

In our second approach, we start by computing $\tilde{c}_{jst} \equiv c_{jst}/\mu_{jst}$ using our demand estimates. As before, we assume $\mu_{jst} = \mu$ for Yoplait products prior to July 2011 and $\mu_{jst} = 1$ otherwise. We then take an arbitrary value of μ (call it μ^{guess}) and compute the implied marginal costs: $c_{jst}^{\mu^{\text{guess}}} = \mu^{\text{guess}}\tilde{c}_{jst}$ for Yoplait products prior to July 2011 and $c_{jst}^{\mu^{\text{guess}}} = \tilde{c}_{jst}$ otherwise.

Figure 2: Estimating the Revenue Sharing Parameter: Indirect Inference Approach



A) Full sample B) Excluding Q3/Q4 2011

Notes: The specifications make use of the estimates in Column (3) of Table 2. Panel B excludes the third and fourth quarter of 2011, as in columns (3) and (4) of Table 1.

Next, we compute the equilibrium prices for every market using $\mathbf{c}^{\mu^{\text{guess}}}$ and our demand estimates. We denote these prices $\mathbf{p}^{\mu^{\text{guess}}}$. Lastly, we estimate equation (1) using $\mathbf{p}^{\mu^{\text{guess}}}$. That is, we make within-product price comparisons of Yoplait products and products not directly affected by the revenue-sharing agreement before and after July 2011, using prices $\mathbf{p}^{\mu^{\text{guess}}}$.

What is the logic of the exercise? Under the assumption that the revenue-sharing agreement termination was the only systematic factor affecting Yoplait products through July 2011, the estimates of equation (1) using $\mathbf{p}^{\mu^{\text{guess}}}$ should reveal a null effect (i.e., $\hat{\beta} = 0$ in equation 1) if the value μ^{guess} equals the true value of μ governing the revenue-sharing agreement. Using this logic, we repeat the steps above, searching for the value of μ^{guess} such that $\hat{\beta} = 0$.

Figure 2 presents the estimates of β in equation (1) using the prices $\mathbf{p}^{\mu^{\text{guess}}}$ that correspond to different values of μ^{guess}. We do this exercise using the demand estimates in Table 2 (column 3), and we repeat the analysis excluding quarters 3 and 4 of 2011.[25] In Figure 2.A we find that the value of μ that leads to $\hat{\beta} = 0$ is $\hat{\mu} = 0.97$; whereas in Figure 2.B, when excluding quarters 3 and 4 of 2011, we find that this value is $\hat{\mu} = 0.95$. These results suggest that General Mills paid Sodima between 3 and 5 percent of its revenues while the revenue-sharing agreement was in place.

[25] See Figure A.4 in the Online Appendix for the same analysis using the estimates in Table 2 (column 2).

Discussion

We conclude this section by noting that both methods rely on the assumption that the termination of the RSA was the one systematic factor that changed pricing incentives during the sample period. Along these lines, the marginal cost approach imposes an explicit constraint on the evolution of marginal costs through the termination of the RSA—i.e., marginal costs are only allowed to change over time through a common trend.

The key difference among both methods is that the marginal cost approach uses a transformation of the equilibrium vector of prices (see equation 5) whereas the indirect inference approach uses prices directly. Confounders that impact prices (e.g., a product-specific demand shock) may have a differential effect on the estimates of the RSA depending on the method used.

We find similar estimates across methods ($\hat{\mu} = 0.95$ and $\hat{\mu} = 0.97$), which suggests that confounders that violate our identification assumption (if any) play a minor role. That said, the marginal cost approach delivers smaller estimates than the indirect inference approach. Why?

As noted above, the sample period is one where Chobani's market share is growing and its prices are flat or falling (see Figure A.1 in the Online Appendix), which suggests in part that Chobani's marginal costs are falling, making the marginal cost approach's assumption of no differential cost changes over time a poor fit for Chobani during the sample period. For this reason, we replicate Table 3 dropping Chobani from the estimation sample and present the results in Table A.7 in the Online Appendix. The table shows that when we drop Chobani, the marginal cost approach delivers estimates of the revenue sharing coefficient nearly identical to the estimates from the indirect inference approach in Figure 2. These results highlight the extra rigidity of the marginal cost approach.

7 The Cost of an Inefficient Vertical Contract

How does the revenue-sharing agreement (RSA) impact General Mills' profits and supply chain? We answer this question by comparing the baseline equilibrium (i.e., that with the RSA in place) with the counterfactual equilibrium in which Yoplait's supply chain is vertically integrated (i.e., the revenue-sharing agreement parameter is set to $\mu = 1$). This comparison allows us to learn about the impact of the distortion on pricing incentives caused by the RSA on market outcomes. We restrict attention to the period before July 2011, which is the period before General Mills acquired Yoplait.

Table 4: The Impact of a Revenue Sharing Agreement on Market Outcomes: General Mills

	(1)	(2)	(3)	(4)	(5)	(6)
		$\mu = 0.97$			$\mu = 0.95$	
	Price	Share	Profit	Price	Share	Profit
Best-response	-0.0195	0.0632	0.0935	-0.0325	0.1051	0.1565
wo/RSA	(0.0005)	(0.0021)	(0.0021)	(0.0004)	(0.0021)	(0.0021)
Equilibrium	-0.0195	0.0631	0.0933	-0.0325	0.1049	0.1563
wo/RSA	(0.0005)	(0.0021)	(0.0021)	(0.0004)	(0.0021)	(0.0021)
N	2,402,718	2,402,718	2,402,718	2,402,718	2,402,718	2,402,718

Notes: The estimates are based on demand estimates in Table 2 (column 3). Standard errors in parentheses. An observation is a product–store–week combination. We restrict attention to weeks before July 2011 (i.e., the time when the transaction was completed) and General Mills products. Each column displays regression coefficients of $\log(X)$, for $X \in \{\text{price, market share, profit}\}$, on an indicator for when General Mills best responds to the removal of the RSA (but all other firms are not allowed to respond) and an indicator for the equilibrium without RSA (an indicator for the baseline equilibrium is the omitted category).

General Mills's Outcomes

We first measure the impact of the RSA on endogenous outcomes set by General Mills. We compute and compare these endogenous variables under three scenarios: i) baseline equilibrium with RSA; ii) no RSA, but General Mills is the only firm allowed to reoptimize; and iii) equilibrium without RSA. The difference between scenarios ii) and iii) allows us to separate the direct effect of eliminating the RSA from the equilibrium feedback effects that come into play once all firms best respond and a new equilibrium without RSA is reached.

