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Elena Argentesi,
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Editor:

Prof. Dr. Hans-Theo Normann
Düsseldorf Institute for Competition Economics (DICE)
Phone: +49(0) 211-81-15125, e-mail: normann@dice.hhu.de

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The Effect of Retail Mergers on Prices and Variety: An Ex-post Evaluation*

Elena Argentesi†, Paolo Buccirossi‡, Roberto Cervone‡,
Tomaso Duso§, Alessia Marrazzo ‡

June 2016

Abstract Unlike most retrospective merger studies that only focus on price effects, we also estimate the impact of a merger on product variety. We use an original dataset on Dutch supermarkets to assess the effect of a merger that was conditionally approved by the Dutch Competition Authority (ACM) on prices and the depth of assortment. We find that the merger did not affect prices but it led the merging parties to decrease the depth of their assortment, thereby reducing consumer choice. This effect is mainly driven by a reduction in variety for stores that were not re-branded after the merger, suggesting that the merging firms reposition their product offerings in order to avoid cannibalization. We also find that the reduction in variety for the merging parties is partially compensated by competitors increasing variety, except in very concentrated markets where all firms decrease variety. The issuance of divestitures partially outweighed the negative effect of the merger. Yet, it appears that additional divestitures would have been necessary to remove completely the adverse effect of the merger on the depth of assortment.

Keywords: Mergers, Variety, Ex-post Evaluation, Retail sector, Supermarkets, Grocery.

JEL Codes: L1, L41, L66, L81, D22, K21, C23

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† *Corresponding author.* Department of Economics, University of Bologna, Piazza Scaravilli 2, 40126 Bologna, Italy. Phone: +390512098661. Email: elena.argentesi@unibo.it

‡Lear, Via di Monserrato, 48, 00186, Rome, Italy.

§Deutsches Institut für Wirtschaftsforschung (DIW Berlin), DICE Düsseldorf, and Berlin Centre for Consumer Policies (BCCP), Mohrenstr. 58, 10117 Berlin, Germany. E-mail: tduso@diw.de.

1. Introduction

Grocery retail plays a central role in consumers' everyday life, with supermarkets being the key point of sales for buying food and household products in most countries. On average, spending on food represents around 15% of household budgets in the European Union. In 2011, the total turnover of the food supply chain exceeded 3,500 EUR billion in the European Union and generated around 6% of the EU gross value added (650 EUR billion).[1] The sector has drastically been transformed by the interplay of several forces on both the supply and demand sides. On the demand side, consumers' habits have changed, such that they tend to do most of their shopping in a single stop, typically a large supermarket. On the supply side, the creation of large supermarket chains coupled with innovations in logistics and distribution allowed the internalization of economies of scale and scope. These developments brought significant benefits to consumers with lower prices and larger variety.

Yet, competition authorities are concerned that effective competition in increasingly concentrated grocery markets may not be sustainable, as underlined by the sector inquiries performed in the UK[2] and Germany.[3] Two main issues are of general concern. First, in most countries few grocery retailers appear to have a strong position in several local markets. Because of potential barriers to entry into these local markets –such as difficulties to find attractive locations as well as scale and scope economies in logistic and distribution networks– regional concentration might lead to customers facing increased prices and decreased choice, quality, and service. Second, concentration in downstream markets increases retailers' buyer power. Buyers' power might be beneficial to consumers since retailers might pass on part of the benefits (lower wholesale prices) arising from their strong position in the bargaining process to consumers (e.g., Inderst and Wey (2007)). Yet, various supply chains' practices might help strong grocery retailers transfer excessive risk and excessive costs to their suppliers, thus adversely affecting investments and innovation throughout the entire supply chain (Competition Commission (2008)). This, in turn, might lead to a reduction in product variety, assortment, and quality. Notwithstanding high concentration, retail competition still seems to be quite effective partially due to the increasing competitive pressure exerted by aggressive discounters, including Aldi, Lidl, and Netto.

For these reasons, mergers in grocery markets tend to be scrutinized very carefully by antitrust authorities. While they might constitute a natural and legitimate mean to react to a rapidly changing competitive environment, at the same time they might be the main vehicle for food retailers to increase market power in already highly concentrated regional markets. Mergers and merger control in grocery markets are been a pervasive phenomenon in European countries since

[1] See http://bit.ly/1tNbFQu.

[2] An extensive analysis of UK grocery markets can be found here: http://bit.ly/1YB39D5.

[3] An overview of the work of the Bundeskartellamt on grocery markets can be found here: http://bit.ly/1SlXG3e.

the 1990s. Therefore, it is crucial to understand the effects of mergers between supermarket chains and whether intervention by antitrust authorities is needed, correct, and effective.

