Can Merger Remedies Cause More Harm than Good?*

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Abstract

This paper investigates whether merger remedies, such as divestitures, can cause more harm than good using a model of firm conduct. The model is estimated leveraging the variation generated by a large divestiture in the US beer market. First, I find that price coordination, materialized through conduct parameters, acts as a countervailing force that limits the pro-competitive effects of a divestiture. Price coordination eliminates about 88% of the welfare gains from a divestiture. Second, based on counterfactual simulations, I show that a merger cleared with divestiture is likely to reduce consumer surplus more than a merger approved without divestiture.

JEL: K21, L4, L13.

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1 Motivation

Merger policies have large consequences for economic welfare. In theory, mergers can have both pro-competitive and anti-competitive effects. A merger can lead to efficiency gains, potentially resulting in lower final prices paid by consumers. However, a merger might also increase the ability to raise final prices, thereby affecting consumers negatively. The available economic literature provides empirical evidence that various mergers have led to higher prices paid by consumers (Kwoka (2014)), leading some authors to argue that merger reviews are typically too lax (Eeckhout (2021)).

The approach used by antitrust authorities to limit the negative consequences of a merger on consumer welfare is to require the implementation of remedies (Dertwinkel-Kalt and Wey (2016)).[1] Researchers and practitioners often argue that structural remedies, such as divestitures, are the most effective policy instruments for mitigating the negative effects of mergers on consumer welfare (Kwoka Jr and Waller (2021)).[2] The objective of a divestiture is to reduce post-merger concentration, which leads to more symmetric firms and limits the ability of the merged entity to raise prices in the relevant market. However, this type of concentration-based argument assumes that firms react individually to changes in market conditions. It also ignores the potential coordinated effects between firms that could act as a countervailing force, limiting the pro-competitive effects of the divestiture.

A divestiture often affects those factors that facilitate price coordination in theory. In particular, price coordination is easier when firms are more symmetric (Loertscher and Marx (2021)). It is also known to be easier when firms interact frequently. The remedy process involves numerous interactions between the potential buyers or the actual buyer and the seller of the divested brand allowing 'thorough due diligence' (FTC (2017)). These theoretical justifications underscore

[1] FTC (2017)), it states that, "*for most of the mergers in which the Commission finds a competitive problem, harm to competition is likely to occur in only a subset of the markets in which the merging parties operate. In those situations, appropriate remedies may protect competition while allowing the merger to proceed.*"

[2] See Kwoka Jr and Waller (2021) discussion, section II, page 4.

the need to empirically examine the price and welfare effects of a divestiture, accounting for potential tacit price coordination.

This paper quantifies the price and welfare effects of divestiture in a model of firm conduct. My empirical analysis focuses on the U.S. beer market from 2007 to 2010. This choice is guided by the presence of several mergers and a divestiture, generating substantial variation in product portfolio patterns, which allows for identifying multiple conduct parameters. Specifically, I study the divestiture of Labatt to North American Brewery (NAB), associated with the merger between Anheuser-Busch and Inbev (ABI) in 2008 in the U.S. beer market. My analysis also includes the other mergers occurring in the beer industry during the same time period: the MillerCoors merger and the acquisition of High Falls Brewing Company by NAB. Another rationale for this choice is the possible presence of price coordination between MillerCoors and ABI (Miller and Weinberg (2017)).

There are two key elements of my analysis. The first component involves the empirical assessment of Labatt's divestiture. I provide novel descriptive evidence showing that the price of the divested brand increased relative to the prices of brewers not directly involved in the divestiture and other mergers in the industry. These findings are complemented with new model-based evidences. Using a structural model of Nash-Bertrand competition that allows for partial price coordination, I explain the mechanisms through which the pro- and anti-competitive effects of a divestiture affect consumers in a model of manufacturer conduct. In the model, price coordination captured by conduct parameters acts a countervailing force, limiting the traditional pro-competitive effects of a divestiture. I extend the previous study by Miller and Weinberg (2017) to allow all brewers affected by a change in their ownership structure, either a merger or a divestiture, to coordinate over each other prices.[3] The results reveal that price coordination is easier with the buyer of the divested brand. I estimate a conduct parameter governing price coordination between the mergers that is equal to 0.344. In contrast, the conduct parameter influencing the degree of price coordination between the mergers and the buyer of the divested brand is equal to 0.791. Second, I quantify the extent to

[3] By contrast, all brewers not directly involved in a merger or divestiture are assumed to compete à la Bertrand.

which price coordination materialized through conduct parameters is a countervailing force limiting the pro-competitive effects of a divestiture. Based on current estimates, price coordination eliminates about 88% of the welfare benefits caused by a divestiture.

The second component of my analysis is the derivation of recommendations for divestiture policies using model-based simulations. First, I implement simulations with calibrated conduct parameters and fixed marginal costs. My findings indicate that there is a significant range of conduct parameters under which a merger cleared with divestiture deteriorates consumer surplus more than a merger cleared without divestiture. Second, I examine how consumers' welfare is affected by the choice of the buyer of the divested brand by simulating the acquisition of Labatt by other buyers in the market. The results show that the actual buyer was correctly chosen, as it is the least detrimental to consumer surplus. However, among the five potential buyers considered in my sample, only the divestiture involving the actual buyer results in a consumer surplus deterioration less severe than that caused by a simple merger. The model reveals an additional margin that antitrust authorities need to include in their analysis when selecting the buyer of the divested brand. In contrast to the setting without price coordination, diversion ratios between the products of the buyer of the divested brand and the potential coordinating partners influence the prices set by the buyer of the divested brand. Higher diversion ratios between these products limit more the pro-competitive effects of a divestiture.

More broadly, my results cast doubt on the likelihood that a divestiture effectively prevents an anti-competitive merger from negatively affecting consumers. The empirical analysis of the divestiture shows that (i) the pro-competitive effects of the divestiture are not large enough to prevent consumers from being harmed, and (ii) this is mainly because the divestiture facilitates price coordination. These results have potentially broad policy implications. Antitrust authorities must consider the potential for price coordination when imposing a divestiture. However, it is highly possible that a policy directly blocking anti-competitive mergers may be more effective than relying on divestitures.

Related Literature The literature estimating how divestitures affect prices and consumer surplus is not large (Asker and Nocke (2021)). A striking feature of both theoretical and empirical studies on divestitures is that only potential unilateral effects are considered. Dertwinkel-Kalt and Wey (2016) provide conditions under which divestiture can prevent anti-competitive mergers in a model without price coordination. Delaprez and Guignard (2024) study a large upstream merger with divestiture in the French coffee market in vertical market structure. They find that the divestiture mitigates the anti-competitive effects of the merger. The relevance of requesting a divestiture to limit the anti-competitive effects of a merger is also confirmed by Friberg and Romahn (2015), who analyze a merger in the Swedish beer market, and by Alviarez et al. (2023), who examine how divestiture impacts consumers across 76 countries, including the United States. My work is directly related to Alviarez et al. (2023), who find that divestitures mitigate the anti-competitive effects of mergers. They demonstrated that, in the U.S., the beer price index would have been 4–7% higher in the absence of divestitures. Contrary to previous authors, this article studies how the presence of price coordination affects standard policy recommendations. I show that, even in simple models ignoring the vertical structure of the market, a merger cleared conditional on a divestiture can deteriorates consumer surplus more than a merger without divestiture. The structural model I estimate also complements previous studies, such as Osinski and Sandford (2021), by explicitly calculating the impact of divestitures on consumer surplus. I show that brand performance as measured by prices and quantities is not a sufficient statistics to evaluate welfare impacts.

This paper is also related to several studies that examine how mergers and other types of alliances affect price coordination in theory (e.g., Cooper and Ross (2009)) or empirically (Miller and Weinberg (2017)). My study is directly related to Miller and Weinberg (2017). They examine how two mergers – Anheuser-Busch Inbev and MillerCoors – may have facilitated price coordination. They find that the observed price increases for products produced by the two mergers are better explained by a model of Nash-Bertrand competition with tacit price coordination. However, they do not study the divestiture associated with the approval of the merger between Anheuser-Busch and Inbev. Therefore, I extend their results by

investigating how the divestiture affects prices and welfare. Specifically, I identify two conduct parameters.[4] First, I show that, there is a large range of conduct parameters such that a merger with divestiture could deteriorate consumer surplus more than a merger cleared without divestiture. Second, I show that the conduct parameter associated with the buyer of the divested brand is larger than the conduct parameter for the two mergers. I also quantify the extent to which price coordination materializing through conduct parameters is a countervailing force limiting the pro-competitive effects of a divestiture. Last, I discuss how standard policy recommendations on the choice of the buyer are affected by possible price coordination. To the best of my knowledge, the descriptive evidence on the price effects of the divestiture, the structural estimates of the conduct parameter for a divested brand, and the policy recommendations on the choice of the buyer of the divested brand presented in this article are new to the literature.

Finally, this article relies on econometric techniques and data that are widely used in the literature providing various sources for cross-checking and validating my empirical results.[5] Demand for beer in the U.S. has previously been estimated based on discrete choice models in various articles including Asker (2016), Goldberg and Hellerstein (2008), and Miller and Weinberg (2017). Reduced form evidence for the mergers MillerCoors and Anheuser-Busch Inbev are provided in Miller and Weinberg (2017) and Ashenfelter et al. (2015). Wang et al. (2023) study also the price effects of a divestiture in the U.S. beer market but the divestiture they study is different than the one analyzed in this article. Precisely, they investigate the divestiture in the 2013 merger between Anheuser–Busch InBev and Grupo Modelo using difference-in-differences analysis. Their results are qualitatively aligned with the price effect I present in this article as they find a price increase for the divested brand. However, they do not identify economic mechanisms that explain these effects. Moreover, their approach does not allow for an analysis of the welfare effects of divestiture. In contrast, the structural model I estimate allows

[4] There are papers estimating several conduct parameters in the literature. For instance, Michel et al. (2023) estimate several conduct parameters in the ready-to-eat cereal industry. Their identification strategy exploits firm promotional activities.

[5] In the remaining part of the article, I systematically compare my results with previous studies in the literature.

us to assess whether a merger approved with divestiture may have a more negative impact on consumers than a merger approved without divestiture. Finally, evidence on the price effects of mergers using counterfactual simulations are presented in Miller and Weinberg (2017) based on a Nash-Bertrand competition model with price coordination.

The article proceeds as follows. Section 2 presents the divestiture of Labatt, the data, and some relevant empirical facts. Section 3 documents some descriptive evidence on the effects of the divestiture on retail prices. Section 4 presents the supply model of price coordination. Section 5 computes the change in consumer surplus associated with the divestiture and provides some policy recommendations on how to select the buyer of the divested brand. Section 6 concludes.

2 Antitrust Case

2.1 Divestiture in the U.S. Beer Market

On July 13, 2008, Anheuser-Busch and InBev announced a proposed merger in which InBev would acquire Anheuser-Busch for approximately $52 billion. Anheuser-Bush accounted for about 50% of sales in the United States with brands such as Bud Light and Budweiser. InBev is a Belgian company that was the second largest brewer in the world, exporting brands such as Becks and Labatt.