Table 4 presents the results of this comparison for the model estimates based on Table 2 (Column 3).[26] We consider RSAs with values of $\hat{\mu} = 0.97$ (estimate using the marginal cost approach) and $\hat{\mu} = 0.95$ (estimate using the indirect inference approach). Each column of the table presents estimates for the following equation

$$\log(X_{jswt}) = \delta_0 + 1\{\text{no RSA, best-response}\}_{jswt}\delta_1 + 1\{\text{no RSA, equilibrium}\}_{jswt}\delta_2 + \varepsilon_{jswt},$$

where X_{jswt} is an outcome variable (price, market share, or profit) for product j at store s in week w under scenario $t \in \{\text{baseline equilibrium, no RSA, best-response, no RSA, equilibrium}\}$. The omitted category in the equation is the baseline equilibrium scenario.

The table shows that removing the revenue-sharing agreement leads to an average equilibrium price decrease of 1.95 to 3.3 percent for Yoplait (General Mills) products, depending

[26] See Table A.8 in the Online Appendix for more details, with a breakdown of changes in market outcomes by firm.

on the value of μ. As discussed in Section 2, from the perspective of pricing incentives, an RSA is equivalent to having an inflated marginal cost. When the RSA is eliminated, the upward pressure on prices introduced by the RSA is eliminated. The effects of eliminating the RSA on Chobani and Groupe Danone products are of second order, making the effects on prices nearly identical between the cases in which the RSA is eliminated and only General Mills is allowed to reoptimize (row labeled 'Best-response wo/RSA') and the equilibrium without the RSA (row labeled 'Equilibrium wo/RSA').

We find that eliminating the RSA causes an average increase in the equilibrium market share of General Mills products of between 6.3 to 10.5 percent. This suggests that eliminating the RSA helps General Mills increase the market share of its products by stealing market share away from rivals and the outside option—a result consistent with Figure A.1 in the Online Appendix.

Lastly, we compute the change in a product's profit in a store when eliminating the RSA. We find that the equilibrium profits of Yoplait products, captured by General Mills, increased by 9.3 to 15.7 percent on average. These numbers combine two effects. On the one hand, the termination of the RSA implies that General Mills no longer has to pay Sodiaal part of its revenue, which induces a mechanical profit gain. On the other hand, the termination of the RSA implies that General Mills becomes more competitive in the product market game (i.e., it can compete as though it has "lower" marginal costs). Being more competitive increases equilibrium profits. We find that both effects are empirically relevant, but the former accounts for about 95 to 96 percent of the gains reported in Table 4.[27]

Did downstream competition limit the extent to which the RSA introduced inefficiencies in this market? The model we discussed in Section 2 shows that the main effect of the RSA is to distort the pricing incentives of the firm that is subject to it. However, the presence of downstream rivals that are not subject to the RSA limits the extent of the inefficiency caused by this contract, as these firms may respond by raising their prices as well. Table 4 shows that the competitive effects are of second order in this setting, and the direct effect of eliminating the RSA dominates the comparison.

How large are these effects? We find that eliminating the RSA would have increased the profit earned by General Mills in a store–year by between \$1,594 ($\mu = 0.97$) and \$2,689 ($\mu = 0.95$) on average. Assuming that the sample of stores in the IRI Marketing Data Set is representative of the universe of supermarket/grocery stores in the U.S. at the time of General Mills's acquisition of Yoplait, the nation-wide change in General Mills' annual

[27]Specifically, 96 percent (column 1) and 95 percent (column 2) of the profit gains in Table 4 result from terminating the payments from General Mills to Sodiaal. The rest of the profit gains come from more competitive pricing.

profits from eliminating the RSA is between \$103 million and \$173 million.[28] Note that we abstract away from licensing fees from this calculation (i.e., lump sum payments between General Mills and Sodima).

Two facts suggest the transaction likely added value to the company. On the one hand, General Mills' stock price increased by 1.44 percent following the announcement of the deal reached with PAI Partners.[29] On the other hand, given the transaction fee of \$1.1 billion, the profit gains mentioned above imply a rate of return of the order of 9.4 to 15.7 percent, which are greater than the reciprocal of the P/E ratio of General Mills at the time of the transaction (e.g., its P/E ratio in 2011 was in the 14-15 range).[30]

General Mills's Supply Chain Outcomes

Our findings suggest a significant distortion in prices and the profits of General Mills caused by the revenue-sharing agreement (RSA). What is the impact of the RSA on Yoplait's supply chain profits? In the scenario with the RSA, the profits of the supply chain equal the sum of the profits of General Mills (product market profits minus the revenue shared with Sodiaal) and Sodiaal (revenue collected from General Mills), whereas in the scenario without the RSA the profits of the supply chain equal the profits of General Mills.

As argued in Section 2, the RSA has two effects on the supply chain's profits. On the one hand, it inflates prices, which increases the price–cost margin of the supply chain. On the other hand, the greater prices cause a decrease in the market shares of the supply chain's products. Depending of the relative magnitude of these effects, the RSA may increase or decrease supply chain profits.

Table 5 presents the results of comparing supply chain profits across the same scenarios as in Table 4. The table shows that eliminating the RSA increases General Mills' supply chain profits by 0.37 and 0.84 percentage points when $\mu = 0.97$ and $\mu = 0.95$, respectively. These findings suggest that while the RSA has an economically significant impact on General Mills's profits, it has a modest impact on the supply chain's profits. This result may explain why RSAs are common in practice.

[28] Here, we scale up the store–year average profit change (between \$1,594 and \$2,689) by 64,366, which is the number of supermarket/grocery stores in the U.S. in 2011 according to the County Business Patterns.

[29] Mike Hughlett, "General Mills confirms deal to buy 50% of Yoplait for \$1.1B", *StarTribune*, March 19th, 2011. Accessed through the Texas A&M University Libraries on August 20th, 2025.

[30] See Online Appendix D for details.

Table 5: The Impact of a Revenue Sharing Agreement on General Mills' Supply Chain Profit

	(1)	(2)
	$\mu = 0.97$	$\mu = 0.95$
	General Mills's Supply Chain Profit	
Best-response wo/RSA	0.0038	0.0087
	(0.0021)	(0.0021)
Equilibrium wo/RSA	0.0037	0.0084
	(0.0021)	(0.0021)
N	2402718	2402718

Notes: The estimates are based on demand estimates in Table 2 (column 3). Standard errors in parentheses. An observation is a product–store–week combination. We restrict attention to weeks before July 2011 (i.e., the time when the transaction was completed) and General Mills products. Each column displays regression coefficients of log(Profit of supply chain) on an indicator for when General Mills best responds to the removal of the RSA (but all other firms are not allowed to respond) and an indicator for the equilibrium without RSA (an indicator for the baseline equilibrium is the omitted category).