This paper analyzes the effects of a merger between two major supermarket chains, C1000 and Jumbo, that was conditionally approved by the Dutch competition authority – Autoriteit Consument & Markt (ACM) – in 2012. Following the existing literature on retrospective merger evaluations (e.g., Ashenfelter, Hosken, and Weinberg (2014) and Ormosi, Mariuzzo, and Richard (2015) for overviews), we start by studying the effect of the merger on prices. Yet, non-price strategies, such as the choice of assortment and product positioning, play a key competitive role in the retailing sector (e.g., Draganska, Mazzeo, and Seim (2009)). Despite the potentially relevant welfare implications of non-price effects of retail mergers, there are no studies considering the effect of mergers on variety among the few empirical studies analyzing the consequences of mergers in the retailing sector (e.g., Aguzzoni, Argentesi, Ciari, Duso, and Tognoni (2016); Allain, Chambolle, Turolla, and Villas-Boas (2016); Barros, Brito, and de Lucena (2006); Hanner, Hosken, Olson, and Smith (2015), Ashenfelter, Hosken, and Weinberg (2015)). Hence, the analysis of the merger's effect on variety is the main contribution we offer in this paper.

We use a database provided by IRI, a firm specialized in collecting and analyzing data on retailing, that contains scanner data on weekly prices (computed as total turnover over volumes, net of promotional measures) for a sample of products sold in 171 stores located in different regions across the Netherlands, for the 2009-2013 period. Moreover, for each store we have information on the overall depth of assortment measured as the number of stock keeping units (SKUs) for 125 product categories for the 2010-2013 period, which allows us to assess the change in product offerings triggered by the merger. Since we not only have data on the merging parties' stores but also on stores of the two main rival chains, the market leader Albert Heijn and Coop, we are able to assess the effects of the merger on prices and variety both for the merged entity and for its competitors for each location in our sample.

Being able to estimate the rivals' reaction to the merger is relevant for two reasons. First, while the effects of mergers on rivals' prices is widely studied in the literature, the effects on rivals' price *and* variety is not yet analyzed. Methodologically, this is important as the study of rivals' reactions to a merger might substantially help to identify its competitive effect (e.g.,Deneckere and Davidson (1985) and Farrell and Shapiro (1990)). Second, from the point of view of policy implications, the assessment of how prices and variety changed after the merger for the merging parties and for their main competitors allows us to draw wider implications in terms of consumer surplus.

A final contribution of this paper is to analyze whether and how structural remedies – specifically, divestitures – imposed by the antitrust authority in 18 regional markets were effective in alleviating the potentially anticompetitive effect of the merger. Our results suggest that the merger did not have any effect on prices, neither for the merging parties nor for competitors.

However, following the merger, the merged entity reduced the depth of its assortment, thereby reducing consumer choice. This effect is mainly driven by stores that were not re-branded, remaining open and operating under the C1000 insignia following the merger. This suggests that the merged entity, when operating under two different insignias, might want to reposition its product offerings in terms of depth of assortment. This finding is consistent with predictions from the theoretical literature. For instance, Gandhi, Froeb, Tschantz, and Werden (2008) find that to avoid cannibalization merging parties move away from each other in the product space.

The negative effect of the merger on variety is partially outweighed by an opposite effect on rivals' assortment choice, which tended to increase after the merger. However, in areas where the market is very concentrated, the effect on variety is unambiguously negative, as both the merging parties and their competitors reduce the range of assortment after the merger.

We finally corroborate these findings by also testing econometrically if the issuance of the divestitures alleviated the negative effects on variety. The results obtained suggest that the divestiture only partially outweighed the reduction in variety caused by the mergers and that the ACM probably should have required a greater number or more intense divestitures.

Our paper relates to several strands of literature. First, it contributes to the growing literature on *ex-post* merger evaluation and, in particular, to the relatively small number of papers analyzing the effect of mergers in retailing sectors.[4] Hosken, Olson, and Smith (2015) highlight the importance of looking at local competition in retail markets, as they find that price effects of mergers in the U.S. grocery retailing industry significantly depend on the degree of local concentration. Similarly, Allain, Chambolle, Turolla, and Villas-Boas (2016) find that grocery mergers in France significantly raised prices, especially in local markets experiencing larger increases in concentration. On the contrary, Chakraborty, Dobson, Seaton, and Waterson (2014) show that the 2004 Safeway/Moorrison merger in the U.K. lowered prices and led to a change in the form of price competition. More generally, Hanner, Hosken, Olson, and Smith (2015) assess instead the effect of retail mergers on entry in the U.S. and show that the relative position of brands change over time but these changes are rarely determined by entry or exit of new, large, firms. Market share dynamics among the incumbents are the driving force and small entrants only gain market shares in small markets.

Within this literature on mergers retrospective, we are not aware of any paper analyzing non-price effects. The only exception is Ashenfelter, Hosken, and Weinberg (2013), who analyze, in an extension of their main analysis, the effects of a merger between home appliance manufacturers on the length of their product line , although the focus of the paper is on price effects. Our empirical strategy, which exploits the local dimension of competition, seems to be particularly appropriate for analyzing non-price strategies such as assortment decisions, which are surely made at an even more local level than are price decisions. Very few papers study the effect of

[4] See Hosken and Tenn (2016) for a survey on retail mergers.

remedies in retrospective merger studies. Friberg and Romahn (2015) is an exception. They analyze the effects of divestitures in the Swedish beer market. Again they focus on a merger among manufacturers and its implications on price. On this issue, our contribution is, therefore, to consider a merger among retailers and focus on the effect of the divestitures on both prices and variety.