The merger was approved subject to the divestiture of Labatt beers in November 2008. The Department of Justice (DOJ) required this divestiture because the merger was expected to have anti-competitive effects in several geographic markets: Buffalo-Rochester and Syracuse. The DOJ did not expect the merger to achieve sufficient cost efficiencies to approve it without divestiture.[6]

Labatt was acquired by KPS partners which created North American Breweries (NAB) in February 2009. The company also acquired High Falls Brewing Company (also often referred to as the Genesee Brewing Company). Before 2018, Labatt did not have a brewery located in the U.S. The first Labatt brewery located in the U.S.

[6]Precisely, the merger report states: "*The anti-competitive effects of the proposed acquisition are not likely to be eliminated or mitigated by any efficiencies that may be achieved by the acquisition.*"

was opened in 2018, a period that is not covered by the dataset I use.[7]

2.2 Data

SALES I use the IRI Academic Database (Bronnenberg et al. (2008)) on sales of beer in the United States from 2007 to 2010 for grocery stores. In the dataset, one row provides information on total unit and dollar sales for a product (defined by its UPC code) at a given store in a given week. I drop sales for the cider category and 'all brands beer' for which the parent company and vendor information is not available. Following Ashenfelter et al. (2015), I drop observations if the price per 12-packs is lower than 2$ or greater than $30. Second, I restrict the sample to the major beer producers: Anheuser-Busch, Constellation Brands Inc, D.G. Yuengling, Heineken, High Falls Brewing, InBev, Molson Coors, and SABMiller. I study 21 brands: Beck's, Beck's Premier Light, Bud Light, Budweiser, Coors, Coors Light, Corona Extra, Corona Light, Dundee Honey Brown Lager, Heineken, Heineken Premium Light Lager, Labatt Blue, Labatt Blue Light, Michelob, Michelob Light, Miller Genuine Draft, Miller High Life, Miller Lite, Yuengling Black and Tan, Yuengling Light Lager, and Yuengling Traditional Lager.[8]

Third, I select the same 39 geographic markets as Miller and Weinberg (2017), dropping some regions where supermarket beer sales are limited. I exclude the following geographic markets: Eau Claire, Harrisburg, Kansas City, New England, Oklahoma City, Philadelphia, Providence, Salt Lake City, Tulsa, Minneapolis, and Pittsfield. Finally, all prices are expressed in 12-pack equivalents and deflated using the Consumer Price Index, with 2007 dollars as the reference.[9] I do not

[7] https://www.brewbound.com/news/fifco-usa-opens-labatt-brewery-in-buffalo/. Accessed February 5, 2024.

[8] Miller and Weinberg (2017) study 13 brands: Bud Light, Budweiser, Michelob, Michelob Light, Miller Lite, Miller Genuine Draft, Miller High Life, Coors Light, Coors, Corona Extra, Corona Extra Light, Heineken, and Heineken Light. Therefore, I study a larger set of brands. I do so to have the necessary variation to study the divestiture. I add the brand Becks, Becks premier, Labatt, and Labatt blue light, which were owned by Inbev in the pre-merger period. I also add the brand Dundee honey brown lager bought by NAB in the post-divestiture period. Last, I add 3 brands owned by DG Yuengling: Yuengling black and tan, Yuengling light lager and Yuengling traditional lager.

[9] You can access the CPI data at the following link: https://fred.stlouisfed.org/series/CPIAUCSL#0.

restrict the sample by package sizes, I define a product as a brand-retailer combination and study monthly sales.[10] Therefore, the raw data are aggregated along two dimensions: package sizes and month.

COST SAVINGS To quantify possible cost efficiencies, I follow previous studies in the literature (Ashenfelter et al. (2015) or Miller and Weinberg (2017)) and use the distance between the nearest brewery and the geographic market in which a given brand is sold as a proxy for cost savings related to shipping costs. For products owned by D.G. Yuengling or initially owned by High Falls Brewing, driving miles between each geographic market and the nearest brewery are computed using the ORS tool plugin in QGIS. D.G. Yuengling has two breweries: one located in Pennsylvania and one located in Florida. High Falls Brewing has one brewery located in Rochester. The driving miles between each IRI market and the nearest brewery for other products in the sample are obtained directly from the supplemental material associated with Miller and Weinberg (2017). Summary statistics are displayed in Table 1.[11] The table shows that the average distance between each IRI market and the nearest brewery is larger for imported beers such as Corona Extra or Labatt.

[10] In Ashenfelter et al. (2015) the analysis is restricted to packages sizes, expressed in 144 ounces equivalents: 0.4138, 6, 0.666, 1, 0.9334, 1.666 and 2. Miller and Weinberg (2017) restrict the sample to package sizes, expressed in 144 ounces equivalents: 0.5, 1, 2, and 2.5.

[11] Note that for the brand 'Dundee Honey Brown Lager', the minimum observed distance is in the geographic market of Buffalo/Rochester, as High Falls Brewing Company has only one brewery located in this market both before and after the divestiture.

Table 1. Average Minimum Distance Between Each IRI Market and the Nearest Brewery by Brands.

Brand	**mean**	**sd**	**min**	**max**
Becks	0.308	0.283	0.000	0.934
Becks Premier Light	0.308	0.279	0.000	0.934
Bud Light	0.218	0.196	0.000	0.832
Budweiser	0.218	0.196	0.000	0.832
Coors	0.452	0.352	0.000	1.339
Coors Light	0.452	0.346	0.000	1.339
Corona Extra	1.587	0.479	0.509	2.348
Corona Light	1.586	0.481	0.509	2.348
Dundee Honey Brown	0.891	0.672	0.000	2.780
Heineken	0.312	0.283	0.000	0.934
Heineken Premium	0.309	0.283	0.000	0.934
Labatt Blue	0.585	0.352	0.102	1.457
Labatt Blue Light	0.473	0.257	0.121	1.184
Michelob	0.223	0.193	0.000	0.832
Michelob Light	0.194	0.157	0.000	0.832
Miller Genuine	0.326	0.277	0.000	1.219
Miller High Life	0.327	0.276	0.000	1.219
Miller Lite	0.327	0.276	0.000	1.219
Yuengling Black	0.380	0.146	0.145	0.605
Yuengling Light	0.387	0.144	0.145	0.605
Yuengling Traditional	0.379	0.146	0.145	0.605

Note: unit in 1000 miles.

2.3 Stylized Facts

Fact 1: The Divestiture is Associated with Significant Variation Across Localized Geographic Markets

Tacit collusion is known to be easier when deviations from tacit agreements are easy to detect. According to Levy and Reitzes (1992), this is the case when firms compete in specific geographic markets, indeed they argue that "because of the localized nature of competition in spatial markets, cheaters may be relatively easier to detect and punish." A key feature of the divestiture of Labatt is that competition concerns were presents only in two geographic markets. Thus, the divestiture studied in this article is a perfect empirical laboratory where deviations from a tacit agreement are easy to detect and punish. In Table 2, I provide evidence to support this point. Precisely, I show the average market shares before and after the merger and divestiture in all geographic markets and in geographic markets with competition concerns.[12] The period between the approval of the merger and the divestiture is made of 3 months. The table reveals that the divestiture is (i) quantitatively important and (ii) the market share of the divested brand varies substantially across geographic markets. On average, the market share of the divested brand is 3.11% before the divestiture and 3.19% after the divestiture across all geographic markets. The acquisition of the divested brand allowed the buyer to enter the beer market with market shares close to those of DG Yuengling, ranking in the bottom of the hierarchy in terms of market shares. In contrast, in geographic markets with competition concerns, the divested brand had a market share of 20.38% in the pre-merger period and 21.12% in the post-divestiture period. The market share of the divested brand is ranked just below AB Inbev and MillerCoors, meaning at the top of the market share hierarchy. Hence, in these markets, any potential deviation from tacit collusion is likely to stand out.

[12] Note that the market shares are revenue shares.

Table 2. Market Shares Pre and Post-Divestiture Period By Geographic Market (%)

	All markets		Competition concerns	
Parent Company	Before	After	Before	After
Merged Entities				
ABI		32.185		25.529
		(1.028)		(1.330)
AB	27.006		19.896	
	(0.695)		(0.942)	
Inbev	4.346		3.746	
	(0.480)		(0.654)	
Labatt (divested brand)	3.117		20.384	
	(0.014)		(1.024)	
NAB (buyer)				
Labatt (divested brand)		3.197		21.121
		(0.107)		(0.868)
High Falls Brewing		0.924		1.595
		(0.085)		(0.157)
Rivals				
High Falls Brewing	1.069		1.711	
	(0.105)		(0.226)	
Millercoors	28.593	30.239	20.722	22.047
	(1.186)	(0.697)	(1.363)	(0.951)
Constellation	22.925	19.471	16.850	12.719
	(2.853)	(2.316)	(3.832)	(2.730)
DG Yuengling	2.663	3.722	7.959	8.542
	(0.498)	(0.364)	(0.663)	(0.830)
Heineken	10.277	10.259	8.728	8.445
	(0.566)	(0.658)	(0.796)	(0.739)

Notes: The table reports the average (across markets) market shares before the merger (23 months) and after the divestiture (22 months) in all geographic markets and geographic markets with competition concerns only. Standard deviation are shown in parenthesis.

Fact 2: Higher Prices for Imported Beers

Table 3 reports the average prices by brewer before and after the divestiture. Two interesting patterns are emerge. Imported beers tend to be more expensive. This can be seen in the rows for beers brewed by Inbev, Constellation and Heineken. Prices for these brewers are higher on average. The divested brand (Labatt) is also imported but tends to be less expensive than other imported beers. Note that the average prices for Labatt beers is on average lower in geographic markets with expected competition concerns where the market shares are also higher.

3 Descriptive Evidence: Price Effects

3.1 Unconditional Price Trends

Figure 1 shows raw average price trends for products of the divested brand, not controlling for additional factors that might affect prices. The first vertical line corresponds to the time at when the merger is approved, while the second vertical line, 3 months after the first, corresponds to the time when the divestiture is finalized. In the next subsection, I further analyze these price trends controlling for various confounding factors.

Figure 1. Average Prices of the Divested Brand

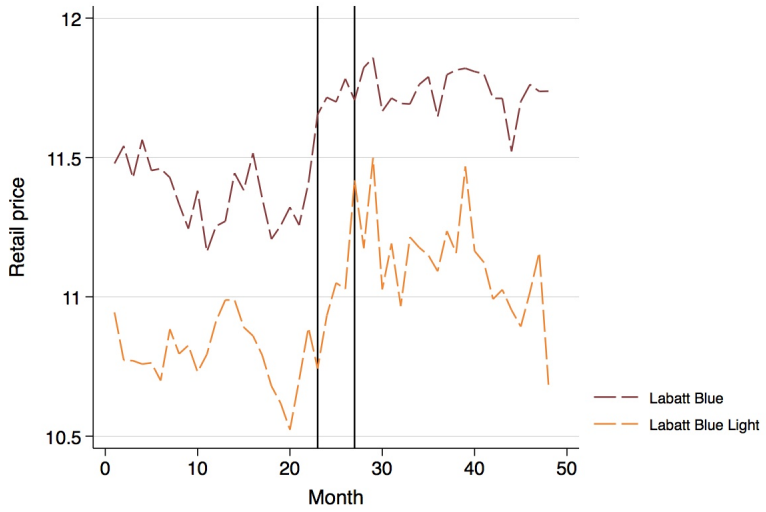

Table 3. Average Prices Pre-Merger and Post-Divestiture Period (%)

	All markets		Competition concerns	
Parent Company	Before	After	Before	After
Merged Entities				
AB Inbev		11.572		11.240
		(0.122)		(0.176)
AB	9.754		8.928	
	(0.191)		(0.151)	
Inbev	14.105		13.927	
	(0.195)		(0.376)	
Labatt (divested brand)	11.198		8.720	
	(0.096)		(0.115)	
NAB (buyer)				
Labatt (divested brand)		11.561		9.265
		(0.092)		(0.153)
High Falls Brewing		12.238		12.114
		(0.235)		(0.886)
Rivals				
High Falls Brewing	10.920		11.021	
	(0.324)		(0.777)	
Millercoors	8.610	8.976	7.923	8.399
	(0.145)	(0.046)	(0.113)	(0.189)
Constellation	14.429	13.952	14.809	14.3138
	(0.349)	(0.207)	(0.571)	(0.282)
DG Yuengling	9.521	10.000	9.339	9.718
	(0.146)	(0.077)	(0.175)	(0.224)
Heineken	14.510	14.484	14.380	14.540
	(0.270)	(0.251)	(0.259)	(0.249)

Notes: The table reports the average (across markets) prices before the merger (23 months) and after the divestiture (22 months) in all geographic markets and geographic with competition concerns only. Standard deviations are shown in parenthesis.