8 Concluding Remarks

Revenue-sharing agreements (RSA) are commonly used along the vertical supply chain. We argue that RSAs introduce a distortion in the supply chain, leading to inefficiency. We quantify the magnitude of this inefficiency in the context of a specific RSA that was in place in the U.S. yogurt industry until 2011. Specifically, between 1976 and 2011, Sodiaal (originally named Sodima and renamed in 1989) owned the Yoplait brand. In the U.S., General Mills sold Yoplait under a licensing contract that involved an RSA. This agreement was terminated in 2011 when General Mills acquired a controlling interest in the Yoplait brand. After this transaction, the supply chain became vertically integrated.

Though the terms of the RSA remain confidential, we exploit our knowledge of the contract structure and its termination date to identify the contract terms. We first estimate demand for the U.S. yogurt industry. With demand estimates in hand, we recover the ratio of marginal costs to the revenue-sharing parameter (μ for Yoplait products before the transaction and one after it, and one for all other products over the entire sample period). We then use two complementary approaches to identify and estimate the revenue-sharing parameter μ. We find that General Mills paid between 3 and 5 percent of its annual category revenues to Sodiaal between 2010 and 2011.

With the estimates of the revenue-sharing parameters in hand, we turn to quantifying the RSA's impact on equilibrium outcomes. We find that vertical integration (eliminating the RSA) decreased equilibrium prices by 1.95 to 3.3 percent and increased General Mills' equilibrium profits by between 9.3 and 15.7 percent. These findings speak to the distortionary effects of revenue-sharing agreements.

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Online Appendix: Not For Publication

The Cost of an Inefficient Vertical Contract

Fernando Luco and Guillermo Marshall

A Additional Tables and Figures

Table A.1: Summary Statistics

		0.375 lbs			1 lbs			1.5 lbs		
Brand	Firm	*N*	Mean	S.D.	*N*	Mean	S.D.	*N*	Mean	S.D.
Brown Cow	Groupe Danone	35,273	1.06	0.24	9,132	3.72	0.56			
Chobani	Chobani	166,203	1.33	0.20	78,602	3.40	0.52			
Dannon	Groupe Danone	115,589	0.67	0.18						
Dannon Activia	Groupe Danone				199,994	2.48	0.42	62,085	3.00	0.48
Dannon Activia Dessert	Groupe Danone				40,468	2.33	0.44			
Dannon Activia Fiber	Groupe Danone				123,824	2.45	0.43			
Dannon Activia Light	Groupe Danone				188,986	2.47	0.42	51,413	2.90	0.51
Dannon All Natural	Groupe Danone	131,621	0.66	0.15						
Dannon Danimals Crushcups	Groupe Danone				127,910	2.36	0.34			
Dannon Lght N Ft Crb & Sugr C	Groupe Danone				67,062	3.05	0.37			
Dannon Light N Fit	Groupe Danone	132,490	0.66	0.16				177,785	2.21	0.35
Dannon Nutriday	Groupe Danone				4,976	1.01	0.08			
Stonyfield Farm	Groupe Danone	85,092	0.96	0.20				20,811	4.08	0.60
Yoplait	General Mills	138,101	1.04	0.21	42,329	2.85	0.44			
Yoplait Delights	General Mills				119,754	2.87	0.46			
Yoplait Fiber One	General Mills				87,553	2.52	0.42			
Yoplait Light	General Mills	203,545	0.67	0.13				0		
Yoplait Light Thick & Creamy	General Mills	141,848	0.66	0.12						
Yoplait Original	General Mills	212,541	0.69	0.15				96,226	2.47	0.42
Yoplait Thick & Creamy	General Mills	150,554	0.66	0.12						
Yoplait Trix	General Mills							130,972	2.69	0.46
Yoplait Yo Plus	General Mills				70,452	2.36	0.45			

Notes: An observation is a store–week–product combination. The columns labeled "Mean" and "S.D." report the mean and standard deviation of prices for each product.

Table A.2: The Impact of Revenue Sharing on Prices: Clustering Standard Errors at the MSA Level

	(1)	(2)	(3)	(4)
	Price (in logs)			
	Full sample		Excluding Q3/Q4 2011	
General Mills * Post July 2011	-0.026	-0.018	-0.038	-0.030
	(0.005)	(0.005)	(0.006)	(0.006)
Week FE	Yes	No	Yes	No
Week–Store FE	No	Yes	No	Yes
Product FE	Yes	No	Yes	No
Product–Store FE	No	Yes	No	Yes
N	3,213,191	3,199,520	2,671,343	2,659,893

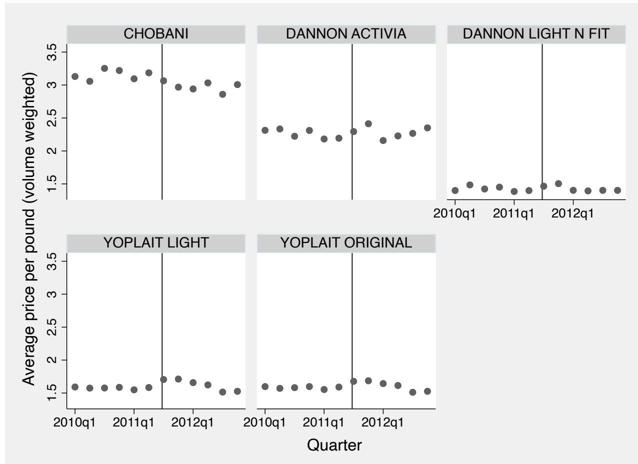
Notes: Standard error clustered at the Metropolitan Statistical Area level in parentheses. An observation is a store–week–product combination. Columns 3 and 4 exclude quarters 3 and 4 of 2011.

Table A.3: The Impact of Revenue Sharing on Promotional Activity

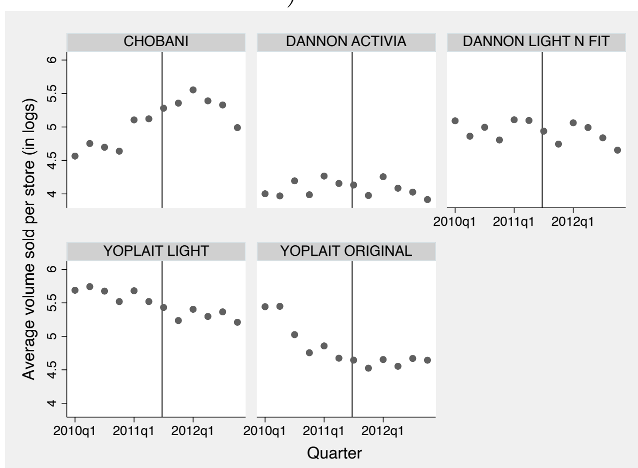
	(1)	(2)	(3)	(4)
	Indicator for minor or major advertisement/display event			
	Full sample		Excluding Q3/Q4 2011	
General Mills * Post July 2011	-0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Week FE	Yes	No	Yes	No
Week–Store FE	No	Yes	No	Yes
Product FE	Yes	No	Yes	No
Product–Store FE	No	Yes	No	Yes
N	3,213,192	3,199,521	2,671,343	2,659,893

Notes: Standard error clustered at the store level in parentheses. An observation is a store–week–product combination. Minor or major advertisement/display events are flagged in the dataset at the store–week–product level. Columns 3 and 4 exclude quarters 3 and 4 of 2011.

