Merger Remedies and Bargaining Power in the Coffee Market*

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June 21, 2026

Abstract

This paper analyzes a merger of large manufacturers with divestiture in the French coffee market. In contrast to previous approaches used to study the effects of upstream divestitures on prices and welfare, we model the vertical market structure. First, our results show that the standard policy recommendation to require divestiture to small recipient firms may not hold when asymmetric bargaining power between firms is considered. Second, models that abstract from vertical market structure imply higher cost levels. In our setting, costs are about 16 percent lower. Last, divestiture can lead to marginal cost savings for the buyer of the divested brand.

Keywords: merger, remedies, divestiture, vertical markets, bargaining power.
JEL classification: D12, L11, L51, L40.

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*We thank Zohra Bouamra-Mechemache, Giacomo Calzolari, Claire Chambolle, Russell Cooper, Gregory Crawford, Thomas Crossley, Tomaso Duso, Rachel Griffith, Yannick Guyonvarch, Bruce Lyons, Hugo Molina, Thomas Ross, Steven Tadelis, Frank Verboven, Thibaud Vergé, Sofia Villas-Boas, and Ginger Zhe Jin for insightful comments and discussions. We thank participants at various conferences and seminars for useful comments. Any errors or omissions are our own.

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1 Introduction

Numerous articles document a rise in market concentration and markups (Grullon et al. (2019), De Loecker et al. (2020), Döpper et al. (2021)). This led to debates over the mechanisms that might explain these findings (Conlon et al. (2023), Eeckhout (2021)). One potential explanation is related to lax merger policy that either did not block directly anti-competitive mergers or implemented ineffective merger remedies (Nocke and Whinston (2022), Kwoka Jr and Waller (2021)).

Divestiture is often considered as the most effective merger remedy and is widely used by competition authorities.[1] Many mergers that are cleared subject to divestitures are horizontal mergers between upstream firms in vertically related industries. In most of these cases, competition authorities assess the potential price effects of these mergers and divestitures based on models assuming that the upstream firms are located downstream.[2] Despite the prevalence of such deals, the effectiveness of divestitures in vertically related markets remains largely unexplored.[3]

The asymmetric bargaining power between upstream and downstream firms is a key feature of vertical markets. Upstream firms bilaterally bargain with downstream firms over wholesale prices to have access to final consumers.

This poses a challenge for antitrust enforcement which finds support in conventional economic theories that advocate divestiture as a remedy for mergers. First,

[1]In Europe, between 2004 and 2018, out of the 109 mergers second phase decisions, 9 were prohibited, 62 were cleared conditional on remedies, and 38 cleared without remedies. See `www.ec.europa.eu/competition/mergers/statistics.pdf`. Over 80% of conditional approvals in either 'phase I' or 'phase II' rely on structural remedies that is the divestiture of assets or brands to competitors (Gerard and Komninos (2020)). In the U.S., between 2003 and 2012 more than 60% of mergers raising competitive concerns were cleared by the competition authorities conditional on the implementation of remedies such as divestiture (Kwoka (2014)).

[2]DEMB/MONDELEZ (Case M.7292) in the coffee market; Sara Lee/Unilever (Case COMP/M.5658) in the deodorants market and INEOS/Solvay (Case M.6905) in the chemicals market are examples of upstream mergers where merger simulation models based on Bertrand competition have been used either by the parties or by the competition authority.

[3]This is confirmed by Asker and Nocke (2021): "*In light of their prevalence, it is surprising how little is known – theoretically and empirically – about merger remedies*".

competition authorities relying on traditional models may overestimate the need to impose a divestiture. Indeed, downstream firms with large bargaining power may limit the ability of the merger to raise negotiated input prices.[4] Second, antitrust enforcers may mistakenly assess a buyer of a divested brand with a small market share as the most suitable because traditional models, which do not account for bargaining power, predict a positive correlation between firm size and prices. However, bargaining power may not be positively correlated with firm size. Thus, a buyer with small market shares but high bargaining power may harm consumers more than a buyer with relatively large market shares but low bargaining power.

The omission of asymmetric bargaining power in the analysis of mergers and divestitures in vertically related markets also raises empirical concerns about the measurement of costs. In a Nash-Bertrand model where upstream firms (e.g., manufacturers) are assumed to set final prices, marginal costs are obtained as the difference between final prices and manufacturers' markups. Thus, in the context of a merger between manufacturers, the computed marginal costs include retail margins. This makes it difficult to identify potential cost efficiencies for both the merged entity and for the purchaser of the divested brands.

In this article, we study the effectiveness of divestiture imposed to clear a merger between manufacturers taking into account the vertical market structure. To do so, we quantify the impact of upstream divestiture on markups and costs in a Nash-bargaining model. This allows to address two questions remaining unanswered, even though they pose major issues for designing merger policy. First, how do upstream divestitures affect markups versus efficiency in vertically related markets? Second, how should antitrust authorities assess the choice of buyer of divested brands?

To answer these questions, we use data from Kantar Worldpanel on consumer coffee purchases in France from 2013 to 2017 and implement a retrospective

[4]This type of argument is encountered in merger case M.5658 Unilever/Sara Lee, where the parties argue that "*the Commission's analysis is likely to overstate the likely price increase from the merger*" precisely because the standard model used by the European Commission ignores the vertical market structure and the fact that retailers may be powerful.

analysis of the DEMB/Mondelez merger case in the French coffee market.[5] The DEMB/Mondelez case is particularly relevant to analyze the effectiveness of an upstream merger with divestiture in a vertically related market. First, bargaining power is a key feature of the coffee market. Prices of raw coffee are volatile, therefore negotiating more fiercely when the price of coffee is high allows manufacturers to limit these fluctuations (Blouin and Macchiavello (2019)). Second, the competition authority and the parties used models ignoring the vertical market structure to assess the price effects of the merger and divestiture. Thus, the DEMB/Mondelez merger case is an ideal laboratory to examine the extent to which merger and divestiture policy could be improved by quantifying and accounting for bargaining power.

Our analysis starts with event study evidences studying the impact of the merger and the divestiture on retail prices. We show that, relative to the prices of products not directly involved in any of the mergers and divestitures, the merged entity raised prices by about 2.7 percent. These estimates can be compared to previous estimates found in the literature as the price effects of mergers without divestiture are studied extensively. For instance, Ashenfelter and Hosken (2010) studies five mergers among which four led to price increases. They find estimates ranging from 3 to 7 percent. Our estimates are close to the lowest effects they found. We also estimate that the prices of the divested brand decreased by about 2.2 percent. The buyer of the divested brand decreased the prices of its other products by about 4.5 percent. The prices effect of a divestiture on the price of the products sold by the buyer of the divested brands is studied by Friberg and Romahn (2015) for a divestiture imposed to clear a merger in the Swedish beer market. They find that the price of the divested product falls by about 3.2 percent and prices of products initially owned by the buyer of the divested brand raise by about 2.6 percent. Contrary to Friberg and Romahn (2015), we find a fall in prices for product initially owned by the buyer of the divested brand supporting the presence of cost efficiencies.

[5] See, Case M.7292 - DEMB/Mondelez/Charger OPCO - https://ec.europa.eu/competition/mergers/cases/decisions/m7292_3753_2.pdf; in this article, we use the terms 'merger' and 'joint venture' interchangeably and will primarily refer to this as a 'merger'.

As a result, some consumers pay higher prices while others pay lower prices, and the observed price changes do not allow for drawing conclusions about the net effect of the merger and divestiture on welfare that may be driven by opposite mechanisms. To assess the net effect on consumer welfare, we estimate a structural model of bargaining building on the framework developed by Gowrisankaran et al. (2015) or Crawford et al. (2018) in including asymmetric bargaining power and cost efficiencies. We also leverage this additional structure imposed on the data to explain the mechanisms through which pro- and anti-competitive effects of merger with divestiture affect consumers in a vertically related market.

A typical anti-competitive effect caused by mergers is through markups (Bjornerstedt and Verboven (2016)). We find that the merger increased upstream markups by around 23 percent. Our approach differs from that of Bjornerstedt and Verboven (2016) by studying and modeling a somewhat less specific market structure where bargaining power is a key feature and studying the divestiture.[6] In complement to the similar economic mechanisms in Bjornerstedt and Verboven (2016), our model quantifies two additional pro-competitive effects. First, our results suggest that retailers have relatively higher bargaining power than manufacturers. Secondly, the buyer of the divested brand may have achieved marginal cost savings on the products already in its portfolio. Despite these two pro-competitive effects and the implemented divestiture, we find that the merger had a negative impact on consumer surplus. This is mainly explained by the fact that markups of the merged entity and buyer of the divested brands increased.

Our estimation of costs in vertical markets also contributes to the recent literature quantifying markups using Nash–Bertrand pricing models (e.g., Grieco et al. (2023); Döpper et al. (2021)). While these studies emphasize the role of costs in determining the relationship between markups and prices, they abstract from vertical market structure. We find that incorporating vertical relationships can have a meaningful effect on inferred costs: in our setting, costs recovered under a Nash–Bertrand framework are about 16 percent higher than those implied by a

[6]The Swedish Analgesics Market is quite peculiar. In their analysis, the distributor Apoteket set a fixed percentage markup on the wholesale prices paid to pharmaceutical companies.

Nash-bargaining model.[7][8]

Another example directly related to divestiture is Alviarez et al. (2025). They study the effect of divestitures on a price index in the beer market across 76 countries. They estimate an oligopoly model assuming that final prices result from competition between manufacturers directly selling their products to consumers. They find that divestitures decrease a beer price index by 1 percent to 6 percent relative to a situation in which the merger is approved without divestiture. They found that this effect is not driven by marginal cost savings. By contrast, we do identify cost efficiencies for the buyer of a divested brand. While cost efficiencies are a key consideration in merger reviews, existing studies that examine the impact of divestiture on costs do not find evidence of such efficiencies. Thus, these estimates add to the empirical literature estimating merger-induced cost efficiencies, such as Miller and Weinberg (2017).

Finally, with the estimated model we derive new policy recommendation on the choice of the buyer of the divested brand in markets where bargaining power is an important feature. In this paper, we show that a buyer that has small market shares but high bargaining power can deteriorate consumer surplus more than a larger buyer with relatively lower bargaining power. This contrasts with the policy recommendation corresponding to aim for small buyers in horizontal markets derived in Nash-Bertrand models (Friberg and Romahn (2015)).

The article is organized as follows. Section 2 presents the DEMB/Mondelez merger case, the data, and pattern relevant for identification. Section 3 documents the event study evidences studying the impact of the merger and the divestiture on retail prices. Section 4 develops the demand model and discusses estimation results. Section 5 introduces the supply model of vertically related market. Section 7 calculates the change in consumer surplus resulting from the merger and of-

[7] The implications for papers examining the impact of changes in costs on prices depend on the extent to which retail margins, which are included in the costs computed in the Nash-Bertrand model, vary over time.

[8] These findings contribute also to the existing research on vertical market structures, which has examined other factors than bargaining power; such as price rigidities and retail price maintenance; that may have shaped the relationship between costs and prices (e.g., Nakamura and Zerom (2010); Bonnet et al. (2013)).

fers policy recommendations regarding the selection of the buyer for the divested brand. Section 8 concludes.

2 Industry Background and Data Pattern Relevant for Identification

2.1 The DEMB/Mondelez Merger

In May 2015, DEMB and Mondelez merged to combine their coffee businesses. The resulting firm, called Jacobs Douwe Egberts (JDE), said in a press release that it expects to become the world's leading coffee company with annual sales of more than €5 billion.[9] JDE owns world-leading brands such as L'OR, Senseo and Tassimo. The company has market-leading positions in several countries, including France. At the time of the merger, the specialist business press expected JDE to be the leader in terms of volume produced and Nestlé to be the leader in terms of value.[10] The French coffee market is dominated by JDE and Nestlé. In France, the European Commission cleared the merger subject to a divestiture, arguing that L'Or, owned by DEMB, and Carte Noire, owned by Mondelez, were close substitutes.[11] Thus, this raised concerns about the potential anti-competitive effects of the merger. Consequently, Mondelez offered to sell its Carte Noire brand to Lavazza.[12] The European Commission evaluated the proposal positively, and Carte Noire was indeed sold to Lavazza in February 2016 for approximately 750 million euros.[13] The divestiture package also included Mondelez's manufacturing

[9] http://www.jacobsdouweegberts.com/company-news/mondelez-international-and-d.e-master-blenders-1753-complete-coffee-transactions/

[10] https://www.lsa-conso.fr/les-nouveaux-maitres-du-cafe,175177

[11] See. p.74, point (369) in the Commission decision of May 5, 2015 (Case M.7292-DEMB/Mondelez/ChargerOpco).

[12] The divestiture also included Mondelez' Lavérune (south of France) manufacturing facility in which Lavazza pooled all the production line of Carte Noire previously located across different factories. See. p.125, in the Commission decision of May 5, 2015 (Case M.7292-DEMB/Mondelez/ChargerOpco).

[13] https://www.lesechos.fr/2016/02/lavazza-finalise-le-rachat-de-carte-noire-196305

facility in France, where Lavazza subsequently consolidated all production lines. This acquisition granted Lavazza its first production presence in France, a market it had previously served solely through distribution. This aspect of the institutional setting points to potential cost efficiencies for the acquirer of the divested brand, as well as lower distribution costs for retailers. We explicitly incorporate these efficiencies into our structural model.