3.2 Difference-in-Differences

I examine the effect of the divestiture on retail prices of the divested brand, controlling for potential confounding factors. The identification strategy compares the retail prices of the divested brand to the retail prices of products not directly involved in the merger, around the time of the merger and divestiture, while controlling for confounding factors. Specifically, I estimate the following equation:

$$\begin{aligned} log(p_{jmt}) = K + \alpha_j + \alpha_m + \alpha_t + \delta_1 \mathbb{1}_{\text{Divested}} \times \mathbb{1}_{\text{Post}} + \delta_2 \mathbb{1}_{\text{ABI}} \times \mathbb{1}_{\text{Post}} \\ + \delta_3 \mathbb{1}_{\text{Buyer}} \times \mathbb{1}_{\text{Post}} + \delta_4 \mathbb{1}_{\text{Divested}} \times \mathbb{1}_{\text{Transitory}} \\ + \delta_5 \mathbb{1}_{\text{MillerCoors}} \times \mathbb{1}_{\text{Post MC}} + u_{jmt}, \quad (1) \end{aligned}$$

where $log(p_{jmt})$ is the price of product j in geographic market m at time t, α_j is a product specific term, α_m is a geographic market specific term, α_t is a month-year specific term. $\mathbb{1}_{\text{Divested}}$ is an indicator variable equal to 1 for products from the divested brand. $\mathbb{1}_{\text{ABI}}$ (resp. $\mathbb{1}_{\text{MillerCoors}}$) is an indicator variable equal to 1 for products owned by AB Inbev (resp. MillerCoors). $\mathbb{1}_{\text{Buyer}}$ is an indicator variable equal to 1 for all other products owned by the buyer of the divested brand. Last, $\mathbb{1}_{\text{Post}}$ is an indicator equal to 1 when the time period t is post-divestiture. $\mathbb{1}_{\text{Post MC}}$ is an indicator equal to 1 when the time period t is post-merger for MillerCoors. $\mathbb{1}_{\text{Transitory}}$ is an indicator variable equal to 1 in the transitory period between the announcement of the merger and the finalization of the divestiture (from July 2008 to February 2009).

In Table 4, I show the estimated coefficients.[13] The control group comprises all the products in my sample that are not directly involved in the mergers and divestiture.[14] In columns (1) and (2), the sample includes the brands not directly involved in any of the mergers. In columns (3) and (4), the sample includes all brands. In columns (1) and (3), the sample includes all geographic markets. In columns (2) and (4), the sample is restricted to geographic markets with expected

[13] An alternative estimated specification is shown in Appendix A.

[14] Note that if prices in the control group increase in response to the price increase by the merger and divestiture, the anti-competitive effects are likely underestimated. For this reason, I do not claim recovering causal effects.

competition concerns. The effect of the divestiture on the prices of the divested brand is given by $\hat{\delta_1}$. The effect of the merger Anheuser-Busch Inbev on prices is given by $\hat{\delta_2}$. Based on this specification, the divestiture resulted in an average price increase for the divested brand of 2.1% to 3.6% depending on the sample restrictions. The merger between Anheuser-Busch and Inbev led to an average price increase of about 3%.

These estimates suggest that the divestiture failed to block the anti-competitive effects of the merger. A divestiture can be pro-competitive through two main channels. First, the divested brand is often sold to a buyer with a smaller product portfolio compared to the seller. Fixing marginal costs, this tends to lead to a drop in the price for the divested brand. Second, the reduction in the number of products in the portfolio of the merged entity is expected to mitigate the potential price increase by the merger.

The fact that the first effect does not appear in the data is surprising and requires further analyses. Note that these reduced-forms do not provide information on the second effect, as the estimates do not reveal what would have been the prices of the merger absent divestiture. By contrast, the structural model I present in Section 4 and discuss in Section 4.2 allows for the quantification of this effect.

Table 4. Actual Price Effects

	(1) $log(p_{jmt})$	(2) $log(p_{jmt})$	(3) $log(p_{jmt})$	(4) $log(p_{jmt})$
$\mathbb{1}_{\text{Divested}} \times \mathbb{1}_{\text{Post}}$	0.036***	0.026**	0.025***	0.021*
	(0.0066)	(0.0096)	(0.0066)	(0.0084)
$\mathbb{1}_{\text{ABI}} \times \mathbb{1}_{\text{Post}}$			0.030***	0.029*
			(0.0032)	(0.012)
$\mathbb{1}_{\text{Buyer}} \times \mathbb{1}_{\text{Post}}$	0.11***	0.0089	0.10***	-0.0014
	(0.010)	(0.011)	(0.0097)	(0.011)
$\mathbb{1}_{\text{Divested}} \times \mathbb{1}_{\text{Transitory}}$	0.0030	-0.0032	0.0087	0.0076
	(0.0063)	(0.0065)	(0.0062)	(0.0052)
$\mathbb{1}_{\text{MillerCoors}} \times \mathbb{1}_{\text{Post MC}}$			0.031***	0.029***
			(0.0032)	(0.0076)
Year-month FE	✓	✓	✓	✓
Product FE	✓	✓	✓	✓
Geographic Market FE	✓	✓	✓	✓
K	2.55***	2.42***	2.45***	2.32***
	(0.019)	(0.0083)	(0.012)	(0.0072)
Market	All	Competition	All	Competition
N	48392	3607	123842	7408
adj. R^2	0.901	0.972	0.946	0.972

Notes: The table reports the estimated parameters from the regression model in Equation (1). Samples in columns (1) and (2) includes those brands not directly involved in any of the mergers. Samples in columns (3) and (4) includes all brands. In columns (1) and (3), the sample includes all geographic markets. In columns (2) and (4), the sample is restricted to geographic markets with expected competition concerns. Standard errors clustered at the product level in parentheses. $+p < 0.1$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

4 The Model

In this section, I calibrate and estimate a supply model to shed light on possible economic mechanisms. The supply model takes as given the preference parameters obtained from the demand estimation. Estimating the demand for U.S. beers is standard in the literature; therefore, I provide a detailed discussion of this step in the Appendix B.

4.1 Price-Competition with Partial Price Coordination

I assume that brewers compete à la Bertrand. Each brewer b owns a subset of product $j \in \Theta_{bmt}$. Denote $\Theta_{bmt}^{Coordination} \neq \Theta_{bmt}$ the subset of product j owned by the coordinating partner of brewer b. The maximization problem of brewer b in geographic market m, at time t, is given by:

$$\max_{\{p_{jmt} \in \Theta_{bmt}\}} \Pi_{mt}^{b}(p) = \sum_{j \in \Theta_{bmt}} (p_{jmt} - c_{jmt}) \mathcal{M}_t s_{jmt}(p) + \sum_{j \in \Theta_{bmt}^{Coordination}} \phi_j (p_{jmt} - c_{jmt}) \mathcal{M}_t s_{jmt}(p), \tag{2}$$

where c_{jmt} is the marginal cost associated with product j in geographic market m at time t and $\mathcal{M}_t$ is the total market size. The parameter $\phi_j \in (0,1)$ allows for the possibility that brewers partially coordinate prices. In the extreme case, with all ϕ_j equal to 1, the maximization problem is similar to that of a cartel. The other extreme case, with all ϕ_j equal to 0 corresponds to a standard Bertrand competition problem without price coordination.

The first-order condition with respect to p_{jmt} is given by:

$$s_{jmt}(p) + (p_{jmt} - c_{jmt}) \frac{\partial s_{jmt}(p)}{\partial p_{jmt}} + \sum_{k \in \Theta_{bmt}} (p_{kmt} - c_{kmt}) \frac{\partial s_{kmt}(p)}{\partial p_{jmt}} + \sum_{k \in \Theta_{bmt}^{Coordination}} \phi_k (p_{kmt} - c_{kmt}) \frac{\partial s_{kmt}(p)}{\partial p_{jmt}} = 0. \tag{3}$$

I obtain J equations per market $m \times t$. The system of J first-order conditions, for a given market mt, in vector notation can be written as follows:

$$s_{mt}(p) + (I_{mt} \odot \Omega_{mt}(p))(p_{mt} - c_{mt}) = 0, \tag{4}$$

where the (j,k)-element of $\Omega_{mt}(p)$ is defined as $\dfrac{\partial s_{kmt}(p)}{\partial p_{jmt}}$.

The block-diagonal matrix I_{mt} is of dimension $J \times J$. The (j,k)-element of I^b_{mt} is defined as:

$$I_{jkmt} = \begin{cases} 1 & \text{if } j \text{ and } k \text{ are sold by the same brewer} \\ \phi & \text{if } j \neq k \text{ belong to ABI and MillerCoors} \\ \phi_d & \text{if } j \neq k \text{ belong to ABI (resp. MillerCoors) and NAB} \\ 0 & \text{otherwise.} \end{cases} \tag{5}$$

I further assume that in the pre-merger period, $\phi = \phi_d = 0$.[15] Recall that in my sample I observe three mergers in my sample: ABI, MillerCoors and the acquisition of High Falls Brewery by NAB (the buyer of the divested brand).[16] Therefore, I allow all mergers to coordinate on prices in the post-merger and divestiture period. Yet, the degree of price coordination between the mergers and the buyer of the divested brand may be different. By contrast, I assume that rivals not involved in any of the mergers compete à la Nash-Bertrand.

From equation (3), I obtain the brewer margins:

$$\gamma_{mt} \equiv p_{mt} - c_{mt} = -(I^b_{mt} \odot \Omega_{mt}(p))^{-1} s_{mt}(p), \tag{6}$$

with c_{mt} the manufacturer's marginal costs that can be recovered as follows:

$$c_{mt} = p_{mt} - \gamma_{mt}. \tag{7}$$

[15] For the sake of clarity a simple illustrative example is provided in Appendix C.

[16] Recall that NAB, the buyer of the divested brand is also completing the acquisition of High Falls Brewery and buying the divested brand at the same time. Therefore, I observe three mergers.