Another strand of literature related to our study analyses the effect of retail mergers by focusing on the issue of buyer power. This literature is mostly theoretical. Specifically, Dobson and Waterson (1997) analyse how increased buyer power resulting from mergers affects prices and welfare. Inderst and Shaffer (2007) instead focus on assortment decisions, showing that increased buyer power may lead to a single-sourcing purchasing strategy by the merging parties, which in turn induces upstream suppliers to reduce product differentiation. Hence, these vertical considerations might be important determinants of not only price but also assortment decisions by the merged firm. Although increased buyer power is often a concern in retail mergers[5], it does not seem to be a major concern in our case. Indeed, the two merging parties already had formed a buying alliance some years before the merger. The channel through which the merger leads to a reduction in variety is, thus, likely to be related more to product repositioning in local markets rather than to increased buyer power.

Finally, our paper is also related to the literature that studies the link between market concentration and product variety. In particular, both Gandhi, Froeb, Tschantz, and Werden (2008) and Mazzeo, Seim, and Varela (2014) study the issue of product repositioning after mergers and highlight the importance of considering effects on variety together with price effects. Yet, their theoretical predictions are not univocal and depend on the specific form of competition as well as consumers' preferences that they assume. The empirical evidence on this issue is also mixed. Most of the existing studies focus on very different industries from grocery retail.

While Berry and Waldfogel (2001) find that mergers increase variety in U.S. radio broadcast markets, Götz and Gugler (2006) find evidence of a reduction of variety after mergers in retail gasoline markets. Sweeting (2012) finds that mergers in the music radio industry do not affect aggregate variety, because changes affecting the merging parties and competitors offset. Finally, Watson (2009) finds mixed evidence of the effect of geographic differentiation on competition and variety in retail eyeglasses. Specifically, he empirically finds a non-monotonic relationship between the intensity of local competition, i.e., the closeness of the rival firms, and the firm's

[5]Recently, the German Federal Cartel office blocked the acquisition of Kaiser's Tengelman, a small but regionally strong German grocery chain, by the largest retail chain, EDEKA. One of the main concerns of the competition authority was that the merger would have significantly increased the strong bargaining power of the leading group of retailers in the procurement of branded products. Notwithstanding the decision of the Cartel Office, in a very controversial procedure, the merger was later allowed by the Economic Minister on the basis of its effects on employment.

product range. Our paper draws on this literature and looks at how several dimension of local competition, such as local market concentration and the strength of discounters, interact with the effect of the merger on price and variety.

The paper is structured as follows. In the next Section we provide some background information on the Dutch grocery market and on the merger under consideration. Section 3 describes the data. We present our empirical analysis in Section 4. Section 5 concludes.

2. The Dutch grocery sector and the merger

During the period between 2009 and 2012, several mergers took place in the Dutch grocery sector. The Dutch competition authority ACM cleared all of them, mostly subject to remedies. In this paper we focus on the last of these mergers, Jumbo's acquisition of C1000.[6] In the following subsections we first describe the functioning of the market as well as the issues related with the last merger.

2.1. The Dutch grocery markets

The main market players at the time of the mergers included the merging parties –Jumbo, C1000, Schuitema, and Super de Boer (SdB)– and several other supermarket chains. Jumbo is a full-service supermarket formula operating across the country. It had a regionally strong position concentrated in the southern regions of the Netherlands, which expanded considerably thanks to the acquisition of SdB and C1000. The most important characteristic of the Jumbo core marketing proposition is the 'every day low price' guarantee. Jumbo stores used to run few promotions. C1000 was also a full-service supermarket formula, which operated across the country. Its core strategy was reportedly focused on deep, short-lived, promotions (including products like beer). Its assortment was reportedly smaller than the other major national players.

Among competitors with a national footprint, Albert Heijn (AH) is the largest full-service supermarket chain and is perceived as the market leader. It operates across the country adopting various store formats. Its commercial offering is similar to Jumbo's offering, especially in terms of product variety. Moreover, it is the only other major chain of supermarkets operating across the whole Dutch territory. Two large hard discounters have an important presence in the Dutch market: Aldi and Lidl. During the first half of the 2010's, hard discounters have progressively increased their assortment, and started selling a (limited) list of branded goods. However, significant differences with traditional supermarket formulas still exist. Finally, the

[6] In a study we did for the ACM (Argentesi, Buccirossi, Cervone, Duso, and Marrazzo (2015)), we assess the price effects of all these mergers. Instead, in this paper, we only focus on the last merger, because it was the most relevant one concluding the acquisition process that started in 2009 and because the data on product assortment are only available for a limited period.

market is characterized by a series of other, smaller, regional players. For instance, Coop is a smaller player that attempted to implement a 'national formula' even though it operates fewer stores. A number of smaller and regional players also exist, including Detail Group, Spar (part of an international group with a stronger position in other countries), Hoogvliet, and Jan Linders.

[insert Figure 1 here]

Figure 1 represents the time evolution of the market shares of all supermarket chains and discounters (at the national level) both in terms of net sales floor area (left panel) and in terms of the number of stores (right panel). Albert Heijn is clearly the largest chain. The combination of SdB, C1000, and Jumbo has a net sales area similar to AH. There is a considerable number of stores belonging to chains other than the ones listed. Overall, the total number of supermarkets has remained almost constant from the beginning of 2009 through the end of 2011.