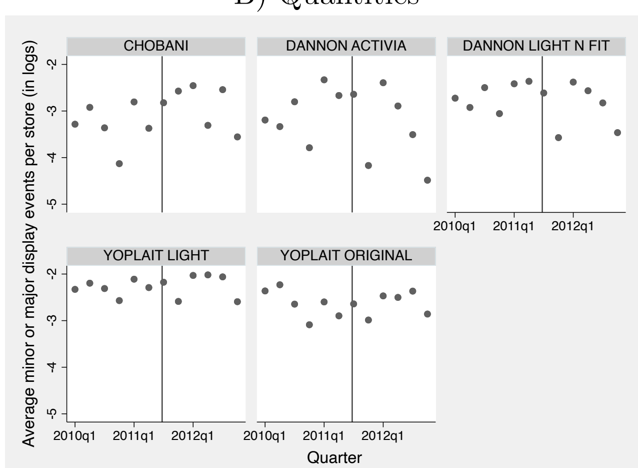
Figure A.1: Price, quantity, and volume trends for the top five products (in revenue)



A) Prices



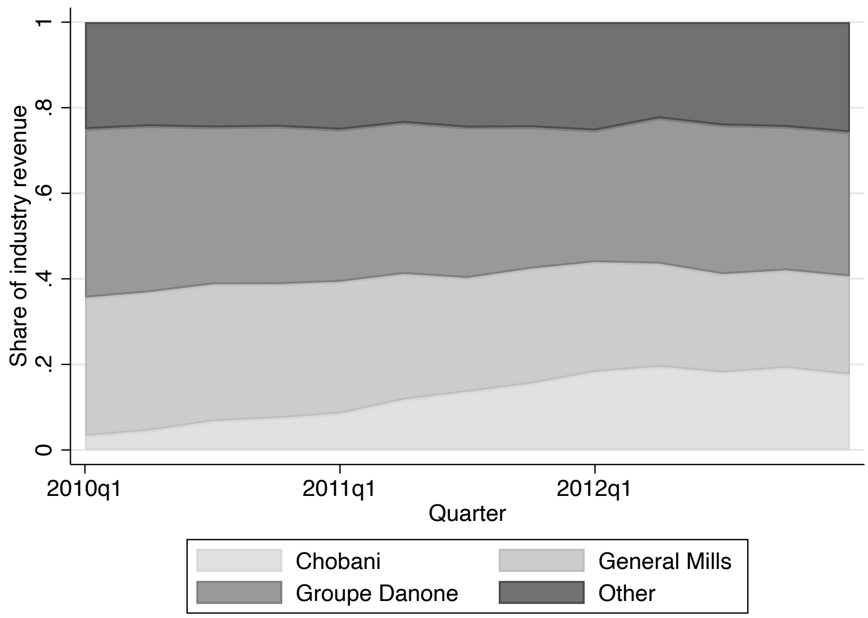
B) Quantities



C) Promotional activity

Notes: The figure reports the average volume-weighted price per pound, average volume (in pounds) sold per store, and average number of minor or major display events per store (e.g., end of aisle displays) over time for the five products with the greatest cumulative revenue during the sample period. The vertical line indicates the time of the transaction, i.e., quarter 3 of 2011.

Figure A.2: Share of Industry Revenue, by Firm



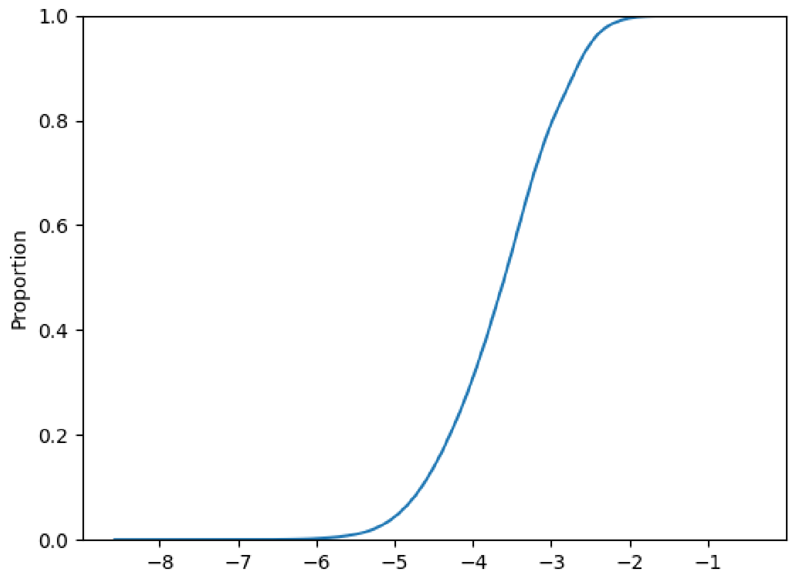
Notes: The figure reports the share of industry revenue captured by each firm in a quarter. We compute industry revenue shares using all products by all firms, including those that are otherwise excluded from our analysis (e.g., private labels).

Table A.4: Estimated own-price elasticities by firm

		Percentile								
Firm	Mean	1%	5%	10%	25%	50%	75%	90%	95%	99%
Chobani	-4.37	-6.17	-5.62	-5.32	-4.83	-4.32	-3.86	-3.46	-3.27	-2.9
General Mills	-3.52	-5.36	-4.85	-4.55	-3.97	-3.42	-3.01	-2.66	-2.48	-2.17
Danone	-3.64	-5.31	-4.85	-4.59	-4.14	-3.65	-3.15	-2.64	-2.45	-2.07

Notes: The table reports percentiles of the firm-specific distribution of own-price elasticities. An observation is a product-store-week combination. The table is based on the estimates of specification 3 in Table 2

Figure A.3: Estimated own-price elasticities



Notes: The figure reports the cumulative distribution function (CDF) of the estimated own-price elasticities according to specification 3 in Table 2.