In this setting, retail prices are determined simultaneously by brewers competing for final consumers directly in the downstream market. Therefore, it is assumed that brewers directly sell their products to consumers thereby omitting the competition between retailers.

4.2 Economic Mechanisms: Model with Calibrated Parameters

In this subsection, I study the price effects and the change in consumer surplus implied by the merger and the divestiture under different arbitrary values of the conduct parameters. There are two benefits: it allows: (i) to discuss the potential economic mechanisms at play, and (ii) making transparent the extent to which these parameters influence the results.

No Price Coordination and No Cost Savings: The Pro-Competitive Effects of a Divestiture

I start with a model without price coordination ($\phi = \phi_d = 0$). I further assume that marginal costs are fixed at their pre-merger level. I solve for a vector of prices in three different counterfactual scenarios: (i) no merger, (ii) a merger without divestiture, and (iii) a merger with divestiture. I then compute the effect of the merger and divestiture relative to the 'no merger' scenario. I show the results in Table 5.

First, I discuss the results for the buyer and the seller of the divested brand. On average the prices of the products owned by the seller of the divested brand increase by 2.437% in the absence of divestiture and increase less if the merger is approved with divestiture. The price of the divested brand would have increased by 6.179% in the absence of divestiture, while it decreases by 0.227% in the scenario where the merger is approved with divestiture.

To sum up, the results reveal two interesting features. First, in the absence of price coordination, standard merger simulation models highlight two pro-competitive forces: (i) the divestiture mitigates the price increase of the merged entity's products, and (ii) the price of the divested brand is expected to decrease. Second, given that the descriptive evidence shows a price increase for the divested

brand, a simple merger simulation model without price coordination is not well suited for deriving a meaningful evaluation of the divestiture of Labatt. In line with previous work by Miller and Weinberg (2017), an additional element possibly explaining the observed price effects for the divested brand is the presence of price coordination. Next, I investigate this possibility.

Table 5. Counterfactuals without Price Coordination

	$\phi = 0 = \phi_d = 0$	
	No Divestiture	Divestiture
Merged Entities		
MillerCoors	4.587%	4.579%
ABI	2.437%	2.389%
Divested brand	6.179%	
NAB (buyer)		
Labatt (divested brand)		-0.227%
High Falls Brewing	0.002%	0.046%
Rivals		
Constellation	0.053%	0.051%
DG Yuengling	0.041%	0.040%
Heineken	0.034%	0.033%
Welfare		
ΔCS	-5.35%	-5.26%
ΔPS	3.18%	3.37%

Notes: The simulations are based on the demand parameters presented in Table 12 and conduct parameters set to zero. The simulations are computed using the period after the divestiture and computed relative to the 'no merger' scenario. There are 46497 observations in the sample. Additional summary statistics including standard deviations are provided in Appendix E.

Price Coordination and No Cost Savings: Divestiture may Deteriorate Consumer Surplus more than a Merger without

I repeat the exercise, but this time I assume different arbitrary values for the conduct parameters. Recall that these conduct parameters govern the degree of tacit price coordination between the merging firms and the buyer of the divested brand, as well as between the merging firms themselves. Precisely, I set ϕ_d and ϕ equal to 0.3, 0.5, and 0.9. I focus the discussion on the computed price effects for the divested brand. With conduct parameters set to $\phi = \phi_d = 0.3$, the computed average price change after a merger without divestiture is 8.136% for the divested brand. After a merger with divestiture, the price of the divested brand increases by 3.563%.

Thus, the price of the divested brand increases after a merger with divestiture, but less than after a merger. This suggests that if marginal costs are set at their pre-merger level, a model with tacit price coordination can explain a price increase for the divested brand. By partially internalizing its rivals' profits, the buyer of the divested brand (NAB) sets higher prices for the divested brand.

Note also that for higher values of the conduct parameters ϕ and ϕ_d, one can see that the price effects associated with the product owned by ABI, tend to be larger after a merger with divestiture compared to a merger without divestiture. Tacit price coordination, materialized through the conduct parameters, may partially offset the two pro-competitive effects of the divestiture.

The results in Table 6 also provide information on the effects of the merger and divestiture on consumer surplus in the presence of tacit price coordination.[17] First, based on the preference estimates (Table 12), the fixed marginal costs, and the conduct parameters, the consumer surplus systematically decreases after the merger, independently of the divestiture. For small values of the conduct parameters ($\phi = \phi_d < 0.3$), it decreases less when a divestiture is imposed, suggesting that divestiture actually mitigates the anti-competitive effects of the merger. However, for large values of the conduct parameters ($\phi = \phi_d > 0.3$), the merger cleared with divestiture deteriorates consumer surplus more than a merger cleared without

[17] Derivation for welfare statistics are provided in Appendix D.

divestiture. In this setting, consumers would be better off with a laissez-faire policy.

Recall that the purpose of this exercise is meant to illustrate how tacit price coordination affects the standard economic mechanisms associated with a divestiture. However, these simulations are based on two strong assumptions: (i) marginal costs are set at their pre-merger level, and (ii) the conduct parameters take the same arbitrary value. In Section 4.3, I relax these assumptions, by estimating the conduct parameters and marginal costs. The associated simulation results are presented in Section 5.

Table 6. Counterfactuals: Price Coordination (Calibrated Parameters)

	$\phi = 0 = \phi_d = 0$		$\phi = 0.3 = \phi_d = 0.3$	
	No Divestiture	Divestiture	No Divestiture	Divestiture
Merged Entities				
MillerCoors	4.587%	4.579%	7.915%	7.929%
AB Inbev	2.437%	2.389%	4.992%	4.975%
Labatt (divested brand)	6.179%		8.136%	
NAB (buyer)				
Labatt (divested brand)		-.227%		3.563%
High Falls Brewing	0.002 %	0.046%	0.005%	5.198%
Rivals				
Constellation	0.053%	0.051%	0.109%	0.108%
DG Yuengling	0.041%	0.040%	0.089%	0.089%
Heineken	0.034%	0.033%	0.070%	0.070%
ΔCS	-5.35%	-5.26%	-11.20%	-11.25%
ΔPS	3.18%	3.37%	6.62%	6.90%
	$\phi = \phi_d = 0.5$		$\phi = \phi_d = 0.9$	
	No Divestiture	Divestiture	No Divestiture	Divestiture
Merged Entities				
MillerCoors	10.145%	10.174%	14.531%	14.588%
AB Inbev	6.698%	6.701%	10.030%	10.073%
Labatt (divested brand)	9.439%		11.977%	
NAB (buyer)				
Labatt (divested brand)		6.152%		11.349%
High Falls Brewing	0.007%	8.728%	0.010%	15.844%
Rivals				
Constellation	0.146%	0.146%	0.216%	0.218%
DG Yuengling	0.122%	0.123%	0.185%	0.187%
Heineken	0.095%	0.095%	0.140%	0.142%
ΔCS	-14.93%	-15.06%	-21.79%	-22.07%
ΔPS	8.60%	8.78%	11.75%	11.40%

Notes: The simulations are based on the estimates presented in Table 12 and given conduct parameters. The simulations are based on data corresponding to the period after the divestiture and computed relative to the 'no merger' scenario. There are 46497 observations in the sample. Additional summary statistics including standard deviations are provided in Appendix E.

4.3 Identification

SUPPLY ESTIMATION I assume that the marginal cost of product j in geographic market m at time t depends on some observable and unobservable cost shocks as summarized by the following equation:

$$c_{jmt} = A + \beta_0 \mathbb{1}_{MillerCoors} \times \mathbb{1}_{Post} + \beta_1 Distance_{jmt} + \beta_2 \mathbb{1}_{import} \times \mathbb{1}_{Post} + \mu_j + \mu_{month} + \eta_{jmt}, \quad (8)$$

where A is a constant, $\mathbb{1}_{MillerCoors} \times \mathbb{1}_{Post}$ is an indicator variable equal to 1 for MillerCoors products in the post-divestiture period. This variable captures potential cost savings for MillerCoors as in Miller and Weinberg (2017). $Distance_{jmt}$ is the distance to the nearest brewery for product j in geographic market m at time t, $\mathbb{1}_{import} \times \mathbb{1}_{Post}$ is an indicator variable that equals 1 in the post-divestiture period if the beer is imported. This variable recognized that an imported beer may face different shocks in the post-divestiture period than a non-imported beer. μ_j is a product-specific effect and μ_{month} is a month-specific effect.

Next, one can re-write the FOC described in equation (4) as follows:

$$p_{jmt} = \gamma_{jmt}(p) + A + \beta_0 \mathbb{1}_{MillerCoors} \times \mathbb{1}_{Post} + \beta_1 Distance_{jmt} + \beta_2 \mathbb{1}_{import} \times \mathbb{1}_{Post} + \mu_j + \mu_{month} + \eta_{jmt}. \quad (9)$$

The structural error term is given by:

$$\eta_{jmt}(\phi, \phi_d, \theta_c) \equiv p_{jmt} - \gamma_{jmt}(p) - A - \beta_0 \mathbb{1}_{MillerCoors} \times \mathbb{1}_{Post} - \beta_1 Distance_{jmt} - \beta_2 \mathbb{1}_{import} \times \mathbb{1}_{Post} - \mu_j - \mu_{month}. \quad (10)$$

Denote the cost parameters as θ_c (1942 parameters). Next, I stack the parameters ϕ, ϕ_d, and the vector θ_c in the vector $\theta^s = (\phi, \phi_d, \theta_c)$. Identifying these parameters is challenging because the unobserved cost shock η_{jmt} is observed by the brewers but not by the researcher. Thus it is likely that brewers set prices knowing the

realization of η_{jmt}. Ignoring this, I could misattribute a price increase due to a positive cost shock to markups. Consequently, I must use instruments to isolate the exogenous markup changes from cost changes.

INSTRUMENTS To identify ϕ and ϕ_d, one needs at least two instruments that are relevant and valid. These instruments must directly affect the markups. The vector of instruments must also to be orthogonal to η. I use an identification strategy similar to Miller and Weinberg (2017) based on the change in ownership structure caused by the merger. Specifically, I create an instrumental variable corresponding to a dummy equal to 1 in the post-divestiture period for the products of the two mergers ($\mathbb{1}_{ABI-MC} \times \mathbb{1}_{Post-divestiture}$). I also use the change in ownership structure caused by the divestiture to create an additional instrument. This instrument is a dummy equal to 1 in the post-divestiture period for the products of the two mergers and the buyer of the divested brand ($\mathbb{1}_{ABI-MC-NAB} \times \mathbb{1}_{Post-divestiture}$). The relevance of these instruments comes directly from the model. Consider the effects taken into account by ABI when setting the price of an arbitrary product. ABI considers the effect of the price set on (i) its own demand, (ii) the demand for the other products it owns, and (iii) the profit of MillerCoors, which may be partially internalized. The instrumental variable $\mathbb{1}_{ABI-MC} \times \mathbb{1}_{Post-divestiture}$ captures these anti-competitive effects. The instrumental variable $\mathbb{1}_{ABI-MC-NAB} \times \mathbb{1}_{Post-divestiture}$ also accounts for the fact that ABI may also internalize the effect of the price it sets on the profit of the buyer of the divested brand. Finally, I assume that these instruments are orthogonal to the unobserved cost shocks and construct the following GMM objective function:

$$\hat{\theta^s} = \underset{\theta^s}{argmin}\ \eta(\theta^s)'\mathbf{Z}\mathbf{W}^{-1}\mathbf{Z}'\eta(\theta^s),$$

where $\theta^s = (\phi, \phi_d, \theta_c)$ is the vector of parameters minimizing the following GMM objective function and $\mathbf{W}$ is a weighting matrix.