Another key institutional feature embedded in the model is the product-by-product nature of negotiations between manufacturers and retailers. This assumption is supported by evidence from the European Commission's review of the merger. Specifically, paragraph 621 (p. 119) of the Commission's decision notes that retailers in several European countries, including France, Greece, Germany, and the Netherlands, often negotiate coffee products separately rather than at the manufacturer level.[14] The same paragraph further reports that most surveyed retailers considered the breadth of a supplier's product portfolio to be of limited importance in negotiations, emphasizing instead that "each product is important and plays its own role" and that the market position of individual brands is more relevant than the size of the supplier's overall portfolio. Accordingly, we model negotiation at the product level rather than assuming that negotiations are conducted over an entire manufacturer's portfolio. More broadly, product-level negotiations are a common feature of manufacturer–retailer relationships across various consumer packaged goods markets (see, e.g., Delaprez (2024)).

2.2 Data

We use scanner data from Kantar Worldpanel on coffee purchases in France from 2013 to 2017. Data were collected from a household sample representative of coffee purchases in France. Before cleaning the data, our dataset contains 1,296,395 observations. In our dataset, a row corresponds to a purchase of coffee by an individual, including information related to the product, such as the price or the name of the manufacturer. In addition, information about the store where the product

[14] European Commission, Case M.7292 – DE Master Blenders 1753/Mondelēz International, para. 621, p. 119.

was purchased is available.

We focus our analysis on the biggest retailers and manufacturers following standard practice in the empirical Industrial Organization literature.[15] We keep purchases in the 7 main retailers: Carrefour, Leclerc, ITM, Auchan, Système U, Casino and an aggregate of discounters. We also focus the analysis on the brands produced by the 8 largest manufacturers: DEMB, Lavazza, Legal, Malongo, Mondelez, Nestlé, Segafredo and an aggregate of private labels.[16] Thus, we include all manufacturers mentioned in the merger case. There are 15 national brands and 7 private labels, which are brands sold under the retailer's name. We study three segments: roast and grounds, beans, and pods (i.e., single-serve coffee pods, used in pod-based machines such as Senseo). We end up with a data set consisting of 966076 purchases, representing 74.52 percent of the total purchases in the sample. Next, based on the merger review, the relevant market is defined nationally, with each market represented by a month–year pair in France. Finally, in the analysis, a product is defined as a brand-segment-retailer combination. Treating the same physical product sold by different retailers as distinct products is standard practice in models of vertical relationships, as it enables the analysis to account for the relevant network structure (e.g., Berto Villas-Boas (2007)). This specification is also consistent with a large literature on bargaining models that incorporate bargaining power and leverage through disagreement payoffs (e.g., Draganska et al. (2010)). The aggregation of the data results in a final dataset that is an unbalanced panel of 218 different products. The final dataset consists of 11682 observations.

2.3 Economic Importance and Data Pattern Relevant for Identification

In this subsection, we present some data patterns that demonstrate the economic importance the divestiture studied, as well as key variations that we use to identify our structural model.

[15]For example, in Bonnet and Dubois (2010), they focus on purchases from the top seven retailers, which represent 70.7% of total purchases in the sample.

[16]We have a total of 28 private labels, thus representing one private label per segment for each retailer and representing in total over the sample period 1575 observations.

Given the limited evidence in the literature on the price and welfare effects of a divestiture, a natural question to address is to what extent divestiture has important economic consequences. To show that it generated a significant change in market shares in the French coffee market, we display the average market shares by brand before and after the merger in Table 1.[17] The period before the merger comprises 28 months. The period after the divestiture is made of 22 months. The period between the approval of the merger and divestiture comprises 10 months. We show that the divestiture we observe is (i) quantitatively and (ii) economically important. (i) The change in average market share for the buyer of the divested brand is large, going from 1.83 percent to 13.41 percent. (ii) Before the merger, Manufacturer 5 is at the bottom of the hierarchy in terms of average market shares. After the merger, Manufacturer 5 ranks third in terms of average market shares. The market share for Manufacturer 1 (resp. Manufacturer 2) is equal to 20.08 percent (resp. 29.64 percent). After the merger, the market share of the new entity is about 35.47 percent. Thus, the data shows that the divestiture had first-order economic effects in the French coffee market. The model in this article allows for identifying and assessing these effects. Note also that the change in product portfolio caused by the merger and divestiture is associated with large changes in market shares, leading to variation in markups. This variation at the portfolio level is a key source of identifying variation needed for the model we estimate in this article.

[17] In the following analysis, manufacturers 1 and 2 merge their coffee businesses in the new joint venture. Manufacturer 5 is the buyer of the divested brand. Average prices by brand before the merger and after the divestiture are displayed in Appendix A.

Table 1. Market Shares Pre-Merger and Post-Divestiture Period By Brand (%)

		Pre		Post	
Firm	Brand	mean	s.d	mean	s.d
	Private Labels	34.10	1.36	34.24	1.53
Manuf. 1	**Brand 1**	7.17	0.97	7.32	1.00
	Brand 2	11.47	1.18	10.94	1.07
	Brand 3	1.44	0.28	0.75	0.20
Manuf. 2	**Brand 4** (divested brand)	12.42	1.08		
	Brand 5	0.76	0.12	1.02	0.21
	Brand 6	4.21	0.57	3.06	0.40
	Brand 7	10.53	1.06	11.07	0.65
	Brand 8	1.72	0.27	1.31	0.13
Manuf. 3	**Brand 9**	6.06	0.89	7.27	0.33
	Brand 10	3.35	0.40	3.71	0.64
Manuf. 4	**Brand 11**	2.03	0.32	2.24	0.39
Manuf. 5 (buyer)	**Brand 12**	1.83	0.25	1.89	0.55
	Brand 4 (divested brand)			11.52	1.55
Manuf. 6	**Brand 13**	2.24	0.41	2.73	0.33
Manuf. 7	**Brand 14**	0.49	0.09	0.68	0.15
	Brand 15	1.12	0.32	1.16	0.26

Note: The table reports the average (across markets) market shares before the merger (28 months) and after the divestiture (22 months). Due to confidentiality restrictions imposed by the data provider, we are unable to disclose the identities of manufacturers and brands.

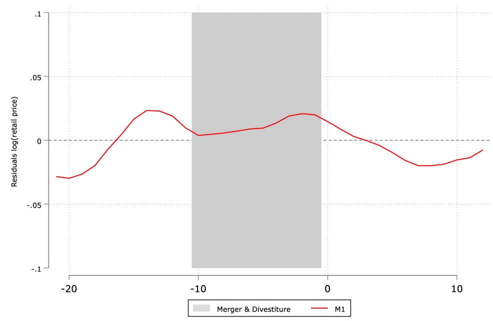
3 Impact of Merger and Divestiture on Retail Prices

We first examine the impact of the merger and divestiture on retail prices using the raw data through a theory-free approach, focusing on descriptive evidences to understand the changes in prices.

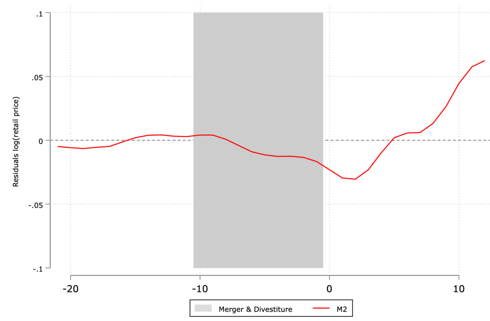
3.1 Average Prices

We start by analyzing how average prices evolve over time. Figure 1 presents average prices after controlling for product fixed effects. Panels 1.1 and 1.2 depict the price trajectories of the two merging manufacturers, M1 and M2. While M1's average price remains relatively stable throughout the period, M2's average price rises sharply following the merger. Panel 1.3 displays the average prices of the divested brand, and Panel 1.4 illustrates the price evolution of other products owned by the acquirer of the divested brand. In both cases, prices decline after the divestiture.[18] We next investigate these patterns in greater depth, controlling for other potential confounding factors using regressions.

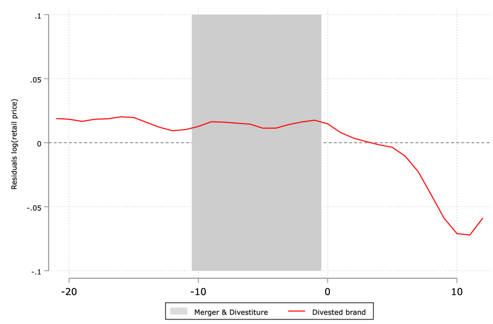
[18]The evolution of average quantities is reported in Appendix B.



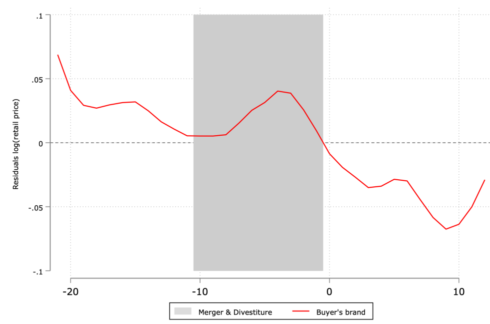
1.1 Merging Firm (M1)



1.2 Merging Firm (M2)



1.3 Divested brand



1.4 Other products (buyer)

Figure 1. Average Prices

Notes: The figure shows the plot of the raw average price for the merging manufacturers (M1 and M2), the divested brand, and the other products of the buyer of the divested brand, after removing the variation due to product fixed effects. The trend line is smoothed using local averages. The gray area corresponds to the period between merger approval and the completion of the merger, when the divestiture was implemented.

3.2 Empirical Specification

We estimate a generalized difference-in-differences specification. Our identification strategy compares product prices of firms involved in the merger and divestiture to those of firms not involved in the merger and divestiture around the time of the merger. The identification strategy is similar to Craig et al. (2021). It is summarized by the following equation:

$$
\begin{aligned}
log(p_{jt}) = K + \alpha_j + \alpha_t + \delta_1 \mathbb{1}_{M1} \times \mathbb{1}_{\text{Post}} + \delta_2 \mathbb{1}_{M2} \times \mathbb{1}_{\text{Post}} + \\
\delta_3 \mathbb{1}_{\text{Divested Brand}} \times \mathbb{1}_{\text{Post}} + \delta_4 \mathbb{1}_{\text{Buying Manufacturer}} \times \mathbb{1}_{\text{Post}} + \\
\beta_1 \mathbb{1}_{M1} \times \mathbb{1}_{\text{Transitory}} + \beta_2 \mathbb{1}_{M2} \times \mathbb{1}_{\text{Transitory}} + \beta_3 \mathbb{1}_{\text{Divested Brand}} \times \mathbb{1}_{\text{Transitory}} + \\
\beta_4 \mathbb{1}_{\text{Buying Manufacturer}} \times \mathbb{1}_{\text{Transitory}} + u_{jt}, \quad (1)
\end{aligned}
$$

where p_{jt} is the retail price of product j at time t. α_t is a month-year specific term that aims to capture changes in market structure that are product invariant. α_j is a product specific term. $\mathbb{1}_{\text{Post}}$ is an indicator equal to 1 if period t belongs to the post-merger/divestiture period. $\mathbb{1}_{\text{Transitory}}$ is an indicator equal to 1 if t belongs to the period between the approval of the merger and the finalization of the divestiture (all months between May 2015 and February 2016). $\mathbb{1}_{M1}$ is an indicator equal to 1 for products owned by the merging manufacturer M1. $\mathbb{1}_{M2}$ is an indicator equal to 1 for product owned by the merging manufacturer M2. $\mathbb{1}_{\text{Divested Brand}}$ is an indicator equal to 1 if the product is from Brand 4 (divested) after the merger/divestiture. $\mathbb{1}_{\text{Buying Manufacturer}}$ is an indicator equal to 1 for all other products owned by the buyer of the divested brand.

Estimating the effect of a merger on retail prices presents challenges that are well documented in the merger literature (Ashenfelter and Hosken (2010)). The first relates to the choice of the control group. Any control group chosen may respond strategically to changes in prices set by the merger and the buyer of the divested brand. For example, if the merged entity raises prices after the merger, any producer in the control group that produces products that are close substitutes might also raise prices. Hence, we do not interpret our results as causal. To the extent that prices are strategic complements, these estimates should be interpreted as a lower bound of the true effects.

Our preferred control group includes the products sold by Manufacturer 6. We report the results in Table 2. In column (i), we estimate equation (1) including only product dummies as controls. In column (ii), we also add market dummies as controls. In column (iii), we add variables controlling for potential transitory price effects in the period between the merger and the divestiture.

The estimated effects of the merger are given by $\hat{\delta}_1$ and $\hat{\delta}_2$. According to this specification, the merger led to an average price increase of about 2.7 percent for products sold by Manufacturer 2. It suggests that neither buyer power nor cost efficiencies are sufficient to limit the anti-competitive effects of the merger. The price effect for products sold by Manufacturer 1, that is the merging firm not involved in the divestiture, is not statistically significant.