2.2. The merger between Jumbo and C1000

In our analysis, we study Jumbo's acquisition of over 400 Schuitema locations (the entire C1000 supermarket chain) that took place in February 2012. C1000 stores initially continued to operate under the C1000 sign, and expected to be re-branded under Jumbo own insignia brand during the years following the merger. At the end of our sample period, the re-labeling from C1000 to Jumbo was not yet fully completed. The Jumbo/C1000 merger approval was conditional on the divestiture of eighteen stores. Jumbo complied in July 2012 to this set of remedies by selling the eighteen locations – along with additional stores – to Coop and Ahold (owner of the Albert Hejin chain).

The geographic market definition adopted by the ACM was a 15-minutes isochrone around the analyzed stores. However, the ACM noted that Dutch consumers are not inclined to shop outside their neighborhood. Hence, in practice, the geographic market definition coincides with the administrative borders of each town. In our analyses, we adopt the definition put forward by the ACM and control for a number of explanatory variables measured at the municipal level to account for local demand and supply drivers as well as levels of competition.

With respect to the product dimension, the relevant product markets defined by the ACM include supermarket chains and hard discounters. In our study, we embrace the product market definition adopted by the ACM. However, we restrict our analysis to a particular format (i.e., regular supermarket), in order to maximize the similarity between the different stores analyzed and make our final sample more homogeneous. Moreover, given the increasing role covered by hard discounters (e.g., Lidl and Aldi) in the Dutch market in recent years, we explicitly control for their presence and strength in each relevant geographic market.

3. Data and Sample

For our empirical analysis, we collected store-level data for an appropriately selected sample of stores from IRI.[7] The period of analysis goes from January 2009 to December 2013 and the date of the merger is defined by the date of the ACM decision in February 2012.

The supermarkets included in our sample are selected from areas where the merging parties overlap and from comparable areas where they do not overlap. To define comparable areas, we pairwise match cities where the merging parties overlap with non-overlap cities by applying a propensity score matching approach, a technique that allows collapsing a set of different characteristics into a single dimension.[8] Within areas of overlap and areas of non-overlap, we select a suitable number of stores both from the merging parties and from competing chains. Our final selection includes over 171 different stores representing the merging parties' chains and two competitors (Albert Heijn and Coop).[9]

For this list of stores, we obtained data on a selection of specific products within several categories as well as information on the stores' full assortment, i.e., how many products were sold in each of the 125 product categories collected in the IRI database. Hence, we have two separate databases to study the merger's effect on price and variety that will be discussed in the next sections.

3.1. Price Data

Due to several constraints, we could not collect *price data* on all products sold in each store. Hence, we based our selection of categories and products on best practices from the academic literature and ideas originating from the 2014 inquiry in the food retail sector carried out from the German Cartel Office (Bundeskartellamt (2015)). The final list of categories includes coffee, cola, cleaners, diapers, fresh milk, traditional Dutch sausage (frikandel), mayonnaise, olive oil, sanitary napkins, shampoo, and toilet paper.

Our selection of these categories is based on the following criteria: i) the inclusion of both 'food' and 'non-food' items; ii) the inclusion of items belonging to the basket of goods typically consumed in the Netherlands; iii) the inclusion of items whose characteristics set them apart

[7] Information Resources Inc., see http://www.iriworldwide.nl/.

[8] We assess the level of similarity taking into account a full range of observable factors that could vary across overlap and non-overlap areas such as demand and supply characteristics (for a similar approach see Aguzzoni, Argentesi, Ciari, Duso, and Tognoni (2016)). Specifically, we use the average density population, average store size, HHI, number of stores, average income, stores' rental cost, and the presence of hard discounters. Moreover, our selection also accounts for a widespread geographic coverage of the Dutch territory and a balanced representation of all merging parties and of the subset of selected competitors. Further details on the propensity score matching procedure used in the analysis are reported in Appendix A.

[9] A description of the criteria for choosing the stores in our sample can be found in Appendix A.0.1

from other items, either because we expect lower price sensitivity or due to higher level of differentiation and innovation (e.g., diapers are an especially interesting product, as they are relatively high-tech, differentiated and pricey); and iv) the inclusion of more traditional items for which comparisons across geographic markets are easier.

To choose the products within the category, it is important that they are comparable both over time and across stores.[10] Dutch supermarket assortments usually include at least one A-brand item, such as 'Coca-cola', one private label, and one first-price (i.e., cheapest) item for each product. We exclude first-price items from our sample, as they may significantly differ in quality according to the data provider. Similar problems hold for fresh articles, which we also exclude. Hence, for each product defined at SKU level, we have three time series: Two SKUs for 'A-brands' and one SKU for private labels. We try to ensure comparability across stores such as same quality and format (e.g., 'fresh whole milk, 1 liter bottle') as well as comparability over time (e.g., not mixing different SKU over time unless necessary to ensure a sufficient coverage of the period under scrutiny).[11]

Our database includes total turnover (in EUR), volume (sales), promotional turnover (in EUR) and promotional share (as a percentage of total sales) measured at store level for the 2009-2013 period. Measurements are weekly and are provided with a four-week periodicity starting with week 4 of 2009. Hence, our price data is determined as total turnover over volumes, and is net of promotional measures.