4.4 Supply Estimation

Table 7 shows the estimated parameters for the supply model. The estimates associated with ϕ and ϕ_d are both statistically significant. It reveals that a model of Nash-Bertrand competition is rejected at any conventional levels. It suggests that ABI (or MillerCoors) and NAB internalize about 80% of their price effects on each other's profits in the post-divestiture period. This is larger than the internalization of price effects by ABI and MillerCoors on each other profits, which is about 34%.[18]

Next, I comment on the results for the estimated cost parameters. The estimate associated with the variable $\mathbb{1}_{MillerCoors} \times \mathbb{1}_{Post}$, which captures potential cost efficiencies that are not a reduction in shipping distance, is equal to -0.223. This represents cost savings of about 4%. This is lower than the estimates found in Miller and Weinberg (2017) and is likely explained by the presence of additional beers in the sample, such as beers brewed by DG Yuengling. The estimate associated with the distance variable is 0.314 and is statistically significant at any conventional levels. Finally, the marginal cost of imported beers decreases by 0.762$ in the post-divestiture period. These cost savings for imported beers are justified by qualitative evidence. For example, Heineken implemented two programs to reduce costs: the Fit2Fight program and the Total Cost Management program (TCM). In their 2009 annual report, they state that "*TCM bore fruit, with EUR155 million of costs taken out of the business*".[19] Another supporting evidence is found for Modelo, the brewer of Corona Extra and Corona extra light. In 2009, In 2009, they cut 1,200 jobs to reduce costs, according to the specialized press.[20] Therefore, it is plausible to observe cost savings for these beers post divestiture. Note also that the divested brand (Labatt) is imported. Thus, the results suggest that the divestiture may have led to some cost efficiencies. This is consistent with recent evidence found by Delaprez and Guignard (2024) on divestitures and cost efficiencies.

[18] The estimate of the conduct parameter for ABI and MillerCoors is broadly consistent with the results in Miller and Weinberg (2017), where they present estimates ranging from 0.24 to 0.37.

[19] See. here. Accessed, February 17, 2022.

[20] See. https://www.reuters.com/article/modelo-idUSN3144621420090331. Accessed, February 17, 2022.

Table 7. Supply Estimates

	Estimates
Conduct	
ϕ	0.344*** (0.009)
ϕ_d	0.791*** (0.016)
Marginal Costs	
$\mathbb{1}_{MillerCoors} \times \mathbb{1}_{Post}$	-0.223*** (0.015)
$Distance$	0.314*** (0.024)
$\mathbb{1}_{import} \times \mathbb{1}_{Post}$	-0.762*** (0.010)
μ_j	✓
μ_{month}	✓
$Constant$	✓
N	93439
GMM	0.000

Notes: The table reports the estimated supply parameters based on Equation (9). There are 93439 observations for the period 2007-2010 period. The sample excludes the months between June 2008 and May 2009 as in Miller and Weinberg (2017). Specifications include product fixed effects, period dummies and a constant. Robust standard errors in parentheses.

I show the average markups and marginal costs implied by this specification in the pre-merger and post-divestiture periods in Table 8. Markups are on average higher for brewers that experienced a change in ownership structure in the form of a merger (MillerCoors and ABI) or a divestiture (NAB). The estimated marginal costs of the imported beers are on average higher than those of domestic beers which is consistent with descriptive evidences presented in Table 1 and 3.

Table 8. Markups and Marginal Costs

	Markups		Marginal costs	
	Pre	Post	Pre	Post
Merged Entities				
MillerCoors	3.185 (0.354)	3.383 (0.300)	5.701 (1.108)	5.372 (1.096)
AB	3.951 (1.037)		6.463 (1.017)	
Inbev	2.765 (.063)		11.487 (0.822)	
ABI		3.810 (0.945)		7.823 (2.235)
Labatt (divested brand)	4.647 (0.359)		8.632 (1.484)	
NAB (buyer)				
Labatt (divested brand)		4.527 (0.359)		7.711 (1.450)
High Falls Brewing	4.137 (0.597)	4.011 (0.610)	8.391 (1.188)	8.281 (0.951)
Rivals				
Constellation	2.670 (0.070)	2.726 (0.074)	11.910 (0.680)	11.179 (0.655)
DG Yuengling	2.560 (0.013)	2.558 (0.014)	7.183 (0.590)	7.170 (0.550)
Heineken	2.783 (0.190)	2.774 (0.176)	12.216 (0.566)	11.573 (0.581)

Notes: Standard deviation in parentheses. The table reports the average (across markets) brewer markups and marginal costs before the merger (23 months) and after the divestiture (22 months) based on the estimates in Table 7.

5 Welfare and Policy Recommendation on the Choice of the Buyer

Next, using the estimated model, I quantify the impact of the divestiture on consumer surplus. I compute the percentage change in prices and consumer surplus caused by the merger ('No Divestiture' column) and the merger with divestiture ('Divestiture' column) based on the demand estimates in Table 12 and the cost parameters in Table 7. The results are shown in Table 9. The columns with $\phi = \phi_d = 0$ correspond to results without price coordination. The columns with $\phi = 0.34$ and $\phi_d = 0.79$ are based on the estimated conduct parameters. First, I comment on the price effects for the divested brand. In the absence of price coordination and based on these estimates, the price of the divested brand would have decreased by about 7.071%. Yet, consumer surplus would have decreased. Therefore, prices

are not a sufficient statistic to evaluate welfare effects. This complement results in Osinski and Sandford (2021) by suggesting that remedies must be evaluated by their impact on consumer welfare rather than by the performance of the divested asset. In contrast, based on a more flexible model allowing for price coordination, the price of the divested brand increases by about 4.329%. This is qualitatively in line with the descriptive evidences in Table 4, nonetheless the model tends to overestimate the price effects. Regardless of the assumption made about price coordination by brewers, a merger without divestiture would have resulted in higher price effects for the divested brand. Therefore, the divestiture mitigates the anti-competitive effects of the merger, but partial price coordination acts as a countervailing force, limiting this pro-competitive channel.[21]

The opportunity cost of implementing a merger without divestiture can be quantified by computing the difference between the change in consumer surplus implied by the merger with and without divestiture.[22] In the absence of price coordination, the divestiture allows for saving about 386000$ in terms of consumer surplus loss. The presence of price coordination reduces this number to about 44000$. In other words, the presence of price coordination eliminates about 88% of the welfare gains caused by the divestiture.[23] In the next section, I use counterfactual simulations to examine the extent to which this depends on the buyer's choice.

5.1 Diversion Ratio

In this section, I explain how the prices of the buyer of the divested brand are affected by the divestiture under price coordination. Denote $D_{jk} = -\frac{\frac{\partial s_k}{\partial p_j}}{\frac{\partial s_j}{\partial p_j}}$ as the diversion ratio for products j and k as in Conlon and Mortimer (2021). D_{jk}

[21] This can also be seen by examining the price effects for the seller of the divested brand (ABI), but the quantitative importance of these effects is somewhat limited. In the absence of price coordination, the price effects of brands owned by ABI are higher when the merger occurs without divestiture. In the presence of price coordination, the price effects of brands owned by ABI are almost similar.

[22] The formulas used to compute welfare are detailed in Appendix D.

[23] In the Appendix H , I show results for the same simulations assuming that $\phi_d = 0.79$ only for ABI and NAB but not for MillerCoors and NAB. I find that the presence of price coordination elimnates about 66% of the welfare gains caused by the divestiture.

Table 9. Price Effects - Estimated Conduct Parameters

	$\phi = 0$ and $\phi_d = 0$		$\phi = 0.34$ and $\phi_d = 0$	$\phi = 0.34$ and $\phi_d = 0.79$
	No Divestiture	Divestiture	No Divestiture	Divestiture
Merged Entities				
MillerCoors	1.254%	1.159%	5.209%	5.214 %
ABI	0.395%	0.255%	2.844%	2.815%
Divested brand	7.708%		10.104%	
NAB (buyer)				
Divested brand		-7.071%		4.329%
Other brands	0.000%	0.025%	0.002%	12.020%
Rivals				
Constellation	0.022%	-0.037%	0.103%	0.052%
DG Yuengling	0.016%	-0.059%	0.070%	-0.002%
Heineken	0.012%	-0.042%	0.058%	0.007%
Welfare				
Δ CS	-1.61%	-1.17%	-8.32%	-8.27%
Δ PS	6.80%	9.25%	10.74%	12.63%
Opportunity cost (Merger without Divestiture ($))	386000 ($)		44000 ($)	

Notes: The simulations are based on the demand parameters presented in Table 12, with conduct parameters and cost parameters in Table 7. The simulations are computed using the period after the divestiture and computed relative to the 'no merger' scenario. There are 46497 observations in the sample. Summary statistics including standard deviations are provided in Appendix F.

represents the fraction of consumers who leave product j after a price increase and switch to product k. From equation (3), omitting the subscript mt, we can express the price for product j as:[24]

$$p_j = (\frac{1}{1+\frac{1}{\epsilon_{jj}}})[c_j + \sum_{k\in\theta_b}(p_k - c_k)D_{jk}(P) + \sum_{k\in\theta_b^{\text{Coordination}}} \phi_k(p_k - c_k)D_{jk}(P)]. \tag{11}$$

Recall that $\Theta_b^{Coordination} \neq \Theta_b$ is the subset of product k owned by the coordinating partners of brewer b.

DIVESTED PRODUCTS Assume one divested product with price p_d is sold to NAB, which initially owns only one product with price p_b. The price of the divested product is given by:

$$p_d = (\frac{1}{1+\frac{1}{\epsilon_{dd}}})[c_d - c_b D_{db}(P) + p_b D_{db}(P) + \sum_{k\in\theta_{\text{NAB}}^{\text{Coordination}}} \phi_k(p_k - c_k)D_{dk}(P)]. \tag{12}$$

If all ϕ are equal to zero, this is the standard first-order condition from a Nash-Bertrand game with multiproduct firms. In the presence of price coordination,

[24] See. Appendix I for derivation.

there is an additional term $\sum_{k \in \theta_{\text{NAB}}^{\text{Coordination}}} \phi_k(p_k - c_k)D_{dk}(P)$. The more the divested product and the products in the coordination group are close substitutes, the higher is the price of the divested product, all else being equal. Note also that higher prices for the product already in the portfolio of the buyer of the divested product p_b lead to higher prices. The effect is stronger when the diversion ratio $D_{db}(P)$ is higher.

PRODUCTS INITIALLY OWNED BY THE BUYER OF THE DIVESTED BRAND The price of the other product owned by the buyer of the divested brand is given by:

$$p_b = (\frac{1}{1 + \frac{1}{\epsilon_{bb}}})[c_b + p_d D_{bd}(P) - c_d D_{bd}(P) + \sum_{k \in \theta_{\text{NAB}}^{\text{Coordination}}} \phi_k(p_k - c_k)D_{bk}(P)]. \quad (13)$$

5.2 Price and Welfare Effects

I assess the change in prices and consumer surplus that would occur if the divested brand (Labatt) was sold to another brewer. I recompute the equilibrium vector of prices by solving the system of equations described in equation (3) based on four counterfactual scenarios. I assume that the acquisition of Labatt is made by each rival separately: (i) Constellation, (ii) DG Yuengling, (iii) Heineken, or (iv) MillerCoors.