The estimated effects of the divestiture are given by $\hat{\delta}_3$ and $\hat{\delta}_4$. Prices of the divested brand decrease on average by about 2.2 percent in the post-merger period. This is intuitive because the divested brand is part of a relatively smaller product portfolio than before, so its new owner (the buyer of the divested brand) has relatively less leverage to increase prices in negotiations. This effect is not statistically significant; however, as we show in the next section, this is likely because the decline only becomes statistically significant gradually over time. The prices of the products initially owned by the buyer of the divested brand decrease on average in the post-merger period. This decrease amounts to 4.5 percent. In the absence of cost savings on these products, this decrease is counter-intuitive.

Indeed, the divested brand is an additional margin that is likely to allow the buyer of the divested brand to increase the prices of the products that were already in its portfolio before the divestiture. Thus, this estimate suggests that the buyer of the divested brand may have achieved some cost savings for the products already in its portfolio. It also justifies why, starting in Section 4, we estimate a structural model to disentangle the extent to which the observed price effects arise from a trade-off between the likely pro-competitive and anti-competitive effects of the merger and the divestiture. Another difficulty associated with our empirical strategy, and raised in Ashenfelter and Hosken (2010), is the choice of sample around, before, and after the merger event. The former is key to obtain estimates that are not contaminated by transitory effects. The latter is important to rule out changes in the market that are not due to the merger. We do not drop the data corresponding to the period around the merger, but control for possible transitory effects. In our cases, the merger is officially approved in May 2015, but the divestiture is officially finalized in February 2016. This period might contains transitory selection effects. Our specification, through the terms $\beta_1 \mathbb{1}_{M1} \times \mathbb{1}_{\text{Transitory}}$, $\beta_2 \mathbb{1}_{M2} \times \mathbb{1}_{\text{Transitory}}$, $\beta_3 \mathbb{1}_{\text{Divested Brand}} \times \mathbb{1}_{\text{Transitory}}$ and $\beta_4 \mathbb{1}_{\text{Buying Manufacturer}} \times \mathbb{1}_{\text{Transitory}}$, capture these effects.[19] In column (iv), we show that the inclusion of these variables leaves the price effect for the product sold by Manufacturer 2 almost unchanged. In contrast, the estimates associated with the divestiture are slightly less negative. This suggests that most of the effects do not take place in the transitory period.

Our preferred comparison window is the largest sample for which we have complete pre- and post-merger year around the transitory period. This choice is consistent with the merger retrospectives literature, including Bjornerstedt and Verboven (2016) or Craig et al. (2021), both of which compare prices one year before and one year after the merger.

[19] In Friberg and Romahn (2015) or Ashenfelter and Hosken (2010) they drop the data corresponding to the period around the merger. Here, we think it is more transparent to keep this data in our sample.

Table 2. Actual Price Effects, Two-Year Window

	$ln(p_{jt})$	$ln(p_{jt})$	$ln(p_{jt})$
	(i)	(ii)	(iii)
$\mathbb{1}_{M1} \times \mathbb{1}_{\text{Post}}$	-0.031**	-0.016	-0.0057
	(0.0012)	(0.013)	(0.018)
$\mathbb{1}_{M2} \times \mathbb{1}_{\text{Post}}$	0.012	0.027**	0.027*
	(0.0076)	(0.0099)	(0.013)
$\mathbb{1}_{\text{Buying Manufacturer}} \times \mathbb{1}_{\text{Post}}$	-0.065**	-0.050*	-0.045*
	(0.021)	(0.022)	(0.023)
$\mathbb{1}_{\text{Divested Brand}} \times \mathbb{1}_{\text{Post}}$	-0.041***	-0.026+	-0.022
	(0.012)	(0.013)	(0.017)
Product dummies	✓	✓	✓
Market dummies		✓	✓
Transitory controls			✓
Number of observations	4268	4268	4268
adj. R^2	0.986	0.986	0.986

Notes: The table reports the estimated parameters from the regression model in equation (1). Standard errors are clustered at the product level in parentheses. $+p < 0.1$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

3.3 Event Studies of Merger and Divestiture

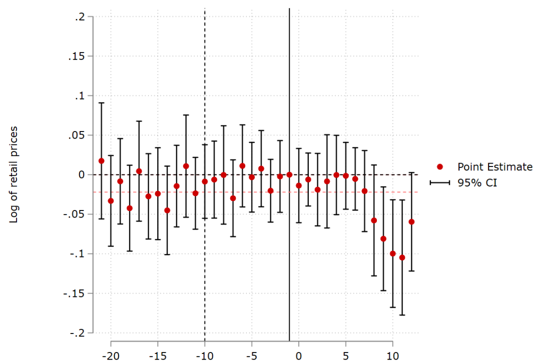
We then examine two potential sources of bias in our estimates using an event study: (i) the estimates could be driven by different trends in log prices in the pre-treatment period, (ii) the estimates could be biased by merger effects that develop slowly over time due to price rigidity or anticipatory effects (the treatment was likely known before the actual approval).

Figure 2 shows the event studies plot for the estimated difference-in-differences specification, controlling for product-specific effects, market-specific effects, and time-varying control variables. The horizontal red line shows the difference-in-differences estimates. The 95% confidence intervals are shown, with standard errors clustered at the product level. The first vertical black line corresponds to the time of merger approval and the second vertical black line corresponds to the finalization of the merger with the divestiture actually implemented.

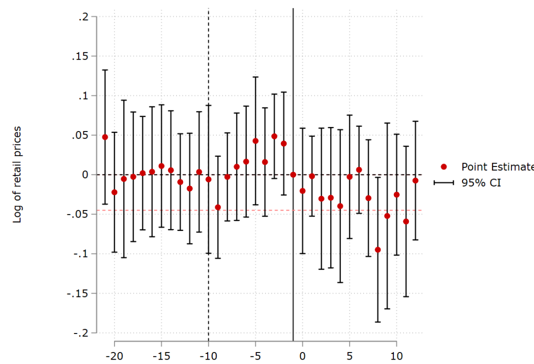
In panel 1.1 of Figure 2, we plot the estimates for the divested brand. Panel 1.2 plots the event study estimates for the products initially owned by the buyer of the divested brand (i.e., excluding the divested brand).

Our preferred specification shows no evidence of pre-trends both for the products of the buyer of the divested brand (excluding the divested brand) and the divested brand. For both the divested brand and the products owned by the buyer of the divested brand, we observe a decrease in prices starting in October 2016. The decrease is larger than the difference-in-differences estimates. The fact that the price decrease is statistically significant only after a few months is consistent with cost efficiencies that are known to take time to arise (Miller and Weinberg (2017)). To further study this possibility our structural model will incorporate cost efficiencies for the buyer of the divested brand.

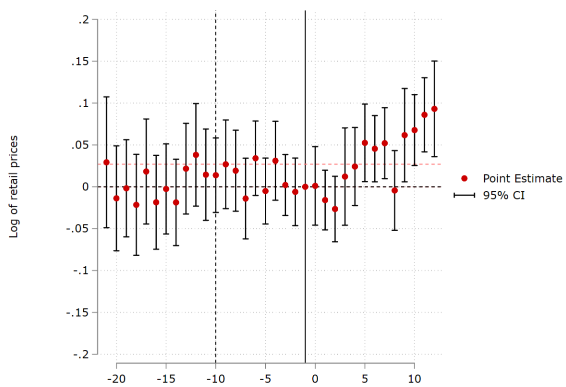
Panel 1.3 shows the event study for Manufacturer 2. The results show no evidence of pre-trends. The price increase in our difference-in-differences specification is driven by effects beginning six months after the divestiture is finalized. The estimated price increase is larger than that implied by the baseline difference-in-differences estimates. Overall, the evidence is consistent with the parallel trends assumption for our preferred control group. However, we do not interpret these results as strictly causal. We next examine these findings in more detail using an estimated structural model of supply and demand. This framework exploits the structure imposed on the data to explain the mechanisms through which pro- and anti-competitive effects of mergers with divestitures affect consumers in vertically related markets. The model also allows us to assess the welfare implications of the merger and to derive policy recommendations.



2.1 Divested brand



2.2 Other products (buyer)



2.3. Merger (M2)

Figure 2. Treatment Effect Estimates

Notes: Event studies plot for the estimated difference-in-differences specification, controlling for product-specific effects, time-specific effects, and time-varying control variables. The horizontal red line shows the difference-in-differences estimates. The 95% confidence intervals are shown, with standard errors clustered at the product level. The first vertical line corresponds to the time of merger approval, and the second vertical line corresponds to the finalization of the merger with the divestiture actually implemented.

4 Demand

4.1 Random coefficient logit model

To model consumer substitution patterns, we estimate a Random Coefficients Logit (RCL) model. Each consumer chooses a product $j \in \mathcal{J}_t = \{1, \ldots, J\}$ or the outside good $j = 0$. Product j is defined as a brand–segment–retailer combination. Consumers are assumed to purchase one unit of the good that provides the highest utility among all products in $\mathcal{J}_t$.

The indirect utility function $\mathcal{U}_{ijt}$ for consumer i buying product j in period t is specified as:

$$\mathcal{U}_{ijt} = -\alpha_i p_{jt} + \theta_i \cdot \text{Pod}_j + \beta_b + \beta_s + \mu_t + \xi_{jt} + \varepsilon_{ijt}, \tag{2}$$

where Pod_j is an indicator variable equal to 1 if the product uses a pod format, β_b are brand fixed effects, β_s are segment fixed effects, and μ_t are market fixed effects. ξ_{jt} is an unobserved product characteristic in period t, and ε_{ijt} is i.i.d. Type I Extreme Value.

We account for unobserved heterogeneity in consumer price sensitivity and in the valuation of the pod format through random coefficients:

$$\alpha_i = \alpha + \sigma_\alpha \, v_{i1}, \qquad \theta_i = \theta + \sigma_\theta \, v_{i2}, \qquad (v_{i1}, v_{i2}) \sim \mathcal{N}(0, 1), \tag{3}$$

where α is the mean price disutility, σ_α captures the standard deviation of price sensitivity across consumers. θ denotes the average utility associated with the pod format, and σ_θ measures the extent of consumer heterogeneity in that preference.

We include a random coefficient on the pod attribute to capture heterogeneity in consumers' valuation of single-serve coffee systems. The merger review suggests that pod-based products appeal disproportionately to a distinct segment of consumers, implying systematic variation in preferences. While some consumers place a high value on pods due to their convenience and premium positioning, others derive little additional utility from this format. Allowing the pod coefficient to vary across individuals accommodates this heterogeneity in tastes.

Outside option. The outside option allows consumers to substitute away from the set of products considered. The outside good includes all brands outside the selected sample. These brands have small market shares and represent around 25.36% of the full sample. We verified that our demand estimates are not sensitive to this modeling assumption by varying the assumed market size.[20]

Placing these products in the outside good group implies that their prices are set exogenously.[21] The indirect mean utility for the products in the outside good is normalized to zero such that:

$$\mathcal{U}_{i0t} = \varepsilon_{i0t}. \tag{4}$$

Assuming that ε_{ijt} is independently and identically distributed across consumers, products, and time as a Type I Extreme Value, predicted market shares are given by the logit choice probabilities integrated over the distribution of individual-specific coefficients:

$$s_{jt}(\delta_{jt}, \alpha, \sigma, \theta, \pi) = \int \frac{\exp\left(-\alpha_i p_{jt} + \theta_i \text{Pod}_j + \delta_{jt}\right)}{1 + \sum_{k \in \mathcal{J}t} \exp\left(-\alpha_i p_{kt} + \theta_i \text{Pods}_k + \delta_{kt}\right)} f(v_{i1}, v_{i2})\, dv_{i1} dv_{i2},$$

where $\delta_{jt} = \beta_b + \beta_s + \mu_t + \xi_{jt}$ and $f(v_{i1}, v_{i2})$ is the standard normal density, with $\alpha_i = \alpha + \sigma_\alpha v_{i1}$ and $\theta_i = \theta + \sigma_\theta v_{i2}$. We define q_{jt} as the quantity of product j sold in period t, and q_{0t} as the quantity of the outside good. The observed market share of product j in market t is then:

$$s_{jt} = \frac{q_{jt}}{\sum_{j \in \mathcal{J}_t} q_{jt} + q_{0t}}. \tag{5}$$

The market share system is determined implicitly by equating observed and predicted shares:

$$s_{jt}(\delta_{jt}, \alpha, \sigma_\alpha, \theta, \sigma_\theta) = s_{jt}. \tag{6}$$

4.2 Estimation and Instruments

Demand estimation. The estimated parameters are α, σ_α, θ, σ_θ, 15 parameters corresponding to the brand dummies (with private label as the reference cate-

[20]See Appendix D

[21]The outside good share is in line with comparable studies in the literature. For instance, Dubois et al. (2019) estimate demand for pharmaceutical products with an outside good market share equal to 29% in Canada and 24% in the U.S.

gory), 4 parameters corresponding to the segment dummies and 59 parameters corresponding to the time fixed effects (with month 1, i.e., January 2013, as the reference period). We stack these parameters to be estimated in the vector θ^d. Next, we define the structural error term $g_{jt}(\theta^d) \equiv \xi_{jt}$ as the variation in market shares not explained by the model. The demand unobservables ξ_{jt} are obtained after inverting the system of market shares defined in (6) 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:

$$\underset{\theta^d}{argmin} \quad g(\theta^d)' Z W Z' g(\theta^d). \tag{7}$$

Z is a matrix of instruments and W is a weighting matrix. The vector $g(\theta^d)$ stack the ξ_{jt} over each market. We follow recommendation presented in Conlon and Gortmaker (2020) regarding best practices for differentiated products demand estimation.