Table A.5: Estimated median own- and cross-price elasticities (Log Normal specification)

ID	Brand	ID 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Brown Cow 0.375	-4.143	0.011	0.240	0.028	0.036	0.075	0.006	0.004	0.015	0.049	0.006	0.009	0.009	0.011	0.061
2	Brown Cow 1.0	0.007	-4.356	0.270	0.024	0.027	0.053	0.004	0.003	0.012	0.035	0.004	0.009	0.011	0.010	0.082
3	Chobani 0.375	0.012	0.009	-4.244	0.028	0.028	0.074	0.005	0.004	0.014	0.042	0.005	0.008	0.009	0.010	0.052
4	Chobani 1.0	0.010	0.008	0.344	-4.508	0.028	0.066	0.005	0.004	0.013	0.037	0.004	0.010	0.008	0.010	0.057
5	Dannon 0.375	0.006	0.006	0.202	0.019	-3.190	0.063	0.006	0.004	0.012	0.036	0.005	0.011	0.009	0.008	0.064
6	Dannon Activia 1.0	0.013	0.007	0.214	0.023	0.030	-3.935	0.006	0.005	0.016	0.044	0.006	0.009	0.010	0.009	0.055
7	Dannon Activia 1.5	0.011	0.007	0.165	0.018	0.034	0.063	-3.603	0.004	0.012	0.036	0.005	0.011	0.009	0.008	0.065
8	Dannon Activia Dessert 1.0	0.008	0.006	0.164	0.021	0.032	0.083	0.005	-3.844	0.015	0.045	0.005	0.010	0.009	0.009	0.068
9	Dannon Activia Fiber 1.0	0.012	0.008	0.198	0.022	0.032	0.079	0.006	0.005	-3.942	0.045	0.006	0.010	0.011	0.009	0.062
10	Dannon Activia Light 1.0	0.013	0.007	0.214	0.023	0.029	0.078	0.006	0.005	0.016	-3.970	0.006	0.009	0.010	0.009	0.055
11	Dannon Activia Light 1.5	0.008	0.008	0.148	0.018	0.033	0.069	0.005	0.004	0.014	0.040	-3.520	0.011	0.009	0.008	0.065
12	Dannon All Natural 0.375	0.011	0.006	0.195	0.018	0.033	0.067	0.006	0.004	0.013	0.039	0.006	-3.205	0.009	0.008	0.065
13	Dannon Danimals Crushcups 1.0	0.011	0.007	0.186	0.021	0.033	0.075	0.006	0.005	0.016	0.043	0.006	0.010	-3.929	0.009	0.062
14	Dannon Light N FT CRB & Sugar 1.0	0.010	0.009	0.311	0.025	0.031	0.065	0.005	0.004	0.013	0.036	0.004	0.011	0.008	-4.378	0.062
15	Dannon Light N Fit 0.375	0.008	0.006	0.180	0.019	0.032	0.064	0.006	0.004	0.013	0.036	0.005	0.011	0.009	0.008	-3.146
16	Dannon Light N Fit 1.5	0.010	0.005	0.151	0.017	0.031	0.069	0.006	0.004	0.014	0.039	0.005	0.009	0.009	0.007	0.058
17	Dannon Nutriday 1.0	0.006	0.002	0.057	0.013	0.021	0.083	0.009	0.009	0.023	0.051	0.012	0.009	0.018	0.008	0.041
18	Stonyfield Farm 0.375	0.009	0.008	0.232	0.021	0.034	0.070	0.006	0.004	0.014	0.044	0.006	0.011	0.010	0.009	0.072
19	Stonyfield Farm 1.5	0.010	0.007	0.329	0.021	0.035	0.062	0.005	0.003	0.013	0.040	0.005	0.013	0.009	0.010	0.078
20	Yoplait 0.375	0.011	0.008	0.229	0.023	0.027	0.073	0.006	0.005	0.014	0.042	0.005	0.008	0.009	0.009	0.050
21	Yoplait 1.0	0.013	0.011	0.265	0.021	0.024	0.071	0.005	0.004	0.011	0.041	0.005	0.007	0.005	0.009	0.039
22	Yoplait Delights 1.0	0.012	0.009	0.212	0.023	0.030	0.075	0.006	0.005	0.015	0.045	0.006	0.009	0.010	0.010	0.058
23	Yoplait Fiber One 1.0	0.010	0.008	0.184	0.021	0.031	0.075	0.006	0.005	0.015	0.046	0.006	0.010	0.011	0.009	0.063
24	Yoplait Light 0.375	0.011	0.006	0.171	0.019	0.031	0.073	0.006	0.005	0.015	0.040	0.006	0.009	0.009	0.008	0.057
25	Yoplait Light Thick & Creamy 0.375	0.011	0.006	0.152	0.018	0.031	0.071	0.006	0.005	0.015	0.041	0.006	0.010	0.010	0.008	0.058
26	Yoplait Original 0.375	0.011	0.006	0.174	0.019	0.031	0.073	0.006	0.005	0.015	0.040	0.006	0.009	0.009	0.008	0.057
27	Yoplait Original 1.5	0.010	0.005	0.166	0.016	0.029	0.071	0.005	0.005	0.013	0.038	0.005	0.008	0.007	0.007	0.050
28	Yoplait Thick & Creamy 0.375	0.011	0.006	0.170	0.019	0.032	0.070	0.006	0.005	0.014	0.041	0.006	0.010	0.009	0.008	0.059
29	Yoplait Trix 1.5	0.011	0.006	0.141	0.018	0.034	0.074	0.006	0.005	0.015	0.043	0.006	0.010	0.011	0.008	0.065
30	Yoplait Yo Plus 1.0	0.011	0.008	0.144	0.022	0.030	0.073	0.006	0.005	0.016	0.044	0.006	0.010	0.012	0.009	0.064

Table A.6: Estimated median own- and cross-price elasticities (Log Normal specification)