The results show that divesting Labatt to a buyer other than NAB would reduce consumer surplus more than a merger without divestiture. Recall from Table 9 that without the divestiture, the merger between Anheuser-Busch and Inbev would result in a decrease in consumer surplus approximately 8.32%. In all counterfactual scenarios the consumer surplus decreases more. Based on this sample, among the five potential buyers, only the divestiture with the actual buyer leads to a divestiture deteriorating consumer surplus less than a simple merger.

Thus, the results suggest that the buyer was correctly chosen. Yet, the divestiture had high chances to affect consumer welfare more negatively than a simple merger. This is fully explained by price coordination. In the absence of price coordination, the divestiture is always beneficial because it reduces consumer surplus less than a merger without divestiture. A merger without divestiture reduces

Table 10. Counterfactuals: The Role of the Buyer - Price coordination.

	Buyer - Divested Brand							
	Constellation		DG Yuengling		Heineken		MillerCoors	
Conduct Parameter - ϕ	0	0.344	0	0.344	0	0.344	0	0.344
Conduct Parameter - ϕ_d	0	0.791	0	0.791	0	0.791	0	0.791
Change in Prices (%)								
Divested Brand	-5.351	13.363	0.113	19.076	-6.161	11.730	6.128	12.954
MillerCoors	1.216	4.883	1.296	4.648	1.214	4.417	1.377	10.642
ABI	0.250	5.589	0.311	5.203	0.248	4.951	0.322	6.195
High falls	-0.066	1.775	0.000	1.758	-0.066	1.569	0.000	0.004
Constellation	0.073	7.964	0.017	0.235	-0.035	0.214	0.021	0.204
DG Yuengling	-0.059	0.012	0.093	12.309	-0.059	0.001	0.016	0.140
Heineken	-0.041	1.771	0.010	3.793	0.064	10.240	0.012	0.114
Welfare								
ΔCS (%)	-1.24%	-11.30%	-1.43%	-9.47%	-1.21%	-9.41 %	-1.58%	-16.31 %
ΔPS (%)	9.30	12.55	6.96	9.14	9.29	10.97	6.89	14.68
Market share (%)	19.471%		3.722%		10.259%		30.239%	

Notes: The simulations are based on the demand parameters presented in Table 12, conduct parameters and cost parameters in Table 7. The simulations are computed using the period after the divestiture and computed relative to the 'no merger' scenario.

consumer surplus by -1.61%. In all counterfactuals, consumers are less negatively affected.

6 Conclusion

This study examines how divestitures affect prices and consumer welfare in the U.S. beer industry. In contrast to previous empirical studies of divestiture, I consider not only unilateral but also multilateral effects.

First, I find that price coordination, materialized through conduct parameters, acts as a countervailing force limiting the pro-competitive effect of the divestiture. My analysis allows for quantifying the importance of this countervailing force: despite large cost efficiencies, price coordination eliminates about 88% of the welfare benefits caused by the divestiture. Second, based on counterfactual simulations, I show that it is likely that a merger cleared with divestiture is more harmful to consumer welfare than a simple merger. The negative effects may outweigh their intended benefits. In a setting with price coordination, any buyers other than NAB would have deteriorated consumer welfare more than a merger

directly approved. This is not the case in a setting without price coordination. More generally, when a merger and divestiture do not lead to any cost efficiencies and the conduct parameters are high, consumer welfare is less negatively affected after a merger without a divestiture policy. Therefore, antitrust authorities must account the possibility of price coordination when imposing a divestiture. Yet, it is highly possible that a policy of directly blocking an anti-competitive merger will outperform a merger with a divestiture policy.

Appendix

A Difference-in-differences with Alternative Fixed Effects

Table 11. Actual Price Effects. No geographic market dummies.

	(1)	(2)	(3)	(4)
	$log(p_{jmt})$	$log(p_{jmt})$	$log(p_{jmt})$	$log(p_{jmt})$
$\mathbb{1}_{Divested} \times \mathbb{1}_{Post}$	0.038***	0.026**	0.027***	0.021*
	(0.0075)	(0.0095)	(0.0072)	(0.0084)
$\mathbb{1}_{ABI} \times \mathbb{1}_{Post}$	0	0	0.029***	0.029*
	(.)	(.)	(0.0035)	(0.012)
$\mathbb{1}_{Buyer} \times \mathbb{1}_{Post}$	0.12***	0.0089	0.10***	-0.0014
	(0.011)	(0.011)	(0.011)	(0.011)
$\mathbb{1}_{Divested} \times \mathbb{1}_{Transitory}$	0.0042	-0.0032	0.0098	0.0076
	(0.0068)	(0.0065)	(0.0065)	(0.0052)
$\mathbb{1}_{MillerCoors} \times \mathbb{1}_{PostMC}$	0	0	0.029***	0.029***
	(.)	(.)	(0.0043)	(0.0076)
Year-month FE	✓	✓	✓	✓
Product FE	✓	✓	✓	✓
Geographic Market FE				
K	2.51***	2.41***	2.36***	2.32***
	(0.0029)	(0.0079)	(0.0028)	(0.0070)
Market	All	Competition	All	Competition
N	48392	3607	123842	7408
adj. R^2	0.882	0.971	0.933	0.972

Notes: The table reports the estimated parameters from the regression model in Equation (1). Samples in column (1) and (2) includes those brands not directly involved in any of the mergers. Samples in columns (3) and (4) include all brands. In Columns (1) and (3) the sample includes all geographic markets. In columns (2) and (4) the sample is restricted to geographic markets with expected competition concerns. Standard errors clustered at the product level in parentheses. $+p < 0.1$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

B The Demand

B.1 Random Coefficient Logit Model

I estimate demand using a random coefficient logit model. Each consumer chooses a product $j \in \mathcal{J}_{mt} = \{1, ..., J\}$ or the outside good $j = 0$. Product j is a brand-retailer combination. Consumers are assumed to purchase one unit of the good that gives the highest utility among $\mathcal{J}_{mt}$ products.

The indirect utility function $\mathcal{U}_{ijmt}$ for consumer *i* buying product *j* $\in \mathcal{J}_{mt}$ in period t and geographic market m is specified as follows:

$$\mathcal{U}_{ijmt} = -\alpha p_{jmt} + \beta_i \mathbb{1}_{\text{Imported}} + \beta_{\text{year}} + \beta_{\text{month}} + \beta_{\text{brand}} + \xi_{jmt} + \epsilon_{ijmt}, \tag{14}$$

p_{jmt} is the price of product j in geographic market m at time t, $\mathbb{1}_{\text{Imported}}$ is an indicator variable equal to 1 if product j is imported, β_{year} represents year-specific coefficients, β_{month} represents month-specific coefficients, β_{brand} captures brand-specific effects, and ξ_{jmt} is an unobserved (by the researcher) characteristic of product j in period t and geographic market m.

I account for unobserved heterogeneity to model consumer valuation of imported beers such as:

$$\beta_i = \beta + \sigma v_i, \quad \text{with} \quad v_i \sim N(0,1), \tag{15}$$

where β is the mean valuation of $\mathbb{1}_{\text{Imported}}$ and σ is a parameter interpreted as the standard deviation across consumers of the mean valuation of $\mathbb{1}_{\text{Imported}}$.

The outside option allows consumers to substitute away from the set of products considered. I assume that the market size is equal to 1.5 times the total sales in a given geographic market. It implies an outside good market share equals to $\frac{1}{3}$. The outside good includes all beers outside the selected sample. The indirect utility for the outside good is normalized to zero such that:

$$\mathcal{U}_{i0mt} = \varepsilon_{i0mt}. \tag{16}$$

Assuming that ε_{ijmt} is independently and identically distributed across consumers, products, geographic markets and time as a Type 1 Extreme Value, predicted market shares are then given by the logit choice probability integrated over v_i for the imported beers:

$$\begin{aligned} s_{jmt}(\delta_{jmt}, \beta, \sigma) &= \int \frac{exp(-\alpha p_{jmt} + \beta_i \mathbb{1}_{\text{Imported}} + \beta_{\text{year}} + \beta_{\text{month}} + \beta_{\text{brand}} + \xi_{jmt})}{1 + \sum_{k=1}^{Jt} exp(-\alpha p_{kmt} + \beta_i \mathbb{1}_{\text{Imported}} + \beta_{\text{year}} + \beta_{\text{month}} + \beta_{\text{brand}} + \xi_{jmt})} dv_i \\ &= \int \frac{exp(\delta_{jmt} + \beta \mathbb{1}_{\text{Imported}} + \sigma v_i \mathbb{1}_{\text{Imported}})}{1 + \sum_{k=1}^{Jt} exp(\delta_{kmt} + \beta \mathbb{1}_{\text{Imported}} + \sigma v_i \mathbb{1}_{\text{Imported}})} dv_i, \end{aligned}$$

Next, define q_{jmt} the quantity of product j that is sold at t and q_{0mt} the quantity of the outside good at t.
The observed market share of product j at t is thus given by $s_{jmt} = \frac{q_{jmt}}{\sum_j q_{jmt} + q_{0mt}}$.
The market shares system is defined by:

$$s_{jmt}(\delta_{jmt}, \beta, \sigma) = s_{jmt}. \tag{17}$$

B.2 Identification

DEMAND ESTIMATION The preference parameters include α, σ (note that β is captured by the brand fixed effects β_{brand}), 20 parameters corresponding to the brand effects (one brand is taken as reference), 11 parameters corresponding to the month dummies (January is taken as reference), 3 parameters corresponding to the year dummies (2007 is taken as reference), and a constant. I stack these parameters to be estimated in the vector θ^d. Next, I define the structural error term $g_{jmt}(\theta^d) \equiv \xi_{jmt}$ as the variation in market shares not explained by the model. The demand unobservables ξ_{jmt} are obtained by inverting the system of market shares defined in (17) as in Berry et al. (1995).

θ^d is the vector of parameters minimizing a generalized method of moments objective function and is defined as follows:

$$\underset{\theta^d}{argmin} \quad g(\theta^d)' Z W Z' g(\theta^d). \tag{18}$$

Z is a matrix of instruments and W is the optimal weighting matrix. The vector $g(\theta^d)$ stacks the ξ_{jmt} over each market. The estimation of the random coefficient Logit is based on Berry et al. (1995).

INSTRUMENTS Ignoring the endogeneity of prices that are simultaneously determined by supply and demand generally leads to estimates associated with prices that are biased toward zero. I circumvent this issue by using instrumental variables.