Instruments and Relevance. Equilibrium prices are determined simultaneously by supply and demand. Therefore, to identify the demand function, one needs instruments that shift supply without directly affecting demand. Failing to instrument price generally provides estimates associated with price that are biased toward zero. We use 8 instruments and report the estimates from the first-stage in Appendix C. We now discuss the validity and relevance of each instrument. First, we use the merger as a supply shifter, as in Miller and Weinberg (2017). Specifically, we create a dummy variable equal to 1 in the post-merger period for the products belonging to the merged entity. Suggestive evidence for the relevance of this instrument is presented in the event studies, which show that prices increase significantly after the merger. The instrument is valid if the demand error term is orthogonal to the change in brand ownership resulting from the merger. The large and precisely estimated first-stage coefficient confirms the instrument's relevance and its strong predictive power for prices. Second, following the logic of BLP-style instruments, we use the average rival shares of arabica, robusta, and decaffeinated products, together with the number of products offered by competing firms within the same coffee segment. These instruments are correlated with prices because retailers' pricing decisions depend on the number and characteristics of competing products through their effect on market shares. Consistent with strategic price complementarities, prices increase with rivals' exposure to Arabica products, which are generally perceived as higher quality, and decrease with rivals' exposure to Robusta and decaffeinated products. Third, we construct differentiation instruments that capture the degree of similarity between a product and its competitors. We measure similarity using the difference between a product's characteristics and the average characteristics of rival products. Specifically, we use the difference between a product's organic and decaffeinated coffee content and the corresponding average content among competing products. The first-stage estimates associated with these instruments are positive and highly significant, suggesting that greater differentiation from rival products is associated with higher prices, as less substitutable products face weaker competitive pressure. Finally, we use a cost shifter constructed as the interaction between the Arabica coffee price index and the product-specific share of Arabica content. As expected, the coefficient is positive, indicating that increases in Arabica input costs translate into larger price increases for products with greater Arabica content. The coefficient is also precisely estimated, providing strong evidence that the instrument is not weak. Overall, the first-stage F-statistic is equal to 147, providing evidence against weak instruments and supporting the relevance of our instruments.

4.3 Demand Estimation Results

Table 3 reports the estimates from the Logit and Random Coefficients Logit (RCL) demand models. Column (i) presents the OLS estimates of the Logit specification. Column (ii) shows the results from the RCL model. In column (i), the estimated price coefficient is -0.03, suggesting substantial bias from price endogeneity. Once price is instrumented and consumer heterogeneity is incorporated through the RCL framework, the estimated price coefficient increases markedly in absolute value, indicating substantially greater price sensitivity. The estimated standard deviation of the price coefficient is 1.23 and statistically significant, providing evidence of considerable heterogeneity in consumers' price responsiveness. Likewise, the estimated standard deviation of preferences for pods is 0.04 and statistically significant, indicating meaningful variation in consumers' valuation of pod-based products. The RCL estimates imply an average own-price elasticity of -2.41. Based on this specification, a 1% increase in the price of a product reduces demand by about 2.4$\%$ on average. The average diversion to the outside good is equal to about 15 percent. The Hansen test of overidentifying restrictions yields a J-statistic of 6.8. With eight excluded instruments and one endogenous variable, the test has seven degrees of freedom. Hence, the Hansen J-test does not reject the overidentifying restrictions. Finally, in Appendix D, we show that our demand estimates are robust to varying outside good assumptions.

Table 3. Demand Parameter Estimates

	Logit	RCL
	(i)	(ii)
Random Coefficients		
Price (α)	-0.03***	-1.56***
	(0.002)	(0.41)
σ_p		1.23**
		(0.57)
σ_θ		0.04***
		(0.01)
Fixed Effects		
Time FE (μ_t)	✓	✓
Brand FE (β_{b})	✓	✓
Segment FE (β_{s})	✓	✓
Observations	11682	11682
Mean own-price elasticity	-0.49	-2.41
First-stage F-statistic		147
GMM J-statistic		6.8
Number of observations	11 682	

Notes: The table reports demand estimates from OLS logit and random-coefficients logit models based on equation (2), with the latter estimated using instrumental variables. Specifications include segment dummies, brand dummies, and time fixed-effects. Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Brand and segment dummies are reported in Appendix C.

Figure 3 presents the distribution of the own-price elasticities of the RCL model. The own-price elasticity of demand ranges from about -2.8 to -1.3. The average own-price elasticity of the pods segment is larger in absolute value than the other two segments with an average own-price elasticity of -2.46, indicating more elastic demand compared to the other segments. In contrast, the demand for products in the roast and ground (resp. beans) segment is less elastic. On average, the own-price elasticity of demand for products in the roast and ground segment (resp. beans segment) is equal to -2.40 (resp. -2.33). The estimated elasticities are in line with those reported by Gayle and Lin (2022) for the U.S. coffee pods market over 2008-2012, where average own-price elasticities range from -5.41 to -2.22. Compared with estimates from earlier periods when pods were not yet available, such as those reported by Bonnet and Villas-Boas (2016), our results suggest that demand is somewhat less price sensitive than in the French beans and roast-and-ground coffee segments during 1998–2006, for which average own-price elasticities were reported to range from -5.26 to -3.10.

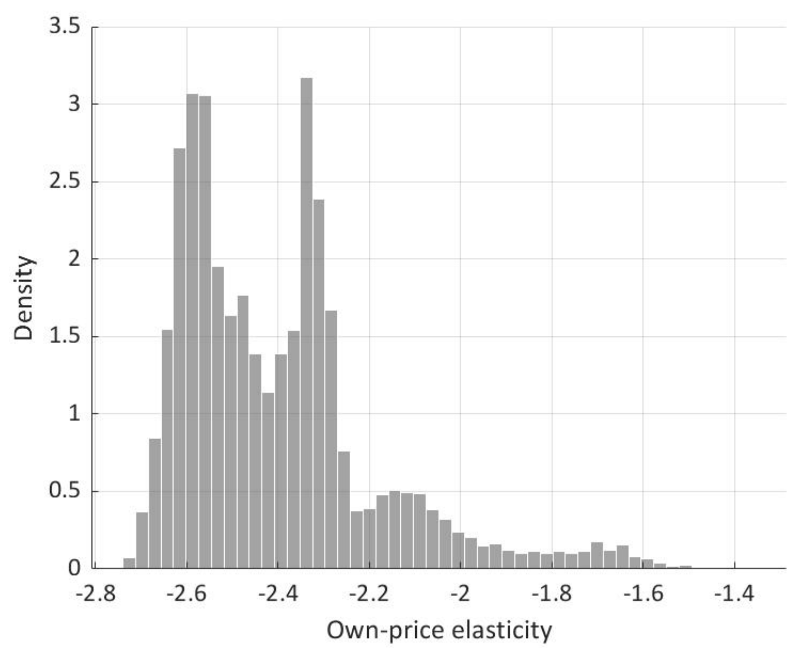


Figure 3. Own-price elasticity of demand

Table 4 provides more details on the substitution pattern obtained with the RCL model. We show the matrix of average diversion ratios by brand (in percent) for the 15 national brands and 7 private labels in our sample. We also show the average diversion ratio to the outside good. The average diversion ratio to the outside good ranges from 2.54 to 35%. For national brands, the diversion patterns do not indicate unusually strong substitution toward private labels. Instead, the largest diversion flows are generally directed toward other national brands. It is interesting to note that the buyer of the divested brand acquired a brand that is a relatively close substitute for products already in its portfolio. Indeed, Table 4 shows that a 1 percent change in the price of the divested brand leads to a 1.93 percent increase in the sales of Brand 12. Since having brands that are close substitutes contributes to higher markups, this suggests that a rationale for purchasing the divested brand is to increase markups.

Table 4. Diversion Ratios by Brand

	Destination Brand																						
	PL1	PL2	PL3	PL4	PL5	PL6	PL7	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	Outside Good
PL1	2.97	4.17	4.15	2.59	3.88	3.36	6.81	5.72	6.93	1.72	7.55	0.46	3.66	3.22	1.82	1.85	1.58	2.89	1.79	2.95	1.30	0.94	27.71
PL2	5.57	2.12	4.12	2.59	3.86	3.37	6.71	5.79	7.24	1.69	7.72	0.49	3.60	3.57	1.82	2.09	1.72	2.84	1.79	2.99	1.27	0.95	26.08
PL3	5.56	4.13	1.77	2.58	3.85	3.36	6.71	5.75	7.17	1.69	7.66	0.49	3.60	3.57	1.81	2.10	1.71	2.84	1.78	2.97	1.27	0.94	26.71
PL4	5.55	4.15	4.13	1.02	3.91	3.42	6.63	6.06	8.02	1.64	8.21	0.57	3.53	4.41	1.87	2.61	2.03	2.79	1.84	3.13	1.23	0.99	22.25
PL5	5.60	4.17	4.15	2.63	1.99	3.40	6.71	5.92	7.57	1.68	7.95	0.52	3.59	3.85	1.86	2.24	1.82	2.84	1.82	3.07	1.26	0.97	24.40
PL6	5.55	4.15	4.13	2.63	3.89	1.64	6.66	5.95	7.78	1.66	8.07	0.55	3.54	4.11	1.86	2.42	1.93	2.80	1.82	3.09	1.24	0.98	23.54
PL7	5.62	4.15	4.14	2.56	3.85	3.35	3.68	5.62	6.65	1.74	7.36	0.43	3.68	3.04	1.79	1.78	1.51	2.91	1.76	2.89	1.31	0.92	29.24
B1	5.48	4.16	4.14	2.72	3.95	3.50	6.52	5.53	9.07	1.58	8.90	0.69	3.41	5.56	1.93	3.35	2.47	2.70	1.89	3.32	1.16	1.04	16.94
B2	5.12	3.99	3.97	2.77	3.88	3.49	5.86	6.97	10.10	1.35	10.24	0.97	3.10	8.37	2.01	4.90	3.55	2.42	1.96	3.67	0.95	1.14	9.23
B3	5.27	3.87	3.85	2.35	3.57	3.08	6.44	5.02	5.60	1.42	6.49	0.35	3.54	2.28	1.64	1.22	1.15	2.77	1.62	2.60	1.27	0.83	33.77
B4	5.42	4.13	4.10	2.74	3.96	3.49	6.32	6.60	9.87	1.51	8.55	0.75	3.33	6.10	1.98	3.54	2.68	2.63	1.93	3.45	1.10	1.08	14.73
B5	4.44	3.54	3.55	2.61	3.52	3.21	4.94	6.84	12.95	1.08	10.37	0.98	2.73	11.34	1.83	7.00	4.53	2.03	1.84	3.57	0.75	1.09	5.26
B6	5.09	3.74	3.74	2.29	3.47	3.00	6.19	4.95	5.87	1.61	6.49	0.38	3.00	2.75	1.59	1.54	1.33	2.68	1.59	2.56	1.22	0.82	34.09
B7	3.96	3.25	3.29	2.53	3.28	3.05	4.36	6.95	13.80	0.90	10.51	1.40	2.48	12.06	1.66	9.42	5.51	1.76	1.75	3.47	0.60	1.04	2.97
B8	5.62	4.21	4.18	2.70	3.98	3.47	6.68	6.19	8.33	1.65	8.48	0.57	3.53	4.14	1.61	2.27	1.97	2.81	1.89	3.25	1.22	1.03	20.21
B9	3.56	2.98	3.02	2.41	3.05	2.84	3.88	6.81	13.71	0.77	10.22	1.47	2.31	16.10	1.50	8.91	5.94	1.56	1.66	3.29	0.50	0.98	2.54
B10	4.17	3.38	3.40	2.55	3.38	3.11	4.63	6.84	13.33	0.99	10.39	1.28	2.60	12.65	1.75	7.94	4.07	1.89	1.79	3.51	0.67	1.07	4.58
B11	5.28	3.89	3.88	2.38	3.60	3.11	6.43	5.16	6.00	1.65	6.73	0.38	3.52	2.62	1.66	1.48	1.31	2.27	1.64	2.66	1.26	0.85	32.22
B12	5.48	4.10	4.07	2.62	3.87	3.37	6.51	6.02	8.06	1.62	8.19	0.57	3.48	4.35	1.87	2.48	2.00	2.75	1.55	3.13	1.20	0.99	21.73
B13	5.53	4.18	4.15	2.73	3.98	3.49	6.50	6.43	9.21	1.58	8.96	0.67	3.43	5.23	1.97	2.99	2.37	2.72	1.91	2.86	1.15	1.06	16.91
B14	5.24	3.83	3.82	2.31	3.53	3.04	6.42	4.88	5.34	1.67	6.29	0.32	3.53	2.04	1.60	1.13	1.08	2.77	1.59	2.53	1.01	0.81	35.20
B15	5.47	4.13	4.09	2.69	3.92	3.43	6.42	6.31	8.98	1.57	8.77	0.65	3.41	5.00	1.94	2.77	2.25	2.70	1.89	3.31	1.15	0.90	18.25

Notes: The table reports average diversion ratios by brand (in percent). The diversion ratios measure, for a unit price increase of an average product in a given brand, the proportion of the resulting lost demand that is reallocated to other brands or to the outside good. Rows correspond to the origin brand (where the price increase occurs) and columns correspond to the destination brand receiving diverted demand. Brands in bold are the brands owned by the merger. PL1 (resp. PL2–PL7) refers to private labels of retailers 1–7. Brand 4 (*B4*) is the divested brand.