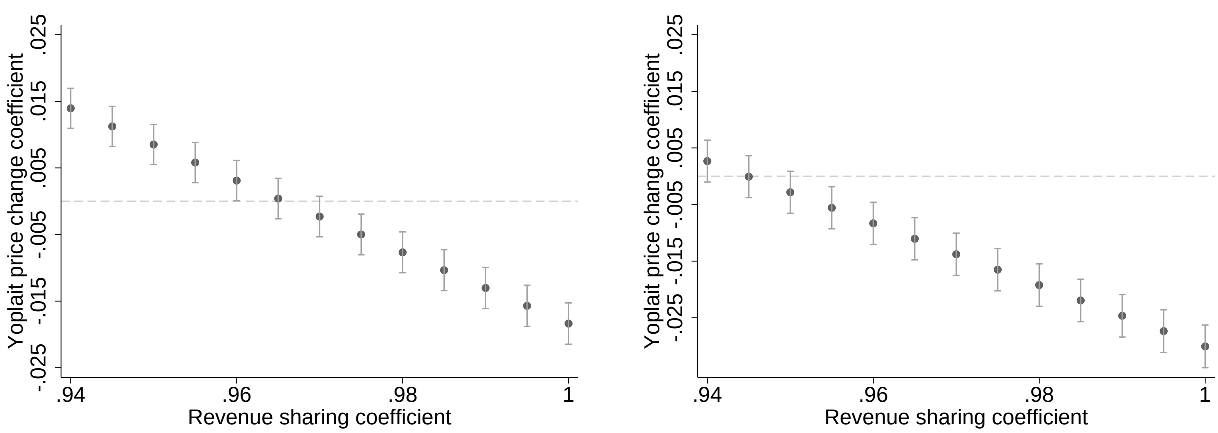
		ID														
ID	Brand	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Brown Cow 0.375	0.044	0.005	0.021	0.025	0.021	0.012	0.018	0.011	0.168	0.014	0.125	0.012	0.012	0.018	0.011
2	Brown Cow 1.0	0.027	0.001	0.041	0.022	0.018	0.008	0.019	0.013	0.107	0.015	0.074	0.007	0.015	0.023	0.011
3	Chobani 0.375	0.043	0.007	0.020	0.012	0.018	0.010	0.017	0.011	0.121	0.013	0.093	0.011	0.011	0.025	0.010
4	Chobani 1.0	0.047	0.003	0.026	0.012	0.015	0.007	0.016	0.011	0.100	0.012	0.076	0.009	0.014	0.028	0.009
5	Dannon 0.375	0.055	0.012	0.020	0.011	0.014	0.007	0.014	0.011	0.127	0.018	0.094	0.012	0.015	0.032	0.010
6	Dannon Activia 1.0	0.049	0.013	0.019	0.012	0.018	0.009	0.017	0.012	0.146	0.016	0.115	0.012	0.013	0.030	0.012
7	Dannon Activia 1.5	0.043	0.008	0.021	0.011	0.017	0.008	0.014	0.011	0.135	0.020	0.101	0.010	0.015	0.030	0.011
8	Dannon Activia Dessert 1.0	0.049	0.005	0.022	0.012	0.022	0.011	0.017	0.011	0.158	0.018	0.115	0.012	0.015	0.029	0.010
9	Dannon Activia Fiber 1.0	0.047	0.012	0.020	0.012	0.019	0.009	0.018	0.012	0.142	0.018	0.114	0.013	0.015	0.031	0.012
10	Dannon Activia Light 1.0	0.049	0.012	0.019	0.012	0.018	0.009	0.017	0.012	0.146	0.016	0.113	0.012	0.013	0.029	0.012
11	Dannon Activia Light 1.5	0.041	0.013	0.020	0.009	0.018	0.008	0.015	0.012	0.157	0.019	0.112	0.012	0.015	0.029	0.013
12	Dannon All Natural 0.375	0.053	0.012	0.019	0.011	0.015	0.008	0.014	0.010	0.144	0.017	0.107	0.012	0.014	0.029	0.011
13	Dannon Danimals Crushcups 1.0	0.048	0.013	0.021	0.012	0.020	0.009	0.017	0.012	0.145	0.017	0.114	0.012	0.015	0.030	0.012
14	Dannon Light N FT CRB & Sugar 1.0	0.045	0.003	0.029	0.012	0.017	0.008	0.016	0.011	0.118	0.013	0.082	0.010	0.014	0.026	0.011
15	Dannon Light N Fit 0.375	0.049	0.012	0.020	0.011	0.015	0.007	0.014	0.011	0.136	0.018	0.105	0.011	0.015	0.030	0.011
16	Dannon Light N Fit 1.5	-2.715	0.014	0.016	0.010	0.015	0.007	0.014	0.010	0.152	0.017	0.116	0.013	0.014	0.030	0.011
17	Dannon Nutriday 1.0	0.040	-2.093	0.007	0.010	0.021	0.002	0.025	0.016	0.186	0.027	0.150	0.011	0.018	0.050	0.017
18	Stonyfield Farm 0.375	0.048	0.009	-4.069	0.012	0.021	0.010	0.018	0.012	0.137	0.018	0.100	0.013	0.015	0.029	0.012
19	Stonyfield Farm 1.5	0.053	0.003	0.044	-4.134	0.016	0.006	0.015	0.012	0.100	0.016	0.071	0.009	0.017	0.028	0.010
20	Yoplait 0.375	0.048	0.011	0.017	0.013	-4.286	0.009	0.017	0.012	0.141	0.015	0.104	0.012	0.012	0.028	0.011
21	Yoplait 1.0	0.051	0.000	0.010	0.006	0.016	-4.402	0.013	0.010	0.149	0.013	0.101	0.012	0.009	0.024	0.006
22	Yoplait Delights 1.0	0.042	0.012	0.020	0.014	0.023	0.011	-4.317	0.013	0.152	0.017	0.113	0.012	0.014	0.027	0.013
23	Yoplait Fiber One 1.0	0.043	0.010	0.022	0.013	0.022	0.010	0.019	-4.113	0.156	0.020	0.113	0.013	0.015	0.030	0.012
24	Yoplait Light 0.375	0.053	0.014	0.017	0.011	0.016	0.008	0.015	0.011	-3.112	0.017	0.121	0.013	0.014	0.031	0.011
25	Yoplait Light Thick & Creamy 0.375	0.052	0.014	0.018	0.010	0.017	0.008	0.015	0.011	0.154	-3.237	0.119	0.013	0.015	0.031	0.011
26	Yoplait Original 0.375	0.053	0.014	0.017	0.011	0.016	0.008	0.015	0.011	0.154	0.017	-3.156	0.013	0.014	0.031	0.011
27	Yoplait Original 1.5	0.059	0.006	0.014	0.009	0.016	0.008	0.012	0.009	0.157	0.014	0.116	-3.099	0.013	0.027	0.008
28	Yoplait Thick & Creamy 0.375	0.056	0.014	0.017	0.010	0.016	0.008	0.015	0.011	0.155	0.018	0.114	0.013	-3.237	0.031	0.011
29	Yoplait Trix 1.5	0.049	0.015	0.020	0.012	0.020	0.011	0.016	0.011	0.159	0.019	0.126	0.014	0.015	-3.287	0.012
30	Yoplait Yo Plus 1.0	0.036	0.010	0.022	0.012	0.021	0.009	0.020	0.013	0.166	0.021	0.131	0.011	0.016	0.029	-3.905

Table A.7: Estimating the Revenue Sharing Parameter: Marginal Cost Approach, Excluding Chobani

	(1)	(2)	(3)	(4)
	No demographics		Demographics	
	Full sample	Excluding Q3/Q4 2011	Full sample	Excluding Q3/Q4 2011
Yoplait * Pre July 2011	0.037	0.055	0.037	0.051
	(0.003)	(0.004)	(0.003)	(0.003)
N	2,955,843	2,458,746	2,956,740	2,459,630
Implied Rev. Sharing Coef.	0.963	0.947	0.964	0.950

Notes: Standard errors clustered at the store level in parentheses. An observation is a product–store–week combination. The 'no demographics' and 'demographic' specifications make use of the estimates in columns (2) and (3) of Table 2. In all specifications we reject the hypothesis that $\hat{\mu}$ is equal to 1.