I use three types of instruments. First, I use the change in the ownership structure implied by the merger and divestiture. I create three dummy variables taking the value 1 in the post divestiture period for the products owned by the new entities Anheuser-Busch Inbev ($\mathbb{1}_{ABI} \times \mathbb{1}_{\text{Post-divestiture}}$), MillerCoors ($\mathbb{1}_{ABI} \times \mathbb{1}_{\text{Post-divestiture}}$) and NAB ($\mathbb{1}_{NAB} \times \mathbb{1}_{\text{Post-divestiture}}$). I also exploit a unique feature of the institutional setting: the market shares of the divested brand vary importantly across geographic markets. In Table 2, one can see that the divested brand has larger market shares in geographic markets with expected competition concerns. The change in ownership structure is likely to affect markups differently in these markets. Therefore, I create three additional dummy variables by interacting $\mathbb{1}_{ABI} \times \mathbb{1}_{\text{Post-divestiture}}$, $\mathbb{1}_{MC} \times \mathbb{1}_{\text{Post-divestiture}}$ and $\mathbb{1}_{NAB} \times \mathbb{1}_{\text{Post-divestiture}}$ with an indicator variable taking the value 1 in geographic markets with expected anti-competitive effects. These 6 instrumental variables are valid if they are orthogonal with the unobserved demand term and affect demand only indirectly through markups shifting supply directly. Next, I use a BLP-type of instrument corresponding to the number of products sold in each market (mt). This instrument is assumed to be relevant as it influences directly the degree of competition in the economy. This instrument is valid if it is uncorrelated with unobserved demand shocks. Last, for each product in each geographic market I use the distance from the nearest brewery as a cost-shifter. The relevance of these instruments is confirmed empirically and detailed further in Appendix B.4.

B.3 Demand Results

In Table 12, I display the estimates for the Logit and Random Coefficient Logit demand parameters.[25] In column (i), I show the results for the Logit demand parameters using Ordinary Least Squares. In column (ii), I present the results for the Logit demand estimates using instruments to cope with the endogeneity of prices. In column (iii), I show the results for the most flexible specification of demand, which allows consumers to have heterogeneous preferences for imported beers, based on Random Coefficient Logit demand.

In the absence of instruments, the coefficient associated with prices is biased toward zero and equal to -0.34 (column (i)). Instrumenting for prices moves the estimate associated with prices further away from zero. Based on simple Logit (column (ii)), the estimate is equal to about -1.23. Using random coefficient logit (column (iii)), the coefficient associated with prices is equal to -0.40 and is statistically significant at any conventional levels. The estimate for the standard deviation of the valuation of imported beers, σ, is statistically significant and equal to 0.85. Note that the mean valuation for beers is captured by brand fixed effects. This specification delivers a median own-price elasticity of demand equal to -4.412.[26] Comparing this implied median own-price elasticity of demand with previous estimates in the literature estimating demand for beer, reveals that it is broadly in line with the literature.[27] For instance, demand specifications in Miller and Weinberg (2017) deliver a median own-price elasticity of demand for beer ranging from -6.10 to -3.81.[28]

[25] The first-stage estimates and all demand estimates are displayed in Appendix B.4.

[26] The specification implies 0% of negative marginal costs.

[27] In Appendix B.5, I provide more detailed information on the own-price elasticity of demand by brand.

[28] In Table 16, I show the average (or median) own-price elasticity found in various additional articles.

Table 12. Demand Parameter Estimates

	OLS	Logit-IV	RCL
	(i)	(ii)	(iii)
Price	-0.34***	-1.23***	-0.40***
	(0.0043)	(0.020)	(0.004)
Standard deviation (σ)			0.85***
			(0.150)
Brand dummies	✓	✓	✓
Month dummies	✓	✓	✓
Year dummies	✓	✓	✓
N	93439	93439	93439
Own-price Elasticity (median)	-3.526	-12.691	-4.142

Notes: The table reports the estimated demand parameters with the Logit and Random coefficient Logit demands based on the utility function in (14). There are 93439 observations for the period 2007–2010 at the brand-retailer-region-month-year level. The samples exclude the months between June 2008 and May 2009 as in Miller and Weinberg (2017). Specifications include 20 brand dummies, 11 month dummies, 3 year dummies, and a constant. Robust standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

B.4 First-Stage Demand Estimates

B.4.1 First-stage Results

Table 13. First-stage estimates: Logit-IV

	(1)
	p_{jmt}
$\mathbb{1}_{\text{ABI}} \times \mathbb{1}_{\text{Post divestiture}}$	.666 (.016)
$\mathbb{1}_{\text{NAB}} \times \mathbb{1}_{\text{Post divestiture}}$	1.144 (.033)
distance	.486 (.011)
BLP	.004 (.000)
$\mathbb{1}_{\text{ABI}} \times \mathbb{1}_{\text{Post divestiture}} \times \mathbb{1}_{\text{competition}}$	-.170 (.033)
$\mathbb{1}_{\text{NAB}} \times \mathbb{1}_{\text{Post divestiture}} \times \mathbb{1}_{\text{competition}}$	-1.558 (.076)
$\mathbb{1}_{\text{MC}} \times \mathbb{1}_{\text{Post divestiture}} \times \mathbb{1}_{\text{competition}}$	-.590 (.023)
$\mathbb{1}_{\text{MC}} \times \mathbb{1}_{\text{Post divestiture}}$	.742 (.014)
Year dummies	✓
Month dummies	✓
Brand dummies	✓
N	93439
F-test excluded instruments	899.64

robust standard errors in parentheses

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

B.4.2 Estimates Dummies: Logit-IV

Table 14. Year, Month and Brand dummies

	Mean
Year 8	-.179 (.011)
Year 9	-.232 (.013)
Year 10	-.350 (.011)
Month 2	.024 (.015)
Month 3	.040 (.015)
Month 4	.034 (.015)
Month 5	-.070 (.015)
Month 6	-.059 (.016)
Month 7	-.101 (.016)
Month 8	-.093 (.016)
Month 9	-.127 (.016)
Month 10	-.073 (.016)
Month 11	-.156 (.016)
Month 12	-.223 (.016)
Brand 2	-.033 (.026)
Brand 3	-4.814 (.019)
Brand 4	-4.818 (.019)
Brand 5	-5.418 (.022)
Brand 6	-5.046 (.021)
Brand 7	-.260 (.027)
Brand 8	-.276 (.027)
Brand 9	-3.229 (.032)
Brand 10	.688 (.021)
Brand 11	.540 (.022)
Brand 12	-3.019 (.033)
Brand 13	-3.480 (.041)
Brand 14	-3.339 (.022)
Brand 15	-3.542 (.023)
Brand 16	-4.866 (.020)
Brand 17	-7.153 (.020)
Brand 18	-5.010 (.020)
Brand 19	-4.106 (.026)
Brand 20	-4.210 (.027)
Brand 21	-4.453 (.026)

Note: robust standard errors in parentheses

B.5 Average Own-Price Elasticity by Brand

Table 15. Average Own-Price Elasticity - Brand

Brand	Own-Price Elasticity
Becks	-5.6607
Becks premier light	-5.6611
Bud light	-3.2497
Budweiser	-3.5296
Coors	-3.5823
Coors light	-3.4819
Corona extra	-5.2254
Corona light	-5.4145
Dundee honey brown lager	-4.891
Heineken	-5,5815
Heineken premium light lager	-5,6464
Labatt blue	-4.6725
Labatt blue light	-4.4431
Michelob	-4.5466
Michelob light	-4.4196
Miller genuine draft	-3.799
Miller high life	-2.8575
Miller lite	-3.4907
Yuengling black and tan	-4,0769
Yuengling light lager	-3,9937
Yuengling traaditional lager	-3,8233

Note: This table shows the average own-price elasticity for each brand computed with the estimates in Table 12, column (3).

B.6 Comparison with Other Papers in the Literature - Own-Price Elasticity

Table 16. Comparison of Own-Price Elasticity with the Literature

	Range Average Own-Price Elasticity
Other papers	
Friberg and Romahn (2015)	-5.95
Asker (2016)	-3.4
Miller and Weinberg (2017)	[-6.10, -3.81]*

Notes: This table shows the average own-price elasticity (* denotes median own-price elasticities) for all demand specifications presented in several papers estimating demand for beer.

C Illustrative Example

Assume 4 brewers producing one beer and 1 brewer producing 2 beers. In the pre-merger period, the ownership matrix is as follows:

$$I^b_{m,pre} = \begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix} \tag{19}$$

Next, assume that brewers 1 and 2 merge; Brewer 3 and 4 merge; and one product owned by brewer 4 is divested to brewer 5.

In the absence of price coordination, the ownership matrix is as follows:

$$I^{b}_{m,post} = \begin{pmatrix} 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 \end{pmatrix} \tag{20}$$

Allowing the data to reveal potential price coordination, the ownership matrix is as follows:

$$I^{b}_{m,post} = \begin{pmatrix} 1 & 1 & \phi & \phi & \phi_d & \phi_d \\ 1 & 1 & \phi & \phi & \phi_d & \phi_d \\ \phi & \phi & 1 & 1 & \phi_d & \phi_d \\ \phi & \phi & 1 & 1 & \phi_d & \phi_d \\ \phi_d & \phi_d & \phi_d & \phi_d & 1 & 1 \\ \phi_d & \phi_d & \phi_d & \phi_d & 1 & 1 \end{pmatrix} \tag{21}$$

D Welfare Statistics

Consumer Surplus

I use the formula derived by Small and Rosen (1981). Based on the utility function specified in equation 14, the change in consumer surplus for an individual i in an arbitrary market mt, is given by the following equation:

$$\Delta E[CS_i] = \frac{1}{|\alpha|}[log(\sum_j exp(-\alpha p^{\star}_{jmt} + \beta_i \mathbb{1}_{Imported} + \eta_{year} + \eta_{month} + \eta_{brand}))- \\ log(\sum_j exp(-\alpha p^{nomerger}_{jmt} + \beta_i \mathbb{1}_{Imported} + \eta_{year} + \eta_{month} + \eta_{brand}))], \quad (22)$$

where $p^{\star}_{jmt}$ is a counterfactual equilibrium price for a given counterfactual scenario and $p^{nomerger}_{jmt}$ is a counterfactual equilibrium price in the 'no merger' scenario. This equation gives the average change in consumer surplus for the subpopulation of the economy with the same representative utility as i.

Brewer Surplus

The change in brewer surplus is computed as follows:

$$\Delta E[BS] = \sum_j^J (p^{\star}_{jmt} - c_{jmt}) S_{jmt}(P^{\star}) - \sum_j^J (p^{no-merger}_{jmt} - c_{jmt}) S_{jmt}(P^{no-merger}) \quad (23)$$

E Average Prices and Standard Deviation (Calibrated Parameters)

Table 17 reports summary statistics (average prices by brewer and standard deviations) for the vector of prices used to compute percentage changes in Table 6. Column (1) shows summary statistics for the vector of prices in the scenario 'No divestiture and no price coordination.' Column (2) shows summary statistics for the vector of prices in the scenario 'Merger and Divestiture without price coordination.' Column (3) shows summary statistics for the vector of prices in the scenario 'No divestiture with price coordination ($\phi = 0.3$)'. Column (4) shows summary statistics for the vector of prices in the scenario 'Merger and Divestiture with price coordination ($\phi = \phi_d = 0.3$)'. Column (5) shows summary statistics for the vector of prices in the scenario 'No divestiture with price coordination ($\phi = 0.5$).' Column (6) shows summary statistics for the vector of prices in the scenario 'Merger and Divestiture with price coordination ($\phi = \phi_d = 0.5$)'. Column (7) shows summary statistics for the vector of prices in the scenario 'No divestiture with price coordination ($\phi = 0.9$).' Column (8) shows summary statistics for the vector of prices in the scenario 'Merger and Divestiture with price coordination ($\phi = \phi_d = 0.9$).' Column (9) shows summary statistics for the vector of prices in the scenario 'No merger.'