5 Supply

The supply model assumes a vertical market structure with M upstream manufacturers and R downstream retailers. We denote Θ_t^M the set of products owned by the manufacturer *m* at time t and Θ_t^R the set of products sold by the retailer *r* at time t.

5.1 Vertical Supply Model

We assume that manufacturers' profit are given by:

$$\Pi_t^M(p) = \sum_{j \in \Theta_t^M} (w_{jt} - mc_{jt}^M)\mathcal{M}_t s_{jt}(p), \tag{8}$$

where $\mathcal{M}_t$ is the total market size, and mc_{jt}^M is the manufacturer's marginal cost of producing the product j at time t.
Retailers' profit is given by:

$$\Pi_t^R(p) = \sum_{j \in \Theta_t^R} (p_{jt} - w_{jt} - mc_{jt}^R)\mathcal{M}_t s_{jt}(p), \tag{9}$$

where p_{jt} the retail price, w_{jt} the wholesale price, mc_{jt}^R the retail marginal cost of distributing the product j at time t.
Our empirical framework is guided by a bilateral bargaining game, in line with Gowrisankaran et al. (2015). In each period t, we consider a game where manufacturers and retailers engage simultaneously and secretly in bilateral bargains to set wholesale prices. At the same time, retailers compete on prices in the downstream market and set final prices for each product. The timing assumption of simultaneous moves, meaning that manufacturer-retailer bargaining and retailer competition occur simultaneously, is common in the Nash-bargaining literature; for example, it is an assumption made in Crawford et al. (2018), Ho and Lee (2017) and Draganska et al. (2010).[22] We start with the downstream market.

[22]An alternative assumption would be sequential moves in which vertical contracts are negotiated before the downstream competition as in Crawford and Yurukoglu (2012).

Bertrand-Nash Competition

Retail prices are determined in a pure-strategy Nash equilibrium. The maximization problem of retailer r at time t is given by:

$$\max_{\{p_{jt}\in\Theta_t^R\}} \Pi_t^R(p) = \sum_{j\in\Theta_t^R}(p_{jt} - w_{jt} - mc_{jt}^R)\mathcal{M}_t s_{jt}(p), \tag{10}$$

Following (10), the first-order condition with respect to p_{jt} is given by:

$$s_{jt}(p) + \sum_{k\in\Theta_t^R}(p_{kt} - w_{kt} - mc_{kt}^R)\frac{\partial s_{kt}(p)}{\partial p_{jt}} = 0, \forall j \in \Theta_t^R. \tag{11}$$

Following (11), we obtain J equations per market t with J unknowns $(w_j - mc_j^R)$. Therefore, the system of J first-order conditions in vector notation can be written as follows:

$$s_t(p) + (I_t^R \odot \Omega_t(p))(p_t - w_t - mc_t^R) = 0,$$

where $\Omega_t(p)$ is a $J \times J$ block-diagonal matrix. The (j,k)-element of $\Omega_t(p)$ is defined as $\dfrac{\partial s_{kt}(p)}{\partial p_{jt}}$. The block-diagonal matrix I_t^R is of dimension $J \times J$. The (j,k)-element of I_t^R is defined as:

$$I_{jkt}^R = \begin{cases} 1 & \text{if } j \text{ and } k \text{ are sold by the same retailer} \\ 0 & \text{otherwise.} \end{cases} \tag{12}$$

We can invert the following expression to obtain the retail margins:

$$\mathbf{m}_t^R \equiv -(I_t^R \odot \Omega_t(p))^{-1} s_t(p) = p_t - (w_t + mc_t^R), \tag{13}$$

with $\mathbf{m}_t^R$ the retail margin and $w_t + mc_t^R$ the retail marginal costs. Next, we can recover the vector of retail marginal costs as $w_t + mc_t^R = p_t - \mathbf{m}_t^R$. We now move to the upstream market.

Nash-Bargaining

We consider an asymmetric Nash-in-Nash bargaining framework à la Horn and Wolinsky (1988). The equilibrium wholesale price of the bilateral negotiation is the argument that maximizes the following equation:

$$\max_{w_{jt}}[\pi_{jt}^R(w_{jt}, p) - d_{jt}^R(\backslash j)]^{\lambda_{jt}} \times [\pi_{jt}^M(w_{jt}, p) - d_{jt}^M(\backslash j)]^{(1-\lambda_{jt})}, \tag{14}$$

where λ_{jt} (resp. $1-\lambda_{jt}$) is a bargaining weight for the retailer (resp. for the manufacturer).[23] π^R_{jt} and π^M_{jt} denote the profit of retailer r and manufacturer m for the product j such that:

$$\pi^R_{jt} = (p_{jt} - w_{jt} - mc^R_{jt})\mathcal{M}_t s_{jt}(p) \tag{15}$$

$$\pi^M_{jt} = (w_{jt} - mc^M_{jt})\mathcal{M}_t s_{jt}(p) \tag{16}$$

We denote d^R_{jt} and d^M_{jt} the disagreement payoff, i.e the outcome of manufacturer m and retailer r realized if the manufacturer-retailer pair fails to reach an agreement as follows:

$$d^R_{jt}(\backslash j) = \sum_{k\in\Theta^R_t\backslash j} (p_{kt} - w_{kt} - mc^R_{kt}) M_t \Delta s_{kt}(\backslash j) \tag{17}$$

$$d^M_{jt}(\backslash j) = \sum_{k\in\Theta^M_t\backslash j} (w_{kt} - mc^M_{kt}) M_t \Delta s_{kt}(\backslash j), \tag{18}$$

with $\Delta s_{kt}(\backslash j)$ is the difference in market shares of product k that occurs when the product j is no longer sold by retailer r. For manufacturer m, the disagreement payoff depends on its sale made on its other products. For retailer r, the disagreement payoff depends on sales made on others' product belonging to the manufacturer m and contracts engaged with other manufacturers. The modeling of bargaining at the product level comes from the institutional evidence indicating that retailers negotiate coffee products individually.[24]

The division of surplus generated by the bilateral contract between manufacturer m and retailer r for product j is given by the first-order condition:[25]

$$\lambda_{jt}(\pi^M_{jt}(w_{jt},p) - d^M_{jt}(\backslash j))\frac{\partial \pi^R_{jt}}{\partial w_{jt}} + (1-\lambda_{jt})(\pi^R_{jt}(w_{jt},p) - d^R_{jt}(\backslash j))\frac{\partial \pi^M_{jt}}{\partial w_{jt}} = 0. \tag{19}$$

[23] We denote λ_{jt} as the Nash bargaining weight per product/market. It can also be similar for all products within a supplier-retailer combination.

[24] More specifically, para. 621 p. 119 of the merger decision states that: "*It also appears that at least retailers in France, Greece, some in Germany and in the Netherlands actually negotiate each of the coffee products separately.*" and also that "*an overwhelming majority of retailers who responded to the Commission's questionnaire stated that while negotiating with their coffee product suppliers, it does not make a significant difference that those suppliers have a broader portfolio covering many coffee brands and formats, since "each product is important and plays its own role"*".

[25] Derivations are provided in Appendix E.

This expression reveals two sources of bargaining forces. The terms $\pi^M_{jt}(\omega_{jt}, p^\star) - d^M_{jt}(\backslash j))$ and $\pi^R_{jt}(\omega_{jt}, p^\star) - d^R_{jt}(\backslash j))$ represent the gain from trade obtained by the manufacturer and the retailer, respectively. The bargaining leverage is low if the gain from trade is high because the firm will significantly lose from not reaching an agreement.

This channel will be referred to as bargaining leverage and contrast with the bargaining power channel represented by the exogenous Nash bargaining weights λ_{jt}. Given that retail prices are fixed during the bargaining stage, from (15) and (16) we have:

$$\frac{\partial \pi^R_{jt}}{\partial w_{jt}} = -\mathcal{M}_t s_{jt}(p)$$
$$\frac{\partial \pi^M_{jt}}{\partial w_{jt}} = \mathcal{M}_t s_{jt}(p)$$

Consequently, the first order condition given by equation (19) can be written as follows:

$$\pi^M_{jt}(w_{jt}, p) - d^M_{jt}(\backslash j) = \frac{1-\lambda_{jt}}{\lambda_{jt}}(\pi^R_{jt}(w_{jt}, p) - d^R_{jt}(\backslash j))$$

Using (15) and (16) we have:

$$\underbrace{(w_{jt} - mc^M_{jt})}_{\mathbf{m}^M_{jt}}\mathcal{M}_t s_{jt}(p) - d^M_{jt}(\backslash j) = \frac{1-\lambda_{jt}}{\lambda_{jt}}\left(\underbrace{(p_{jt} - w_{jt} - mc^R_{jt})}_{\mathbf{m}^R_{jt}}\mathcal{M}_t s_{jt}(p) - d^R_{jt}(\backslash j)\right),$$

where $\mathbf{m}^M_{jt} \equiv w_{jt} - mc^M_{jt}$ is the manufacturer margin and $\mathbf{m}^R_{jt} \equiv p_{jt} - w_{jt} - mc^R_{jt}$ is the retailer margin for product j at time t. Next, replacing the disagreement payoff given by (17) and (18) we obtain the following equation:

$$\mathbf{m}^M_{jt}\mathcal{M}_t s_{jt}(p) - \sum_{k\in\Theta^M_t\backslash j} \mathbf{m}^M_{kt}\mathcal{M}_t \Delta s_{kt}(\backslash j) = \frac{1-\lambda_{jt}}{\lambda_{jt}}\left(\mathbf{m}^R_{jt}\mathcal{M}_t s_{jt}(p) - \sum_{j\in\Theta^R_t\backslash j} \mathbf{m}^R_{kt}\mathcal{M}_t \Delta s_{kt}(\backslash j)\right) \tag{20}$$

Let's define $\mathcal{S}_t$ as the following $J \times J$ matrix:

$$\mathcal{S}_t = \begin{pmatrix} s_{1t} & -\Delta s_{2t}(\backslash 1) & \dots & -\Delta s_{Jt}(\backslash 1) \\ -\Delta s_{1t}(\backslash 2) & s_{2t} & \dots & -\Delta s_{Jt}(\backslash 2) \\ \vdots & \vdots & \ddots & \vdots \\ -\Delta s_{1t}(\backslash J) & -\Delta s_{2t}(\backslash J) & \dots & s_{Jt} \end{pmatrix},$$

and re-write equation (20) in matrix form:

$$(I_t^M \odot \mathcal{S}_t)\mathbf{m}_t^M = (\frac{1-\lambda_t}{\lambda_t})(I_t^R \odot \mathcal{S}_t)\mathbf{m}_t^R. \tag{21}$$

The block-diagonal matrix I_t^M is of dimension $J \times J$. The (j,k)-element of I_t^M is defined as:

$$I_{jkt}^M = \begin{cases} 1 & \text{if } j \text{ and } k \text{ are sold by the same manufacturer} \\ 0 & \text{otherwise.} \end{cases} \tag{22}$$

We can invert (21) to obtain the manufacturer margins:

$$\mathbf{m}_t^M \equiv (\frac{1-\lambda_t}{\lambda_t})(I_t^M \odot \mathcal{S}_t)^{-1}(I_t^R \odot \mathcal{S}_t)\mathbf{m}_t^R = w_t - mc_t^M, \tag{23}$$

Equation (23) shows that margins of manufacturers depend on the vector of bargaining weight λ_t.

Using the retail markups obtained from the downstream market, the marginal cost of retailers for each product can be expressed as a function of costs of production and distribution and manufacturers' margin:

$$\begin{aligned} p_t - \mathbf{m}_t^R = w_t + mc_t^R &= (w_t - mc_t^M) + (mc_t^R + mc_t^M) \\ &= \mathbf{m}_t^M(\lambda_t, \mathbf{m}_t^R) + mc_t^R + mc_t^M. \end{aligned} \tag{24}$$

5.2 Estimation and Instruments

Supply estimation. Taking the demand estimates as given, we identify the supply-side parameters, bargaining weights and marginal costs, by bringing equation (24) to the data. Since wholesale prices are unobserved, retailer and manufacturer marginal costs, mc_{jt}^R and mc_{jt}^M, cannot be separately identified. Following the approach of Gowrisankaran et al. (2015), we parameterize total marginal costs, $mc^R_{jt} + mc^M_{jt}$, as a function of observable cost shifters and an unobserved cost component. Under this specification, equation (24) can be rewritten as:

$$\begin{aligned} p_t - \mathbf{m}^R_t &= \mathbf{m}^M_{jt}(\lambda, \mathbf{m}^R_{jt}) + mc^R_{jt} + mc^M_{jt} \\ &= \mathbf{m}^M_{jt}(\lambda, \mathbf{m}^R_{jt}) + \beta_1 \mathbb{1}_{\text{Buying Manufacturer}} \times \mathbb{1}_{\text{Post}} + \beta_2 \mathbb{1}_{\text{Divested Brand}} \times \mathbb{1}_{\text{Post}} + \vartheta x_{jt} \\ &+ \phi_r + \phi_s + \phi_t + \eta_{jt}, \end{aligned} \tag{25}$$

where η_{jt} captures unobserved cost shocks. The right hand side of equation (25) has three additional components. First, $\mathbf{m}^M_{jt}(\lambda, \mathbf{m}^R_{jt})$ denotes the manufacturer's markup, which is a function of the retailer bargaining weight, λ, and the retailer's markup, $\mathbf{m}^R_{jt}$. Second, motivated by the observed post-divestiture price decreases for products sold by the buyer of the divested brand, we include cost shifters related to the divestiture through two indicator variables: $\mathbb{1}_{\text{Buying Manufacturer}} \times \mathbb{1}_{\text{Post}}$ equals one for all other products of the buyer of the divested brand in the post-divestiture period and $\mathbb{1}_{\text{Divested Brand}} \times \mathbb{1}_{\text{Post}}$ equals one for the divested brand's products in the post-divestiture period. These terms capture potential cost savings arising from the divestiture.[26] Third, we include a cost shifter unrelated to the divestiture. x_{jt} control for variation in input costs, defined as the interaction between the Arabica coffee price index and the Arabica content share of product j at time t.[27] This measure captures observable changes in marginal costs driven by movements in coffee bean prices. Last, ϕ_r are retailer dummies (6 parameters), ϕ_s are segment dummies (4 parameters) and ϕ_t are month-year dummies (59 parameters).