Figure A.4: Estimating the Revenue Sharing Parameter: Indirect Inference Approach, remaining specifications (no demographics)



A) Full sample B) Excluding Q3/Q4 2011

Notes: The specifications make use of the estimates in Column (2) of Table 2. Panel B excludes the third and fourth quarter of 2011, as in columns (3) and (4) of Table 1.

Table A.8: The Impact of an Efficient Vertical Contract on Market Outcomes: The Role of Competition

	(1)	(2)	(3)	(4)	(5)	(6)
	Price change (in log points)		Market share change (in log points)		Profit change (in log points)	
	BR	Equilibrium	BR	Equilibrium	BR	Equilibrium
Panel A: Revenue sharing parameter 0.97						
Chobani	-	0.00014	-0.00694	-0.00755	0.13061	0.13044
		(0.00001)	(0.00007)	(0.00007)	(0.00080)	(0.00080)
General Mills	-0.01940	-0.01941	0.06322	0.06307	0.09367	0.09350
	(0.00006)	(0.00006)	(0.00033)	(0.00033)	(0.00030)	(0.00030)
Groupe Danone	-	-0.00031	-0.00809	-0.00698	0.09351	0.09351
		(0.00000)	(0.00006)	(0.00005)	(0.00031)	(0.00031)
Panel B: Revenue sharing parameter 0.95						
Chobani	-	0.00025	-0.01162	-0.01274	0.22981	0.22954
		(0.00001)	(0.00012)	(0.00012)	(0.00149)	(0.00148)
General Mills	-0.03244	-0.03245	0.10511	0.10488	0.15673	0.15646
	(0.00009)	(0.00009)	(0.00055)	(0.00055)	(0.00050)	(0.00050)
Groupe Danone	-	-0.00052	-0.01352	-0.01180	0.16226	0.16225
		(0.00001)	(0.00010)	(0.00009)	(0.00055)	(0.00055)
Observations	1,811,560	1,811,560	1,811,560	1,811,560	1,811,560	1,811,560

Notes: The estimates are based on demand estimates in Table 2 (column 3). Standard errors in parentheses. An observation is a product–store–week combination. We restrict attention to weeks prior to July 2011 (i.e., the time when the transaction was completed). Each column displays regression coefficients of $\log(X^{\text{counterfactual}}) - \log(X^{\text{observed}})$ on firm-level indicators, for $X \in \{\text{price}, \text{market share}, \text{profit}\}$. $X^{\text{counterfactual}}$ are the equilibrium outcomes with an efficient vertical contract in columns labeled 'Equilibrium'; whereas in columns labeled 'BR', $X^{\text{counterfactual}}$ is the best response of General Mills to rivals' prices when an efficient vertical contract is implemented and rivals are not allowed to respond. X^{observed} is the equilibrium outcome in the observed equilibrium.

B A Supply-Side Model with a Retail Sector

We assume the existence of manufacturers and a retailer. Manufacturers simultaneously set the wholesale prices of their portfolio of products to maximize their profits at the market level. The retailer takes wholesale prices as given and chooses retail prices according to a pricing equation discussed below.

Specifically, we assume that the manufacturing firm f (e.g., General Mills), selling product portfolio $\mathcal{J}_{fst}$ at store s in week t, solves

$$\max_{w_{jst}\forall j\in\mathcal{J}_{fst}} \sum_{j\in\mathcal{J}_{fst}} (w_{jst}\mu_{f(j)t} - c_{jst}) M_{st} s_{jst}(\mathbf{p}(\mathbf{w})),$$

where $\mu_{f(j)t}$ corresponds to the share of revenues that firm f keeps (and $1-\mu_{f(j)t}$ corresponds to the share of revenues that f pays to the upstream firm), c_{jst} is the manufacturer's marginal cost of product j at store s in week t, $\mathbf{p}(\mathbf{w})$ is the retail price correspondence given the vector of wholesale prices $\mathbf{w}$, and M_{st} represents the size of the market.

The first-order conditions for the manufacturing firm f are given by

$$s_{jst}(\mathbf{p}(\mathbf{w})) + \sum_{k\in\mathcal{J}_{fst}} \sum_{h\in\mathcal{J}_{fst}} (w_{kst} - c_{kst}/\mu_{f(k)t}) \frac{\partial s_{kst}(\mathbf{p}(\mathbf{w}))}{\partial p_{hst}} \frac{\partial p_{hst}}{\partial w_{jst}} = 0, \tag{7}$$

where we use that $\mu_{f(k)t} = \mu_{f(j)t}$ for all $j, k \in \mathcal{J}_{fst}$.

We follow Miller and Weinberg (2017) and assume that the retail prices are determined by the system of equations

$$0 = \lambda s_{jst} + \sum_{k\in J_{st}} \frac{\partial s_{kst}(\mathbf{p})}{\partial p_{jst}} (p_{kst} - w_{kst}), \quad \forall j \in J_{st}, \tag{8}$$

where $\lambda \in [0, 1]$ and $J_{st} = \bigcup_f J_{fst}$. This system of equations is identical to the system of first-order equations of a retailer firm that maximizes its profit, except for the presence of the scaling parameter λ. The parameter λ scales the retail markups between zero ($\lambda = 0$) and the monopoly markups ($\lambda = 1$), capturing in a simplified way the competitive pressure faced by the retailer. We assume that the retailer's marginal cost of selling a good equals the wholesale price of that good.

Combining Equation 7 and Equation 8 yields an equation like Equation 4, where we can recover the ratios $c_{kst}/\mu_{f(k)t}$ for every product–store–week combination, as a function of prices, demand estimates, and a value of λ (the scaling parameter in the retail prices equations).

C Contracts

In this Appendix, we provide documentation regarding the contract between General Mills and Sodima/Sodiaal.

A copy of the original contract between the two can be found in `https://www.sec.gov/Archives/edgar/data/40704/000089710107001522/gen072744s1_ex10-32.htm`. This contract establishes the obligations and rights of the parties (e.g., manufacturing, property, machine maintenance, assistance) and the payment structure.

By 2010, this contract had been amended twelve times. Examples include

- Historical record: `https://www.sec.gov/Archives/edgar/data/40704/000089710107001522/gen072744s1_ex10-32.htm`. Includes information about:
  - 1st amendment (1977)
  - 2nd amendment (1981)
  - 3rd amendment (undated in the public record)
  - 5th amendment (undated in the public record)
  - 7th amendment (1999)
  - 8th amendment (2002)
- 9th amendment: `https://www.sec.gov/Archives/edgar/data/40704/000089710108000662/genmills081060_ex10-1.htm`
- 10th amendment: `https://www.sec.gov/Archives/edgar/data/40704/000095013709002011/c50087exv10w17.htm`
- 11th amendment: `https://www.sec.gov/Archives/edgar/data/40704/000095012309071898/c55115exv10w2.htm`
- 12th amendment: `https://www.sec.gov/Archives/edgar/data/40704/000095012310114560/c61873exv10w4.htm`

We conclude that contract amendments, though not occurring every year, were not uncommon and, to the best of our knowledge, did not result in termination threats.