Table 17. Average Prices by Firm for each Scenario

	$\phi = 0 = \phi_d = 0$		$\phi = 0.3 = \phi_d = 0.3$		$\phi = \phi_d = 0.5$		$\phi = \phi_d = 0.9$		$\phi = \phi_d = 0$
	No Divestiture (1)	Divestiture (2)	No Divestiture (3)	Divestiture (4)	No Divestiture (5)	Divestiture (6)	No Divestiture (7)	Divestiture (8)	No merger (9)
Merged Entities									
MillerCoors	8.67 (.38)	8.67 (.38)	8.95 (.41)	8.95 (.41)	9.13 (.43)	9.14 (.43)	9.50 (.48)	9.50 (.48)	8.29 (.28)
ABI	10.54 (1.74)	10.54 (1.74)	10.80 (1.74)	10.80 (1.74)	10.97 (1.74)	10.97 (1.74)	11.31 (1.74)	11.31 (1.74)	10.25 (1.41)
NAB (buyer)									
Labatt (divested brand)	13.06 (.14)	12.27 (.003)	13.30 (.20)	12.74 (.09)	13.46 (.23)	13.06 (.15)	13.78 (.30)	13.70 (.28)	12.30 (.00)
High Falls Brewing	9.41 (.00)	9.42 (.00)	9.41 (.00)	9.90 (.10)	9.41 (.00)	10.23 (.18)	9.41 (.00)	10.90 (.33)	9.41 (.00)
Rivals									
Constellation	14.57 (.02)	14.57 (.02)	14.58 (.03)	14.58 (.03)	14.58 (.03)	14.58 (.03)	14.59 (.04)	14.59 (.040)	14.56 (.02)
DG Yuengling	9.52 (.01)	9.51 (.01)	9.52 (.01)	9.52 (.01)	9.52 (.01)	9.52 (.01)	9.53 (.02)	9.53 (.02)	9.51 (.01)
Heineken	14.62 (.01)	14.62 (.01)	14.62 (.02)	14.62 (.02)	14.63 (.02)	14.63 (.02)	14.63 (.02)	14.63 (.02)	14.61 (.01)

Notes: The simulations are based on the estimates presented in Table 12 and given conduct parameters. The simulations are based on data corresponding to the period after the divestiture and computed relative to the 'no merger' scenario.

F Average Prices and Standard Deviation with Estimated Parameters

Table 18 reports summary statistics (average prices by brewer and standard deviations) for the vector of prices used to compute percentage changes in Table 9. Column (1) shows summary statistics for the vector of prices in the scenario 'No divestiture and no price coordination.' Column (2) shows summary statistics for the vector of prices in the scenario 'Merger and Divestiture without price coordination.' Column (3) shows summary statistics for the vector of prices in the scenario 'No divestiture with price coordination.' Column (4) shows summary statistics for the vector of prices in the scenario 'Merger and Divestiture with price coordination.' Column (5) shows summary statistics for the vector of prices in the scenario 'No merger.'

Table 18. Average Prices by Firm for Each Scenario

	No Divestiture	Divestiture	No Divestiture	Divestiture	No Merger
Price Coordination	No	No	Yes	Yes	No
	(1)	(2)	(3)	(4)	(5)
Merged Entities					
MillerCoors	8.58 (1.07)	8.57 (1.07)	8.91 (1.07)	8.91 (1.07)	8.47 (1.08)
ABI	11.20 (2.20)	11.19 (2.20)	11.48 (2.19)	11.47 (2.19)	11.16 (2.19)
NAB (buyer)					
Labatt (divested brand)	11.85 (1.46)	10.22 (1.44)	12.11 (1.47)	11.47 (1.47)	11.00 (1.44)
High Falls Brewing	10.78 (.95)	10.78 (.94)	10.78 (.94)	12.07 (.95)	10.78 (.95)
Rivals					
Constellation	13.88 (.64)	13.87 (.64)	13.89 (.64)	13.89 (.64)	13.88 (.64)
DG Yuengling	9.73 (.54)	9.72 (.54)	9.74 (.54)	9.73 (.54)	9.73 (.54)
Heineken	14.18 (.58)	14.18 (.58)	14.19 (.58)	14.18 (.58)	14.18 (.58)

Notes: The vector of prices are solutions to the first order condition defined by equation 3 for the scenario of interest. The parameters used are the demand parameters presented in Table 12, alongside the conduct parameters and cost parameters in Table 7. Standard deviations in parentheses relate to variation across markets. There are 46497 observations in the sample corresponding to the post-divestiture period.

G Robustness - Alternative Ownership Matrix

Table 20 shows simulation results when I set the conduct parameters for MillerCoors and NAB to be equal to 0.34 as the conduct parameter for MillerCoors and ABI ϕ. The opportunity cost of clearing the merger ABI without the divestiture is higher than in the setting presented in Table 9. However, note that if I would estimate a similar ϕ (rather than forcing the conduct parameter for MillerCoors and NAB to be equal to 0.34) for MillerCoors and NAB, and MillerCoors and ABI, it is likely that the parameter ϕ_d for ABI and NAB goes up. Next, it could decrease the opportunity costs of clearing the merger without the divestiture.

Table 19. Counterfactuals: Alternative Ownership Matrix Structure

Price Coordination	No divestiture	Divestiture
Merged Entities		
MillerCoors	5.209	5.15732
ABI	2.844	2.811
NAB (buyer)		
Divested brand	10.104	1.497
High	0.002	9.032
Rivals		
Constellation	0.103	0.050
DG Yuengling	0.070	-0.003
Heineken	0.058	0.006
ΔCS	-8.32%	-8.17%
Opportunity cost (Merger without Divestiture ($))	131000 ($)	

Notes: The simulations are based on the demand parameters presented in Table 12, conduct parameters for MillerCoors and NAB set to 0.34, conduct parameters for ABI and NAB set to 0.79 and cost parameters in Table 7. The simulations are computed using the period after the divestiture and computed relative to the 'no merger' scenario. There are 46497 observations in the sample.

H Average Prices and Standard Deviation (Counterfactual Buyer)

Table 20. Average Prices by Firm for each Scenario

	Constellation		DG Yuengling		Heineken		MillerCoors		No merger
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Price Coordination	No	Yes	No	Yes	No	Yes	No	Yes	No
Labatt (divested brand)	10.42 (1.44)	12.45 (1.48)	11.01 (1.45)	13.07 (1.50)	10.33 (1.44)	12.27 (1.48)	11.66 (1.44)	12.40 (1.48)	11.00 (1.44)
ABI	11.19 (2.20)	11.77 (2.41)	11.20 (2.20)	11.73 (2.38)	11.19 (2.20)	11.70 (2.39)	11.20 (2.20)	11.82 (2.18)	11.16 (2.19)
Constellation	13.89 (.64)	14.98 (.76)	13.88 (.64)	13.91 (.65)	13.87 (.64)	13.91 (.65)	13.88 (.64)	13.91 (.64)	13.88 (.64)
DG Yuengling	9.72 (.54)	9.73 (.54)	9.74 (.54)	10.92 (.60)	9.72 (.54)	9.73 (.54)	9.73 (.54)	9.74 (.54)	9.73 (.54)
Heineken	14.18 (.58)	14.43 (.63)	14.18 (.58)	14.72 (.79)	14.19 (.58)	15.64 (.82)	14.18 (.58)	14.20 (.58)	14.18 (.58)
High Falls Brewing	10.77 (.95)	10.96 (.96)	10.78 (.95)	10.96 (.96)	10.77 (.95)	10.94 (.96)	10.78 (.95)	10.78 (.94)	10.78 (.95)
MillerCoors	8.57 (1.07)	8.86 (1.04)	8.57 (1.07)	8.84 (1.04)	8.57 (1.07)	8.83 (1.04)	8.58 (1.07)	9.35 (1.08)	8.47 (1.08)

Notes: The vector of prices are solutions to the first order condition defined by equation 3 for the scenario of interest. The parameters used are the demand parameters presented in Table 12, alongside the conduct parameters and cost parameters in Table 7. Standard deviations in parentheses relate to variation across markets. There are 46497 observations in the sample corresponding to the post-divestiture period.

I FOC and Diversion Ratio

Recall the first order condition from equation (3). Omitting subscript mt, the first-order condition with respect to p_j is given by:

$$s_j(p)+(p_j-c_j)\frac{\partial s_j(p)}{\partial p_j}+\sum_{k\in\Theta_b}(p_k-c_k)\frac{\partial s_k(p)}{\partial p_j}+\sum_{k\in\Theta_b^{Coordination}}\phi_k(p_k-c_k)\frac{\partial s_k(p)}{\partial p_j}=0. \quad (24)$$

Then, we have:

$$p_j=\frac{-s_j-\sum_{k\in\theta_b}(p_k-c_k)\frac{\partial s_k}{\partial p_j}-\sum_{k\in\theta_b^{coordination}}\phi_k(p_k-c_k)\frac{\partial s_k}{\partial p_j}+c_j\frac{\partial s_j}{\partial p_j}}{\frac{\partial s_j}{\partial p_j}} \quad (25)$$

$$\iff$$

$$p_j=\frac{-s_j\frac{p_j}{s_j}}{\frac{\partial s_j}{\partial p_j}\frac{p_j}{s_j}}+\frac{(-\sum_{k\in\theta_b}(p_k-c_k)\frac{\partial s_k}{\partial p_j}-\sum_{k\in\theta_b^{coordination}}\phi_k(p_k-c_k)\frac{\partial s_k}{\partial p_j}+c_j\frac{\partial s_j}{\partial p_j})}{\frac{\partial s_j}{\partial p_j}} \quad (26)$$

Denote $\epsilon_{jj} = \frac{\partial s_j}{\partial p_j}\frac{p_j}{s_j}$ the own-price elasticity of demand. We have:

$$p_j(1+\frac{1}{\epsilon_{jj}}) = \frac{(-\sum_{k\in\theta_b}(p_k-c_k)\frac{\partial s_k}{\partial p_j} - \sum_{k\in\theta_b^{coordination}}\phi_k(p_k-c_k)\frac{\partial s_k}{\partial p_j} + c_j\frac{\partial s_j}{\partial p_j})}{\frac{\partial s_j}{\partial p_j}} \quad (27)$$

Denote $D_{j,k} = -\frac{\frac{\partial s_k}{\partial p_j}}{\frac{\partial s_j}{\partial p_j}}$ the diversion ratio between product j and k. Then, I can re-write the equation as follows:

$$p_j(1+\frac{1}{\epsilon_{jj}}) = c_j + \sum_{k\in\theta_b}(p_k-c_k)D_{jk}(P) + \sum_{k\in\theta_b^{coordination}}\phi_k(p_k-c_k)D_{jk}(P) \quad (28)$$

$\Longleftrightarrow$

$$p_j = (\frac{1}{1+\frac{1}{\epsilon_{jj}}})[c_j + \sum_{k\in\theta_b}(p_k-c_k)D_{jk}(P) + \sum_{k\in\theta_b^{coordination}}\phi_k(p_k-c_k)D_{jk}(P)], \quad (29)$$

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