Instruments and identification. The variable η_{jt} may be observed by manufacturers and retailers - but not by the researcher - before prices are determined. It

[26]Such savings are consistent with the divestiture having included the Mondelez manufacturing plant in Lavérune (southern France), where Lavazza consolidated all Carte Noire production lines previously spread across multiple factories. Lavazza also began producing its own brand at this French facility, facilitating its entry into the French market. Thus, both production and distribution costs may be affected. Figure A.1 in Appendix A illustrates that the buyer of the divested brand now produces its brand in the French manufacture located in Lavérune.

[27]The price index is obtained from the French National Institute for Statistics and Economic Studies (INSEE).

creates an endogeneity issue since η_{jt} depends on prices and market shares that are likely to be correlated with unobserved costs. Note that in our setting, a product is defined at the brand-segment-retailer level, so marginal costs can vary across retailers and identification does not rely on equal costs across retailers for the same brand. To address this endogeneity issue, we use instrumental variables that satisfy the orthogonality condition $E[\mathbf{Z}'\eta(\theta^s)] = 0$. Identification requires at least as many instruments as parameters to be estimated. Given our final objective, which is to provide recommendations to competition authorities on the choice of the buyer, we estimate 6 bargaining weights, i.e. one bargaining per firm, including one for the merging manufacturers (M1 and M2) together. We also assume that private labels manufacturer are vertically integrated with retailers (i.e., $\lambda = 1$).

We use two types of instruments. First, we use a dummy equals one for products belonging to the merged entity after the merger in the same spirit as Miller and Weinberg (2017). This instrument captures the change in competition due to the merger with divestiture and exploits the variation in product portfolio generated by this change in ownership. The relevance of the instrument is supported by our event study for the prices of products sold by the merger. This instrument is valid if the changes in product portfolio caused by the merger are not systematically correlated with the unobserved cost shocks. The second set of instruments consists of BLP-type instruments. Specifically, we interact the number of rival products with firm indicators, generating one instrument for each firm. Since there are six firms in the sample, this yields 6 BLP-type instruments. In total we use 7 instruments and identify 6 bargaining weights.

Next, we can stack the parameters in the vector of parameters $\theta^s = (\lambda, \phi, \beta_1, \beta_2)$. θ^s is the vector of parameters minimizing the following GMM objective function:

$$\hat{\theta^s} = \underset{\theta^s}{argmin}\; \eta(\theta^s)'\mathbf{Z}\mathbf{W}^{-1}\mathbf{Z}'\eta(\theta^s), \tag{26}$$

where $\mathbf{W}$ is the optimal GMM weighting matrix. We set $\mathbf{W} = \mathbf{Z}'\mathbf{Z}$ in the first step and then use estimates of the optimal weight matrix in the second step.

5.3 Supply Estimation Results

Table 5 shows the estimated parameters for the vertical supply model. First, we discuss the estimated bargaining weights. We estimate 6 bargaining weights. Our approach allows us to identify a new pro-competitive force relevant to divestiture policy. The results show that, on average, retailers have relatively more bargaining power than manufacturers.[28] This greater relative bargaining power of retailers limits the ability of the merger to raise input prices. This pattern is identified by variation in retail prices that cannot be reconciled with the relationship among downstream markups, marginal costs, and the upstream markups implied by the model's first-order conditions under symmetric bargaining power between manufacturers and retailers. The fact that retailers have more bargaining power than retailers is consistent with evidences from the French retail sector that are external to the model and our study.[29] For instance, the OECD notes that in France, "downstream, distributors are highly concentrated and have strong negotiating powers" (OECD (2024)).

[28]The bargaining weight of the retailer (or manufacturer) is denoted λ (or $(1-\lambda)$).

[29]For example, large retailers such as Carrefour have been reported to require substantial non-negotiable discount as a condition for entering negotiations, suggesting that retailers can exert significant influence over manufacturers (Reuters (2021)).

Additionally, this finding does not appear to be driven by the specific bargaining framework employed in our analysis. In particular, Bonnet et al. (2025) estimate a model with sequential bargaining in the French soft-drink industry and similarly find that retailers possess greater bargaining power than manufacturers. The fact that this result emerges in a different market and under an alternative bargaining framework suggests that the relatively strong bargaining power of retailers is a robust feature of French retail markets.

Table 5. Supply parameter estimates

	Estimates	
Retailer bargaining weights (λ)		
Merged entity	0.885***	(0.012)
Manufacturer 3	0.715***	(0.007)
Manufacturer 4	0.913***	(0.035)
Manufacturer 5 (buyer)	0.836***	(0.022)
Manufacturer 6	0.747***	(0.010)
Manufacturer 7	0.904***	(0.027)
Cost Parameters		
$\mathbb{1}_{\text{Buying Manufacturer}} \times \mathbb{1}_{\text{Post}}$	-0.684*	(0.345)
$\mathbb{1}_{\text{Divested brands}} \times \mathbb{1}_{\text{Post}}$	0.759	(0.406)
Arabica Price Index $\times$% Arabica	0.005***	(0.001)
ϕ_s	✓	
ϕ_r	✓	
ϕ_t	✓	
GMM objective function	6.808	
Hansen J-test	0.726	
p-value (Hansen test)	0.394	
Number of observations	11 682	

Notes: Heteroskedasticity-robust standard errors in parentheses. The Hansen J-test does not reject the null hypothesis that the overidentifying restrictions are valid, suggesting that the instruments are jointly valid. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Next, to assess the extent to which markups are affected, we compute the average manufacturer markups in Table 6 before and after the merger with divestiture. We also show the share of total profit obtained by the manufacturers before and after the merger. The results show that the markups of the merged entity increased by about 23 percent on average. The markups associated with the divested brand increased by about 26 percent. This shift is attributed to the relatively higher bargaining power of the buyer compared to the merged entity. It also allows the buyer of the divested brand to obtain a higher share of the total profit generated by the divested brand. In contrast, in a Nash-Bertrand competition model, the markups associated with the divested brand would have decreased as the brand is transferred from a large product portfolio to a relatively smaller one.[30] In addition, the buyer of the divested brands increased the markups on its existing brands by about 15 percent. This is due to a higher disagreement payoff in negotiating wholesale prices for brands already in its portfolio before the divestiture. Moreover, the buyer also obtains a higher share of the total profit both for the divested brand and for the products already in its portfolio, because the buyer of the divested brands has relatively higher bargaining power compared to the merged entity (0.16 versus 0.11). Thus, the additional anti-competitive effects from the relatively larger bargaining weights and the increase in its disagreement payoff do not explain why the prices of products already sold by the buyer before the divestiture decreased, as indicated by the event study. One possible explanation that the model allows for is cost efficiency.

[30]Results for the change in markups under Nash-Bertrand competition are available in Appendix G.

Table 6. Manufacturer markups and profit sharing

Manufacturer	Markups (€/kg)		Profit Sharing (%)	
	Pre	Post	Pre	Post
Merged entity	1.33	1.64	13.30	15.03
	(0.87)	(0.96)	(0.11)	(0.46)
Manufacturer 5 (buyer):				
Divested brand	1.68	2.12	14.24	16.08
	(1.23)	(1.57)	(0.17)	(0.13)
Other products	1.52	1.75	14.31	16.00
	(1.13)	(1.14)	(0.07)	(0.15)
Rivals	2.34	2.24	27.53	27.41
	(2.40)	(2.17)	(0.39)	(0.25)

Notes: Standard deviation in parentheses. The table reports the average (across markets and retailers) manufacturer markups and profit sharing before the merger (28 months) and after the divestiture (22 months).

In Table 5 we present cost efficiency estimates. The results indicate that the costs associated with the other products of the buyer of the divested brand decreased significantly. The estimate is statistically significant at the 0.1 level. Thus, the results show that the buyer achieved cost savings primarily on the products that were already in its portfolio. The estimated cost saving is about 0.7€ per kilogram, which corresponds to a cost reduction of about 8%. The change in costs associated with the divested brand is not precisely estimated.

We are able to identify cost savings by estimating a model that extends Nash–Bertrand models to allow for vertical market structure, relaxing the assumption that manufacturers sell directly to final consumers. This generalization has broader implications for cost measurement beyond merger analysis. Indeed, several studies find that price patterns are mainly explained by cost variation in models that abstract from vertical relationships. Table 7 presents average costs derived from a Nash–bargaining model, ranging from approximately 9 €/kg to 10 €/kg, with a mean of 8.64 €/kg. In comparison, the Nash–Bertrand model yields an average total cost of 10 €/kg, approximately 16% higher than in the Nash–bargaining framework because these costs contains retail margin. Overall, the results suggest that inferred cost measures can be sensitive to the underlying models.

The model we estimate identifies pro- and anti-competitive mechanisms through which prices are impacted. The fact that merger prices increased while the prices of the buyer of the divested brand decreased raises the question of whether the merger and divestiture increased or decreased consumer surplus. In the next section, we evaluate the model's predictive performance as an additional validation exercise. Next, we use counterfactual simulations to evaluate the impact of the merger and divestiture on consumer surplus relative to a benchmark counterfactual in which no merger occurred.

Table 7. Marginal Cost Measures

	Marginal cost (€/kg)
Merged entity	8.63
	(6.64)
Manufacturer 5 (buyer):	
Divested brand	10.36
	(8.59)
Other products	8.40
	(5.71)
Rivals	8.07
	(5.98)
Total	8.64
	(6.72)

Notes: Standard deviation in parentheses. The table reports the average (across markets and retailers) total marginal costs.

6 Model Validation

Before turning to counterfactual simulations, we assess the predictive accuracy of our model relative to a standard merger simulation framework. Using pre-merger data, we simulate a merger with divestiture under both a Nash–Bertrand model and our vertical supply model with Nash–bargaining, and compare each model's predictions to the observed price effects.

The Nash–Bertrand model predicts that prices of the merged entity's products would increase by approximately 13.5%, whereas our preferred Nash–bargaining model predicts an increase of about 4%, much closer to the observed effect of roughly 3%. A similar pattern emerges for the divested brand: observed prices decrease by about 2%, while the Nash–Bertrand model predicts a decrease of approximately 13% and the Nash–bargaining model predicts a decrease of about 4.4%.

For products already in the buyer's portfolio, the two models diverge further: the Nash–Bertrand model predicts a substantial price increase, while the Nash–bargaining model predicts that, in the absence of cost savings, prices would rise by up to 2.26%. A price decrease can therefore only be rationalized by the presence of cost savings. The "Cost Savings" column indicates that the vertical supply model, when cost savings are incorporated, can indeed predict a decline in prices. In contrast, in the horizontal model, the retail margins are embedded in unobserved costs, so estimated cost savings conflate efficiency gains with margin adjustments and therefore are not economically interpretable as a true measure of cost reduction.

Overall, these results indicate that the bargaining framework is more consistent with observed post-merger outcomes. We now turn to the counterfactual analysis of the merger and divestiture's effects on final prices.

Table 8. Counterfactual results (horizontal vs. vertical)

	Horizontal	**Vertical**	
		No cost savings	*Cost savings*
△ Retail price (%)			
Merged Entity	13.5	3.89	4.00
Manufacturer 5 (buyer):			
Divested Brand	-12.9	-4.58	-4.38
Other products	12.5	2.26	-9.51
Rivals	-0.26	-0.59	-0.45

Notes: This table reports the average percentage price change (quantity-weighted). The first column corresponds to the horizontal merger. The second and third columns report vertical merger simulations without and with cost savings, respectively. Simulations are based on the estimates in Tables 3 and 5, using the post-divestiture period.

7 Counterfactual Analysis

7.1 Consumer surplus

Using counterfactual analysis, we assess the changes in prices and consumer surplus due to the merger and the divestiture separately. To do so, we recompute the equilibrium vector of prices under three counterfactual scenarios: (1) no merger; (2) merger without divestiture; and (3) merger with divestiture but no cost savings for the buyer of the divested brand. For each scenario, we adjust the ownership matrix (I_t^M) in equation (23) to reflect the relevant ownership structure and incorporate or eliminate the associated cost efficiencies.