D The impact of the Yoplait acquisition on General Mills' day-to-day stock returns

Two facts suggest the transaction likely added value to the company. On the one hand, General Mills' stock price increased by 1.44 percent following the announcement of the deal reached with PAI Partners.[31] On the other hand, given the transaction fee of $1.1 billion, the profit gains mentioned above imply a rate of return of the order of 9.4 to 15.7 percent, which are greater than the reciprocal of the P/E ratio of General Mills at the time of the transaction (e.g., its P/E ratio in 2011 was in the 14-15 range).

We explicitly consider the impact of the transaction on the stock prices of General Mills and Danone (Chobani is privately owned so we cannot perform the analyses that follow). We use the daily returns to test whether the returns that followed relevant dates (such as the announcement of the deal as well as when it was closed) were significantly different from those experienced in the two years before the transaction. We did this considering both the day-to-day returns and considering where the returns rank in the corresponding distributions. We find that though daily returns were positive for both General Mills (1.44%) and Danone (1.08%), in both cases we reject that these are abnormal or that these rank in the top 5 percent of returns during our sample period.

We also conducted an in-depth search of media articles from the time period of interest focusing on General Mills. We focused on identifying articles that explicitly mentioned stock price changes following the different announcements. We were able to find the following:

- General Mills filed for arbitration following Sodima's announcement of its intention to terminate the agreement. General Mills filed after the closing of the stock market and the source writes "In after-hours trading, General Mills stock was up a few pennies."[32]
- General Mills' stock price increased by 1.44 percent following the announcement of the deal reached with PAI Partners.[33]
- General Mills' stock price increased by 2 cents (0.05 percent) after it was announced that the deal with PAI Partners and Sodiaal had received regulatory approval.[34]

[31] Mike Hughlett, "General Mills confirms deal to buy 50% of Yoplait for $1.1B", *StarTribune*, March 19th, 2011. Accessed through the Texas A&M University Libraries on August 20th, 2025.

[32] Mike Hughlett, "No more Yoplait? General Mills says no way", *StarTribune*, September 11th, 2010. Accessed through the Texas A&M University Libraries on August 20th, 2025.

[33] Mike Hughlett, "General Mills confirms deal to buy 50% of Yoplait for $1.1B", *StarTribune*, March 19th, 2011. Accessed through the Texas A&M University Libraries on August 20th, 2025.

[34] Business Briefs, "General Mills to control Yoplait", *Investor's Business Daily*, May 19th, 2011; Mike Hughlett "General Mills buying biggest bite of Yoplait", *StarTribune*, May 19th, 2011; Accessed through the Texas A&M University Libraries on August 20th, 2025.

E Examining the determinants of the supply chain's profit-maximizing μ

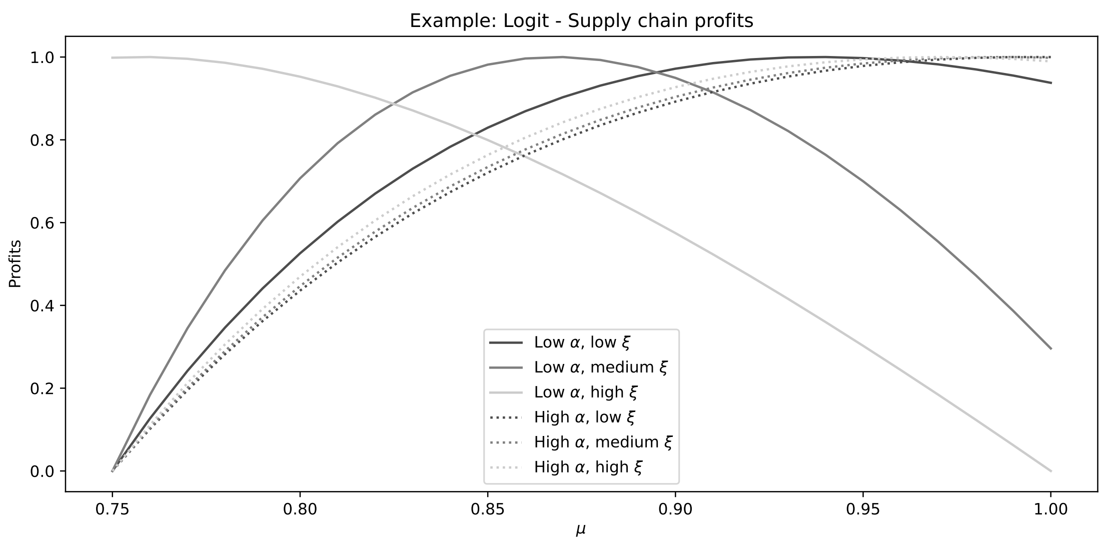
The model that we presented in section 2 showed that the derivative of the supply chain's profits with respect to the revenue-sharing parameter μ can be positive or negative, meaning that such a contract may increase supply chain profits despite causing inefficiency. In this Appendix, we show that this result is not specific to the Hotelling-style model presented in section 2; it holds in other settings as well. Specifically, we consider a Logit duopoly, where $s_j(p,\xi;\alpha) = \frac{\exp(-\alpha p_j+\xi_j)}{1+\exp(-\alpha p_1+\xi_1)+\exp(-\alpha p_2+\xi_2)}$, and where firm 2 is subject to a revenue-sharing agreement with parameter μ.

In this model, μ, α, and $\xi = [\xi_1, \xi_2]$ determine equilibrium prices and profits. In what follows, we focus on symmetric cases (i.e., $\xi_1 = \xi_2$) because this symmetry simplifies the explanation of our findings; however, our findings do not depend on this symmetry.

We focus on the supply chain's profits. In Figure A.5, we show our findings. First, solid lines in the figure denote cases with low demand elasticities. Dashed lines indicate cases with higher demand elasticity. It is immediate from the plot that when demand elasticity is higher, the μ that maximizes the supply chain's profits is equal to one, no matter the values of ξ. However, when demand elasticity is lower, the μ that maximizes the supply chain's profits is interior, and it shifts to the left as the value of ξ increases.

Although this is a stylized example that could be generalized further, we believe it illustrates that, in general, the optimal μ can be interior or on the boundary, depending on demand elasticity and the extent of vertical differentiation.

Figure A.5: Supply chain profits as a function of the demand elasticity and the revenue-sharing parameter



Notes: The figure examines how profits of the supply chain depend on both the revenue-sharing parameter μ and the price coefficient α.