3.2. Variety Data

In order to analyze the effect of the merger on product variety, we also collected quarterly data on the number of SKUs for each of the 125 product categories sold in each store form 2010 through 2013. This variable represents the depth of assortment and measures the product offerings available to consumers in each of the 171 stores in our sample.

Table 1 reports preliminary statistics on the dependent variables of our empirical analysis: prices and variety. Because we have very different products in our samples, the price variation is large, ranging between few cents and 40 EUR: some products are quite cheap, while other very expensive. As expected, private label products are, on average, much (38%) cheaper than A brand products. The average number of SKUs per category is very large (93.6) as it is the

[10] In the price analysis, we focus on a balanced sample of products that were sold throughout the entire sample period. This allows us to use SKU-specific fixed effects that significantly enhance the quality of our specification. The potential shortcoming of this choice is that the merger could have an effect on the composition of products and, consequently, an average price or, better, income effect for the consumers. This is what we try to evaluate when studying the merger's effect on assortment.

[11] The list of selected SKUs for the price analysis is reported in Appendix B.

variation across categories, stores, and time. Some categories are not offered at all in some stores in a given quarter, while other categories have up to 1,689 different SKUs (for instance sauces).

[insert Table 1 here]

3.3. Control variables

To identify the appropriate control areas as well as to cleanly disentangle the effect of the merger on prices and variety from the effect of the market conditions, we collect data on demand and supply shifters in order to control for them in our analysis. These data was collected from two main sources: the Central Bureau of Statistics – Statistics Netherlands (http://www.cbs.nl/en-GB/menu/home/default.htm) and the department of Spatial Economics & Spatial Information laboratory of VU University Amsterdam. Table 2 summarizes our data on local demand and market conditions. Data have different time references, as reported in the table.

[insert Table 2 here]

4. Empirical analysis

The aim of the study is to analyze the impact of the merger on prices and variety. We implement a difference-in-difference (DiD) approach, in which we exploit both time and cross-sectional variation of prices and product variety to identify the effect of the merger. The DiD approach entails a comparison of two properly identified groups: the treated group –which has been affected by the 'treatment', i.e., the merger– and the control group –which has not been affected by the 'treatment'– before and after the merger decision. The double differencing removes the time invariant effects of each group (treatment and control) as well as the common time effects that might be otherwise confounded with the effect of the merger. The strength of this method is that it isolates the effect of the merger from any other factors that (i) may affect the trend in price (variety); and (ii) may be related to the differences between the treated and the control group.

The basic idea of our empirical strategy is that retail competition in grocery markets works at the local level. The competitive effects of a merger are expected to be potentially stronger in areas characterized by an overlap between the merging parties – i.e., areas where stores of both insignias were present at the time of the merger – than in areas where the parties did not compete with each other. The former areas, in fact, would be the ones experiencing stronger changes in competitive conditions as a decrease in the number of competitors occurs. Therefore, we can attempt to identify the potential effect of mergers by comparing prices and variety of assortment of the merging parties in areas of overlap vis-a-vis areas of no overlap.[12]

[12]This identification strategy is very similar to the one used in, for instance, Aguzzoni, Argentesi, Ciari, Duso,

4.1. Local or National Competition?

The choice of the most appropriate counterfactual to evaluate the effects of a merger strictly depends on the geographic extent of competition. A comparison between the price – or other variables of interest– in areas where the merging parties overlap (i.e. areas affected by the merger) vis-à-vis areas of no overlap (i.e. not affected by the merger) identifies the effect of the merger only if competition is, at least to some extent, local.

In general, retail chains may have national or local pricing strategies and retail offers.[13] Since this issue was not fully explored during the review of the Jumbo/C1000 merger, in the study we conducted for the ACM (Argentesi, Buccirossi, Cervone, Duso, and Marrazzo (2015)), we carry out a more in depth assessment, examining both qualitative evidence –such as questionnaires to market participants and evidence collected during phone interviews– and quantitative evidence on the variation of retail offers across stores.

With respect to pricing strategies, both the questionnaires and the interviews support the view that prices are generally set at national level. In addition, the majority of respondents reported that promotional measures, which affect final prices to consumers, are also generally set at the central level and, in any case, almost never at store level. However, the interviews also indicated a consensus that Jumbo allows for greater degree of autonomy in price setting at store level than other chains. Therefore, we complement the qualitative evidence with an analysis of the geographic extent of price variability.

First, we graphically analyze the price distribution for different supermarket chains of each SKUs at different points in time by means of boxplots. Second, we compute, for each SKU and each month, the standard deviation of price from SKU's average price of that month. We then divide the price standard deviation of each SKU by the average price of that SKU in order to obtain a measure of the price dispersion (the coefficient of variation) which is independent of the price level. These analyses are shown in Appendix C. Although price variation appears to be limited (both by looking at boxplots and by a close examination of the cumulative distribution function of the coefficient of variation), figures show that some variability exists. Therefore, given the existence of some variation, local competition cannot be ruled out.

As for variety, in the majority of the cases, questionnaires report that, although the overall range of assortment is generally set at central level, individual stores are allowed a substantial degree of autonomy in their individual assortment decisions. Indeed, it is reasonable to assume that the stores belonging to each chain adapt their own assortment to the local conditions of

and Tognoni (2016) to evaluate the price effect of a merger between U.K. book retailers and Hosken, Olson, and Smith (2015) to study the effect of U.S. grocery mergers on prices.