Table 9 shows the percentage changes in prices and consumer surplus under the three scenarios. Column (i) shows the change in prices and consumer surplus in scenario (2) (i.e., merger without divestiture) relative to scenario (1) (i.e., no merger). It shows that the merger without divestiture decreased consumer surplus as the merger leads to a substantial price increase.[31] Columns (ii) and (iii)

[31]The fact that rival prices decrease slightly is consistent with the implications of nonlinear demand. Appendix F provides a simple analytical illustration of this mechanism.

show the changes in prices and consumer surplus relative to scenario (1) (i.e., no merger) without and with cost savings, respectively. With cost savings (i.e., column (iii)), the merger with divestiture reduces the price of the divested brand and of the buyer's other products, which is consistent with the price pattern observed in the data.

The results also reveals that the merger reduces the consumer surplus, but it decreases less with the divestiture. Thus, the results support the choice of the European Commission to request the use of divestiture to mitigate the anti-competitive effects of the merger. Yet, the results suggest also that the divestiture was not sufficient to prevent a negative effect on consumers. Provided that the divested brand could have been sold to another buyer, it raises the question of how much it depends on the choice of the buyer.

Table 9. Counterfactual results

Δ **Retail price (%)**	No divestiture	Divestiture	
		no cost savings	cost savings
	(i)	(ii)	(iii)
Merged Entity	5.26	2.97	3.05
Manufacturer 5 (buyer):			
Divested Brand	8.27	-5.28	-5.18
Other products	-0.53	2.69	-9.02
Rivals	-1.33	-0.34	-0.24
Δ Consumer surplus (%)	-0.812	-0.189	-0.154

Notes: This table shows the average percentage price change (weighted by quantity). The simulations are based on the estimates presented in Table 3 and Table 5 and are computed using the period after the divestiture.

7.2 Policy recommendations

In this section, we examine the extent to which the choice of the buyer of the divested brand affects the estimated impact on prices and consumer surplus. We also aim to provide some recommendations to competition authorities on how to select the buyer of the divested brand in the presence of bargaining power.

We simulate four counterfactuals in which Brand 4 (i.e., the divested brand) is divested to either Manufacturer 3, 4, 6 or 7 instead of the observed divestiture to Manufacturer 5. We show the results in Table 10. We assume in each case that the buyer obtains the same cost savings as those we observe for Manufacturer 5 (i.e., 8%). Column (i) corresponds to the percentage change in prices and consumer welfare caused by the actual merger and divestiture. The remaining columns show the percentage change in prices and consumer surplus caused by the merger with the same divested brand but a counterfactual buyer (i.e., either M3, M4, M6, or M7).

The table shows interesting sets of results. First, the actual divestiture does not yield the lowest change in consumer surplus. In particular, divesting to Manufacturer 4 or Manufacturer 7 would have been less harmful to consumers. Second, the result for Manufacturer 4 is interesting because it shows that, although Manufacturer 4 had a higher pre-merger market share than the actual buyer, it has a lower average bargaining weight. This highlights that policy recommendations regarding the choice of a divestiture buyer may differ once bargaining power is taken into account. In Friberg and Romahn (2015), it is argued that the best way to mitigate the anti-competitive effects of a merger through divestiture is to select a small buyer. In contrast, our results suggest that divesting a brand to a small buyer with high bargaining weight is unlikely to mitigate the anti-competitive effects of the merger.

Last, divesting Brand 4 to Manufacturer 3 would have a negligible impact on the price of the divested brand. This is mainly due to its higher market share limiting the potential for a price drop. Note that there are no direct links between market shares and bargaining weights. The literature on bargaining provides several plausible determinants of bargaining weight. For instance, a high bargaining weight can be due to a better brand assortment, the patience of firms to reach an agreement (Draganska et al. (2010)) or better negotiation skills (Grennan (2014)). The antitrust authorities cannot infer values of these weights based on observed market shares and therefore the estimation of these weights is key when making decision on the choice of the buyer of the divested brand.

Table 10. The choice of the buyer

Δ Retail price (%)	*Actual buyer* Manuf. 5 (i)	*Scenarios* Manuf. 3 (ii)	Manuf. 4 (iii)	Manuf. 6 (iv)	Manuf. 7 (v)
Merged Entity	3.05	2.81	3.02	2.99	2.92
Buyer:					
Divested brand	-5.18	-0.286	-5.21	-4.90	-5.53
Other products	-9.02	-1.58	-5.19	-3.09	-5.90
Rivals	-0.24	-0.267	-0.285	-0.306	-0.271
Δ Consumer surplus (%)	-0.154	-0.256	-0.138	-0.164	-0.153
Pre-merger market share (%)	1.84	10.24	1.96	2.34	1.65
1-λ	0.16	0.29	0.09	0.25	0.10

Notes: This table shows the average percentage price change (weighted by quantity). The simulations are based on the estimates presented in Table 3 and Table 5 and are computed using the period after the divestiture. In particular, we assume a cost savings for each buyer of 8%, derived from our supply estimation results. Pre-merger market share is the average pre-merger market share between month 17 and month 28.

8 Conclusion

This paper examines the effectiveness of divestiture as a merger remedy in the French coffee market, where bargaining power between manufacturers and retailers is a key feature of the market. The results challenge the common wisdom that brands should be divested to a small buyer. We show that a buyer that has small market shares but high bargaining power can deteriorate consumer surplus more than a larger buyer with relatively lower bargaining power.

Our approach also allows us to overcome a measurement challenge that economists often face when estimating marginal costs. Models that do not account for vertical market structure imply higher cost levels, by about 16 percent in our setting. Based on our cost measures, we find that divestiture is associated with cost efficiencies for the buyer of the divested brand, thereby positively affecting competition.

This article documents evidences of an additional pro-competitive force. Retailers have relatively higher bargaining power than manufacturers, resulting in lower wholesale prices paid by retailers and consequently lower final prices. However, this higher bargaining power was not sufficient to block the anti-competitive effects of the merger as prices of the merged entity raised. This is mainly explained by the fact that after the merger and divestiture markups increased. The markups of the merged entity increased by about 23 percent on average, whereas the markups associated with the divested brand increased by about 26 percent. In addition, the buyer of the divested brands increased the markups on brands already in its portfolio by about 15 percent. Therefore, this article shows that the anti-competitive effects of the DEMB/Mondelez merger and the associated divestiture dominate the pro-competitive effects thereby leading to a decrease in consumer surplus. Beyond this specific merger and divestiture, and to the extent that cost efficiencies may not always be present, the results cast doubt on the effectiveness of divestiture as a merger remedy.

In conclusion, an interesting research agenda to pursue is to assess the extent to which the choice of divested brands rather than the buyer may affect consumer welfare. However, we acknowledge that this exercise falls outside the scope of this article as it requires developing an approach that allows to estimate brand-level bargaining weights.

Appendix

A Descriptive Statistics

Table A.1 Mean Retail Price Pre-Merger and Post-Divestiture Period By Brand (€/Kg)

		Pre		Post	
Manufacturer	Brand	mean	s.d	mean	s.d
	Private Labels	16.49	14.62	17.06	12.95
Manuf. 1	**Brand 1**	29.88	22.32	27.75	19.75
	Brand 2	17.40	1.20	16.91	1.07
	Brand 3	10.63	7.39	15.42	17.07
Manuf. 2	**Brand 4** (divested brand)	23.05	18.87		
	Brand 5	23.04	1.92	22.60	2.99
	Brand 6	14.57	7.34	9.62	3.04
	Brand 7	27.39	1.45	28.65	2.30
	Brand 8	11.62	0.95	11.11	0.99
Manuf. 3	**Brand 9**	30.85	1.78	30.11	1.69
	Brand 10	24.64	2.32	23.67	2.38
Manuf. 4	**Brand 11**	21.43	18.95	18.13	16.29
Manuf. 5 (buyer)	**Brand 12**	19.41	12.76	18.57	12.74
	Brand 4 (divested brand)			22.83	17.61
Manuf. 6	**Brand 13**	22.17	11.96	21.31	12.71
Manuf. 7	**Brand 14**	7.85	1.48	12.46	13.19
	Brand 15	17.76	13.49	16.93	13.51

Note: The table reports the average (across markets) retail prices before the merger (28 months) and after the divestiture (22 months).

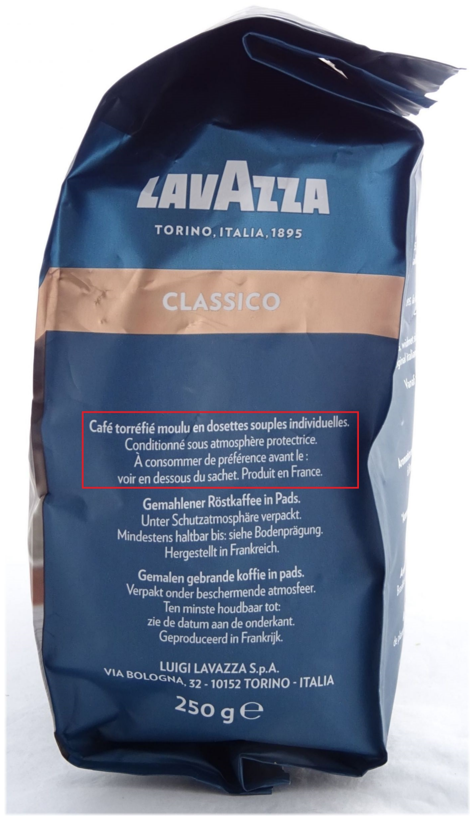
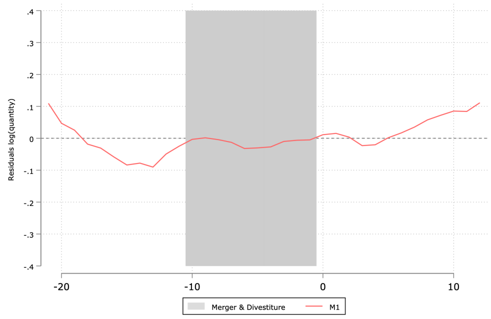


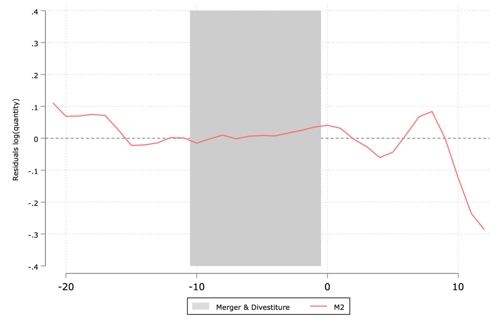
Figure A.1 Lavazza Packaging (2019)

Notes: Packaging of Lavazza in 2019, produced in France. Red box shows that the buyer of the divested brand now produces its brand in the French manufacture.

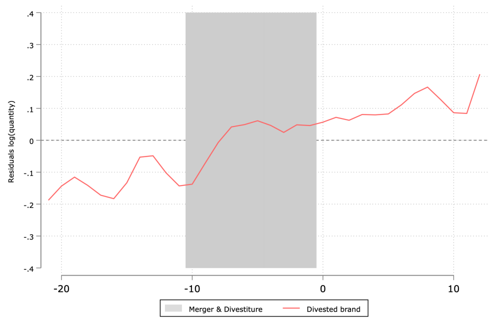
B Average Quantities



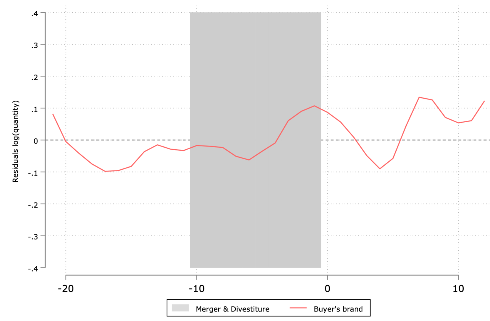
B.1 Merging Firm (M1)



B.2 Merging Firm (M2)



B.3 Divested brand



B.4 Other products (buyer)

Figure B.1 Average Quantities

Notes: The figure shows the plot of the raw average quantity for the merging manufacturers (M1 and M2), the divested brand, and the other products of the buyer of the divested brand, after removing the variation due to product fixed effects. The trend line is smoothed using local averages. The gray area corresponds to the period between merger approval and the completion of the merger, when the divestiture was implemented.

C Demand Results

Table C.1 First Stage Regression Logit

	Price
$\mathbb{1}_{\text{Merger}} \times \mathbb{1}_{\text{Post}}$	1.870***
	(0.252)
Nb. of rivals' products sold	-0.0003
/segment within a retailer	(0.011)
Δ from rivals'	3.422***
organic coffee share	(0.473)
Δ from rivals'	5.011***
decaffeinated coffee share	(0.603)
Av. rival	-92.120***
decaffeinated coffee share	(11.860)
Av. rival Arabica	11.956***
coffee share	(1.249)
Av. rival Robusta	-24.693
coffee share	(18.329)
Arabica coffe cost shifter	0.0185***
	(0.0009)
μ_t, β_s, β_b	✓
F-Test	147
Number of observations	11 682

Notes: Standard errors in parentheses.
+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table C.2 Segment and Brand Fixed Effects

Variable	Estimate	Std. Error
Segment fixed effects		
Roast and Ground	2.261	(4.198)
Soft Pods	2.531	(4.510)
Rigid Pods	4.789	(4.361)
Beans	-0.250	(4.267)
Brand fixed effects		
Private labels	-	
Brand 1	-0.093	(0.251)
Brand 2	1.216	(0.218)
Brand 3	-2.678	(0.168)
Brand 4	-0.065	(0.243)
Brand 5	-0.058	(0.639)
Brand 6	-2.452	(0.078)
Brand 7	0.283	(0.433)
Brand 8	-1.305	(0.311)
Brand 9	0.212	(0.367)
Brand 10	1.518	(0.649)
Brand 11	-2.156	(0.056)
Brand 12	-1.754	(0.233)
Brand 13	-0.587	(0.316)
Brand 14	-2.836	(0.197)
Brand 15	-2.051	(0.262)

Notes: Standard errors in parentheses.

D Robustness to Market Size Assumptions

We further assess the robustness of our demand estimates by varying the assumed market size. Table D.1 reports results when the market size is decreased or increased by 5% and 10%. The estimates remain stable across specifications, with implied own-price elasticities ranging from -2.34 to -2.45. Overall, these findings support the robustness of our demand model.

Table D.1 Robustness to Market Size Assumptions

	Market size			
	- 10%	- 5%	+ 5%	+ 10%
Price	-1.78	-1.67	-1.47	-1.38
	(0.33)	(0.37)	(0.45)	(0.48)
σ_p	1.09	1.17	1.28	1.33
	(0.52)	(0.54)	(0.59)	(0.62)
σ_{pods}	0.025	0.031	0.042	0.048
	(0.006)	(0.009)	(0.015)	(0.019)
Time FE (μ_t)	✓	✓	✓	✓
Brand FE (β_b)	✓	✓	✓	✓
Segment FE (β_s)	✓	✓	✓	✓
Own-price elasticity	-2.34	-2.38	-2.43	-2.45

Notes: The table reports the estimated demand parameters based on RCL market size scaled up and down by 5 and 10%. The table reports the estimated demand parameters based on the random coefficient logit demand implied by the utility functions in (2) using instruments when the market size is scaled up and down by 5% and 10%.

E First Order Condition Bargaining Problem

The equilibrium wholesale price is the argument that maximizes the following equation:

$$\max_{w_{jt}}[\pi^R_{jt}(w_{jt}, p) - d^R_{jt}(\backslash j)]^{\lambda_{jt}} \times [\pi^M_{jt}(w_{jt}, p) - d^M_{jt}(\backslash j)]^{(1-\lambda_{jt})}, \quad (27)$$

Taking the log in (27), we obtain:

$$\lambda_{jt}\ log(\pi^R_{jt}(w_{jt}, p) - d^R_{jt}(\backslash j)) + (1 - \lambda_{jt})\ log(\pi^M_{jt}(w_{jt}, p) - d^M_{jt}(\backslash j))$$

Taking the derivative with respect to w_{jt}, we get the following first order condition:

$$\lambda_{jt}\left(\frac{\partial \pi^R_{jt}(w_{jt}, p)}{\partial w_{jt}}(\pi^R_{jt}(w_{jt}, p) - d^R_{jt}(\backslash j))^{-1} + (1 - \lambda_{jt})\frac{\partial \pi^M_{jt}(w_{jt}, p)}{\partial w_{jt}}(\pi^M_{jt}(w_{jt}, p) - d^M_{jt}(\backslash j))^{-1}\right) = 0.$$

Re-arranging, we obtain:

$$\lambda_{jt}(\pi_{jt}^{M}(w_{jt},p)-d_{jt}^{M}(\backslash j))\frac{\partial\pi_{jt}^{R}}{\partial w_{jt}}+(1-\lambda_{jt})(\pi_{jt}^{R}(w_{jt},p)-d_{jt}^{R}(\backslash j))\frac{\partial\pi_{jt}^{M}}{\partial w_{jt}}=0.$$

F Rival Price Responses under Nonlinear Demand: Analytical Example

Consider a multiproduct firm producing goods 1 and 2 that sets prices (p_1, p_2) while facing a rival firm producing good 3 that sets price p_3. Let $\mathbf{p} = (p_1, p_2, p_3)$ and let quantities demanded be $Q_1(\mathbf{p})$ and $Q_2(\mathbf{p})$. The firm's profit is

$$\Pi(\mathbf{p}) = (p_1 - c)\, Q_1(\mathbf{p}) + (p_2 - c)\, Q_2(\mathbf{p}),$$

and the firm chooses (p_1, p_2) to maximize $\Pi(\mathbf{p})$.

First-order conditions

Define $\Pi_i := \partial\Pi/\partial p_i$. The optimal prices satisfy

$$Q_1(\mathbf{p}) + (p_1 - c)\,\frac{\partial Q_1(\mathbf{p})}{\partial p_1} + (p_2 - c)\,\frac{\partial Q_2(\mathbf{p})}{\partial p_1} = 0,$$

$$Q_2(\mathbf{p}) + (p_2 - c)\,\frac{\partial Q_2(\mathbf{p})}{\partial p_2} + (p_1 - c)\,\frac{\partial Q_1(\mathbf{p})}{\partial p_2} = 0.$$

Second-order conditions

Let $\Pi_{ij} := \partial^2\Pi/(\partial p_i \partial p_j)$. The elements of the Hessian matrix are

$$\Pi_{11} = (p_1 - c)\,\frac{\partial^2 Q_1}{\partial p_1^2} + 2\frac{\partial Q_1}{\partial p_1} + (p_2 - c)\,\frac{\partial^2 Q_2}{\partial p_1^2},$$

$$\Pi_{22} = (p_1 - c)\,\frac{\partial^2 Q_1}{\partial p_2^2} + 2\frac{\partial Q_2}{\partial p_2} + (p_2 - c)\,\frac{\partial^2 Q_2}{\partial p_2^2},$$

$$\Pi_{12} = \Pi_{21} = (p_1 - c)\,\frac{\partial^2 Q_1}{\partial p_1 \partial p_2} + \frac{\partial Q_1}{\partial p_2} + (p_2 - c)\,\frac{\partial^2 Q_2}{\partial p_1 \partial p_2} + \frac{\partial Q_2}{\partial p_1}.$$

A sufficient condition for an interior maximum is

$$\Pi_{11} < 0 \qquad \text{and} \qquad \Delta := \Pi_{11}\Pi_{22} - \Pi_{12}^2 > 0.$$

Comparative statics with respect to the rival price p_3

Totally differentiating the two first-order conditions with respect to p_3 yields

$$\Pi_{11}\,\frac{\partial p_1}{\partial p_3} + \Pi_{12}\,\frac{\partial p_2}{\partial p_3} + \Pi_{13} = 0,$$

$$\Pi_{21}\,\frac{\partial p_1}{\partial p_3} + \Pi_{22}\,\frac{\partial p_2}{\partial p_3} + \Pi_{23} = 0,$$

where

$$\Pi_{13} = (p_1 - c)\,\frac{\partial^2 Q_1}{\partial p_1 \partial p_3} + \frac{\partial Q_1}{\partial p_3} + (p_2 - c)\,\frac{\partial^2 Q_2}{\partial p_1 \partial p_3},$$

$$\Pi_{23} = (p_1 - c)\,\frac{\partial^2 Q_1}{\partial p_2 \partial p_3} + (p_2 - c)\,\frac{\partial^2 Q_2}{\partial p_2 \partial p_3} + \frac{\partial Q_2}{\partial p_3}.$$

Solving this linear system gives

$$\frac{\partial p_1}{\partial p_3} = \frac{\Pi_{23}\Pi_{12} - \Pi_{13}\Pi_{22}}{\Delta}, \qquad \frac{\partial p_2}{\partial p_3} = \frac{\Pi_{13}\Pi_{21} - \Pi_{23}\Pi_{11}}{\Delta}.$$

Linear-demand case: positive price response of rival

If $Q_1(\mathbf{p})$ and $Q_2(\mathbf{p})$ are linear in prices, then all second derivatives of demand are zero:

$$\frac{\partial^2 Q_i}{\partial p_j \partial p_k} = 0 \qquad \text{for all } i \in \{1,2\},\ j,k \in \{1,2,3\}.$$

In this case,

$$\Pi_{11} = 2\frac{\partial Q_1}{\partial p_1}, \qquad \Pi_{22} = 2\frac{\partial Q_2}{\partial p_2}, \qquad \Pi_{12} = \Pi_{21} = \frac{\partial Q_1}{\partial p_2} + \frac{\partial Q_2}{\partial p_1},$$

and

$$\Pi_{13} = \frac{\partial Q_1}{\partial p_3}, \qquad \Pi_{23} = \frac{\partial Q_2}{\partial p_3}.$$

Substituting into the general expressions yields

$$\frac{\partial p_1}{\partial p_3} = \frac{\left(\frac{\partial Q_2}{\partial p_3}\right)\left(\frac{\partial Q_1}{\partial p_2} + \frac{\partial Q_2}{\partial p_1}\right) - \left(\frac{\partial Q_1}{\partial p_3}\right)\left(2\frac{\partial Q_2}{\partial p_2}\right)}{\left(2\frac{\partial Q_1}{\partial p_1}\right)\left(2\frac{\partial Q_2}{\partial p_2}\right) - \left(\frac{\partial Q_1}{\partial p_2} + \frac{\partial Q_2}{\partial p_1}\right)^2},$$

$$\frac{\partial p_2}{\partial p_3} = \frac{\left(\frac{\partial Q_1}{\partial p_3}\right)\left(\frac{\partial Q_1}{\partial p_2} + \frac{\partial Q_2}{\partial p_1}\right) - \left(\frac{\partial Q_2}{\partial p_3}\right)\left(2\frac{\partial Q_1}{\partial p_1}\right)}{\left(2\frac{\partial Q_1}{\partial p_1}\right)\left(2\frac{\partial Q_2}{\partial p_2}\right) - \left(\frac{\partial Q_1}{\partial p_2} + \frac{\partial Q_2}{\partial p_1}\right)^2}.$$

To sign these derivatives, assume standard linear-demand conditions:

$$\frac{\partial Q_i}{\partial p_i} < 0 \quad (i = 1, 2), \qquad \frac{\partial Q_i}{\partial p_j} > 0 \quad (i \neq j), \qquad \frac{\partial Q_i}{\partial p_3} > 0 \quad (i = 1, 2),$$

i.e., own-price effects are negative, products are substitutes, and the rival's price shifts demand outward. Under the second-order condition $\Delta > 0$, both numerators are strictly positive, and therefore $\frac{\partial p_1}{\partial p_3} > 0$ and $\frac{\partial p_2}{\partial p_3} > 0$.

Nonlinear demand case: ambiguous price response of rival

With nonlinear demand, the second-order derivatives $\partial^2 Q_i/(\partial p_j \partial p_3)$ do not vanish. These curvature terms enter the comparative statics through

$$\Pi_{13} = \frac{\partial Q_1}{\partial p_3} + (p_1 - c)\frac{\partial^2 Q_1}{\partial p_1 \partial p_3} + (p_2 - c)\frac{\partial^2 Q_2}{\partial p_1 \partial p_3},$$

and

$$\Pi_{23} = \frac{\partial Q_2}{\partial p_3} + (p_1 - c)\frac{\partial^2 Q_1}{\partial p_2 \partial p_3} + (p_2 - c)\frac{\partial^2 Q_2}{\partial p_2 \partial p_3}.$$

The first terms in Π_{13} and Π_{23} capture the direct demand-shift effect of an increase in the rival's price p_3: holding own prices fixed, higher p_3 raises demand for products 1 and 2 when goods are substitutes. This force alone pushes the firm to increase its prices, as in the linear-demand benchmark.

The additional curvature terms capture how the slope of demand with respect to own prices changes when p_3 changes. For instance, $\partial^2 Q_1/(\partial p_1 \partial p_3)$ measures

how the own-price sensitivity $\partial Q_1/\partial p_1$ varies with p_3. If an increase in p_3 makes demand for product 1 more elastic (i.e., the slope becomes more negative), then $\partial^2 Q_1/(\partial p_1 \partial p_3) < 0$, which reduces the incentive to raise p_1. If it makes demand less elastic, the term is positive and amplifies the incentive to raise p_1. Hence, Π_{13} and Π_{23} need not be positive, even when products are substitutes.
Since

$$\frac{\partial p_1}{\partial p_3} = \frac{\Pi_{23}\Pi_{12} - \Pi_{13}\Pi_{22}}{\Delta}, \qquad \frac{\partial p_2}{\partial p_3} = \frac{\Pi_{13}\Pi_{21} - \Pi_{23}\Pi_{11}}{\Delta},$$

the sign of $\partial p_i/\partial p_3$ depends on the relative magnitudes of the direct demand-shift terms and the curvature terms. Consequently, an increase in the rival's price p_3 may either increase or decrease the firm's optimal prices. In contrast, under linear demand all curvature terms are zero, so the direct demand-shift effect dominates and yields positive pass-through.

G Changes in Markups under Nash–Bertrand Competition

Table H.1 Manufacturers' markup

Manufacturer	Markups (€/kg)	
	Pre	Post
Merged entity	9.76	11.60
	(6.58)	(9.54)
Manufacturer 5 (buyer):		
Divested brand	12.03	10.83
	(9.54)	(7.87)
Other products	7.96	8.96
	(5.72)	(5.69)
Rivals	8.73	8.99
	(6.32)	(5.92)

Notes: Standard deviation in parentheses. The table reports the average (across markets and retailers) manufacturer price-cost margins before the merger (28 months) and after the divestiture (22 months).

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