[13] Dobson and Waterson (2005) analyze the relative profitability of uniform and local pricing. A joint report by the UK Competition Commission and the Office of Fair Trading (Competition Commission and Office of Fair Trading (2011)) stresses the relevance of this issue in retail mergers.

supply (e.g., competitive pressure coming from the other local players), demand (e.g., distribution of consumer preferences), and individual constraints (e.g., size of the stores, shelf space, etc.). For this reason, it is quite safe to assume that decisions on product assortment are set locally.

4.2. Main Empirical Approach

We run our analysis for the full sample, including the merging firms and competitors, as well as separately for the merging parties and the competitors. The estimation on the full sample aim at measuring the overall effect of the merger at the market level, which is possibly what is more relevant for consumers. While the estimations on the sub-samples aim at identifying the strategic reactions of the different players in the market.

In our main specification, we compare the change in an outcome variable in a selection of stores that were located in overlap areas with the change in the same outcome variable before and after the merger in other stores picked from the best-matched non-overlap areas.[14] Note that the matching procedure is made store by store and separately for the merging parties and the competitors. For instance, for each merging party store in overlap areas, we find the store for the same parties that best matches from non-overlap areas. We estimate the following equation:

$$Out_{ist} = \alpha + \beta overlap_s + \gamma post_t + \delta post_t \times overlap_s + \lambda Z_{st} + \mu_{is} + \tau_t + \varepsilon_{ist}, \qquad (1)$$

where Out_{ist} is the price (variety) level for product (products' category) i at store s during month (quarter) t; $overlap_s$ is a dummy variable that takes on the value of one if the store is located in an overlap area; $post_t$ is a dummy variable that takes on the value of one if the products' price (variety) is observed in the post-merger period (i.e. after February 2012 for the price regression and after the first quarter of 2012 for the variety regression); Z_{st} is a set of variables that control for local market features (on the demand and supply side) that change over time.

We control for the average difference in the price and product assortment across different product categories and supermarket chains by including fixed effects μ_{is} for all combinations of categories and supermarket insignias. By following this approach, we are able to control for the effect on price and variety determined by the change in insignia.[15] Moreover a time trend together with a set of quarterly dummies τ_t is meant to capture aggregate uncertainty.[16]

[14] As an additional robustness check, we also run a specification where we use the competitors as a control group for the merging parties (e.g., Ashenfelter, Hosken, and Weinberg (2013)). These additional regressions should especially help in identifying the effect of the merger if pricing decisions are mostly national (see Aguzzoni, Argentesi, Ciari, Duso, and Tognoni (2016)).

[15] When using the product(or category)-insignia fixed effects, the coefficient for the variable $overlap_s$ is not identified as the variable is collinear to the fixed effects.

[16] We also tried a specification with time fixed effects and obtained similar results.

The error term ε_{ist} is assumed to be heteroskedastic and correlated at the product-insignia level in the price analysis and products' category-insignia levels in the variety analysis.[17]

The main variable of interest is $post_t \times overlap_s$, whose coefficient measures the average treatment effect of the merger on product variety by identifying the additional variation in price or variety experienced by the treated stores compared to the control stores moving from the pre-merger to the post-merger period.

To effectively implement the DiD approach, we need to ensure that the difference in the average behavior in the control group adequately represents the counterfactual difference in the average behavior that would have occurred absent the treatment. In practice, we have to properly identify treatment and control groups taking into account the specificities of the market. In the discussion of the empirical results in the next sessions, we will show whether our aforementioned matching approach was able to ensure this common-trend assumption.

An additional important element for the definition of the identification strategy is that three mergers have affected the Dutch market over four years (2009-2012). In order to isolate the effect of the last merger, we had to restrict the choice of the areas and, consequently, of the stores in such a way that the average behavior of the treated and control group could not be biased by the occurrence of the other mergers.

4.3. The Merger Effects on Prices

To start our empirical exercise, we first look at some descriptive trends. Figure 2 shows the average price trend for stores in the overlap and non-overlap areas for a subset of products in the analyzed categories. We do not differentiate between the merging parties and the competitors.

[insert Figure 2 here]

The average price evolution faced by consumers in the treatment and control areas are quite similar and, more importantly, are subject to a same common trend during the pre-treatment period. This is a key assumption for the identification of the average treatment effect through the DID approach that is met in our sample.[18] Moreover, the graphs offer a preliminary glimpse of the result of our econometric analysis: prices in the treated and control stores seem to mostly maintain the same trend and level throughout the period of the analysis. If the merger had any negative impact on prices, we would have expected the distance between the two price trends to increase in the post-merger period.

To confirm the result of this graphical analysis, we perform several regressions using the aforementioned DiD methodology. We report the results of the main specifications for the price

[17] We experimented with different correlation structures but our results were not strongly affected.

[18] To support this finding, we also estimate a regression where we verify whether the time trends differ between treated and non-treated areas. We do not find any significant difference.

analysis in table 3. First, prices in the full sample and, especially, for the merging firms seem to have significantly decreased in the post-merger period for both treated and control stores - the coefficients' estimate for the variable 'post' are negative and significant in the first two specifications. However, and more interestingly for this study, our regressions show that the price change post-merger is not different between stores located in the overlap areas compared to stores located in the non-overlap areas ('Overlap × Post'), i.e., the merger did not have any significant effect on prices. The average result estimated in the full sample (column 1) holds both for the merging parties' (column 2) and for the competitors' prices (column 3), suggesting that the merger did not have any significant effect on this dimension of competition.

[insert Table 3 here]

Among the various controls, the most interesting one is probably the variable measuring the discounters' market shares, which captures the competitive pressure coming from the hard-discounters (in particular Aldi and Lidl). The coefficient's estimate is positive and significant, thereby indicating that in the cities where the market share of the discounters is higher, the average price charged by the merging stores is higher. The result we obtain might at first seem counterintuitive: we would expect that the presence of hard discounters intensifies the competitive conditions in a city, driving prices down. However, a possible explanation relies on product differentiation. In those areas where competition from hard-discounters is strong, premium supermarkets differentiate themselves by focusing on the high-priced products.

The results of Table 3 are robust to several checks (see table 10 in Appendix D). First, since we do not know exactly when the two merging parties became one single entity and because the competitive conditions could have started changing with the notification of the acquisition, we also run specifications where we exclude windows of 3 and 6 months around the merger date from our dataset. Results do not change, independent of whether we look at the full sample, merging parties, or competitors.

Second, we evaluate whether the merger had a different impact for those stores located in areas with high concentration (HHI above 4,000) (first three columns of table 11 in Appendix D). We do not find any significant effect in aggregate, neither for merging parties nor competitors.

Third, we evaluate if the requirement of a divestiture influences the effect of the merger. For this purpose, we include in our model a dummy that takes the value one if the store is located in an area where the merging parties divested one (or more) store(s). We then interact the variable 'Overlap × Post' with the variable 'Divestiture' to explore if the merger had a different effect in the areas where a divestiture was required (columns (4)-(6) of table 11). Again, we do not find any significant effect.

Fourth, we evaluate whether the merger had a different impact on the prices of those stores

that did not experience a re-branding from C1000 to Jumbo. Even in this case, we do not find any significant effect (last three columns of table 11).

Finally, in the case when stores adopt a national pricing policy, it might still be possible that the merger caused an increase in price throughout the Netherlands,. Hence, we perform an additional analysis where we use the competitors to the merging parties as a control group.[19] The underlying assumption, based on economic theory, is that if the merging parties increase their prices after the merger, competitors will increase their prices too, but less than the merging parties (e.g., Deneckere and Davidson (1985)). In this case we do not find evidence that the merging parties increased their prices more than their competitors.

4.4. The Merger Effects on Variety

The previous analysis suggests that the merger did not have any significant effects on prices. This makes the analysis of the effects on non-price dimensions even more valuable. Along these dimensions, decisions about product assortments and variety offered are key strategic choices in retailing markets. Indeed, according to the questionnaires and the interviews that we performed, supermarket stores have a great degree of freedom with respect to product variety and can mostly determine their preferred assortment.[20] Therefore, we believe that the analysis looking at the merger's impact on variety across areas might be particularly informative, as this seems to be one of the key strategic decisions at the local level.

For some selected product categories, figure 3 compares the evolution of the total number of SKUs per store – our measure of variety – in the overlap areas to the average level of product variety in non-overlap areas.[21] Again, we do not differentiate among stores from the merging parties and competitors to obtain the aggregate picture at the market level, which is possibly the one most relevant for consumers. Also in this case, the figures show quite similar trends before the merger.[22] However, almost all series seem to diverge post-merger.

[19] Results are available in Argentesi, Buccirossi, Cervone, Duso, and Marrazzo (2015).

[20] See Argentesi, Buccirossi, Cervone, Duso, and Marrazzo (2015), chapter VI.

[21] The sample for this analysis is not exactly identical as the one used for price analysis due to data quality issues that forced us to drop a number of observations. Note that we undertook a separate matching procedure to identify overlap and non-overlap areas for the analysis on variety, since the relevant variable for this analysis is different from the one relevant for the price analysis

[22] Also in this case, we estimate a regression where we verify whether the time trends differ between treated and non-treated areas. Although the coefficient measuring this difference is on average positive and statistically significant, it is also very close to zero (0.03). According to the regression analysis, there is a negligible discrepancy between the trend in average depth of assortment in the treated and control stores. Considering that the average level of variety in the pre-merger period across all the stores is equal to 90 SKUs per category, the discrepancy would amount to less than one SKU (0.03% in relative terms). Therefore, we can assume that the treated and control stores have a similar trend in variety over the pre-merger period and the stores in the non-overlapping areas are an adequate control group. See the appendix for details.

[insert Figure 3 here]

The depth of assortment in the treated stores of the merging parties is sometimes lower and sometimes higher than the level of product variety in the control stores, depending on the category. Yet, the level of variety is regularly lower in the treated stores than in the control stores in the period after the merger and the distance between the two trends increases after the merger date, which is indicated by the vertical line at the first quarter of 2012. This anticipates the results of the econometric analysis: the merger seems to have had a negative impact on the level of product variety at the market level.

We then perform a more formal econometric analysis to gain a precise estimate of these effects and to understand where the post-merger decrease in product variety originates. According to our results (column 1 of Table 4), the merger negatively affected the average level of the product variety at the market level. This result is driven by the merger effect on the merging parties' product variety, which significantly decreased in overlap areas if compared to the control regions (column 2). Considering that the average variety level in the control stores in the post-merger period (counterfactual level) is equal to 88 SKUs per category and the coefficient for the treatment effect is -4.188, the merger caused a reduction in variety by 4.7%. The estimated effect of the merger on competitors' variety (column 3) seems instead to go in the opposite direction. In particular, competitors increase their assortment in overlap areas, where the merger is supposed to have produced a stronger effect. Note, however, that the magnitude of the effect on competitors is much smaller than the first-order effect on the merging parties, which explains our average negative effect at the market level.

Similarly as for the price regressions, we run alternative specifications to check the robustness of our results (Table 12 in the Appendix D). Specifically, we drop three and six months of data from around the merger date, respectively. Results do not change and we still find significant – and even stronger – effects on variety. The assortment of the merging parties is significantly reduced by the merger, while competitors significantly increase their variety.

4.5. Heterogeneous Treatment Effects

In order to explore further the drivers of the previous results, we estimate a set of heterogeneous treatment effects. We show the results of such additional regressions for the full sample, as well as the merging parties and their competitors, in tables 5.

First, we investigate whether the effect of the merger varies across areas depending on the level of post-merger concentration (column 1 to 3 in table 5). We find the effect on variety is particularly severe in areas where concentration is high (Herfindal-Hirschmann-Index – HHI – higher than 4,000). Interestingly, this is not only true for the merging parties but also for their competitors. This result suggests that in particularly problematic areas, consumers were strongly

and negatively affected by the merger: all players in the market reduced their assortment as a consequence of the merger.

[insert Table 5 here]

Second, we explore the impact of divestitures on the variety effect (column 3 to 6 in table 5). We still estimate a significant negative effect in overlap areas without divestitures during the post-merger period, both for the full sample and the merging parties. Moreover, we still find a positive effect for the competitors. However, now the interaction of the 'Overlap × Post' dummy the with a dummy measuring whether a divestiture took place is positive and significant in the full sample and for the merging parties, and negative and significant for the competitors. In the full sample and for the merging parties these two positive effects are, however, not large enough to compensate for the negative coefficient estimate of the DiD variable. Hence, the overall effect of the merger in areas affected by the remedies is still negative and significant, although much smaller than in other treated areas where no divestiture was required. This indicates that that the divestitures were effective: they modified the competitive conditions in the post-merger period in the areas where they were required.

Finally, we assess whether the effect on variety is related to re-branding of stores from C1000 to Jumbo. We, therefore, interact the treatment variable with a dummy that is equal to 1 for stores that were not re-branded (column 7 to 9 of Table 5).[23] The negative effect of the merger on variety of the merging parties is mainly driven by stores that keep on operating under the C1000 insignia after the merger. Instead, the merger does not have any significant effect on the variety of merging parties' stores that either operate as Jumbo or are re-labeled as Jumbo (the 'DiD' coefficient). This evidence suggests that, in areas where the merged entity operates two stores with different insignias, it repositions product assortments in order to avoid cannibalization, consistent with the theoretical findings in Gandhi, Froeb, Tschantz, and Werden (2008).

To understand whether this is just a transitory effect, we also estimated this effect considering different lengths of the post-merger period [24]. Our findings suggest that C1000's variety decreases over time as a consequence of the merger, in line with the idea that this product repositioning takes some time to be fully realized.

This result does not necessarily imply that operating stores under two different insignias is a long-run decision of the merged entity, as we have no information on what happens to these stores after 2013. Our evidence just suggests that, for the stores that were not re-branded (33 out of 49 C1000 stores in our sample), the depth of assortment decreased as a result of the merger.

[23] For the competitors, we define the no 're-branding' dummy at the market level. Hence, this variable is equal to one for those areas where the C1000 was not re-branded. Moreover, since we did not have any observations for Coop stores in area with no-rebranding, the results are only driven by AH's behavior.

[24] These results can be obtained upon request

Finally, also consistent with the repositioning story, we observe that the main competitor, Albert Heijn, strongly reacted to the merging parties repositioning by increasing its variety in areas where the not re-branded C1000 stores strongly decrease their assortment. Again, however, we also find that the latter effect is not sufficient to balance the average negative effect on variety (column 7).

4.5.1. Category level analysis

The results presented so far, even the heterogenous treatment effects, represent average effects across all 125 categories in our sample. While we think that this is the right approach, as we want to measure the average effect for a consumer who buys a basket of goods potentially including products from all categories, it is interesting to understand which categories are driving this average result.

In an additional robustness check, we therefore re-run our previous regression at the category level for the merging parties.[25] Reassuringly, 112 out of 125 coefficients' estimate of the average treatment effect are negative.[26]. Among these estimates, 37 are significant.[27] Among the categories for which we find significant negative effects, we have both food and non-food products. This means that the average effect discussed in the previous sections captures the main tendency of the merger on merging firms' overall assortment decisions.

5. Conclusions

The empirical evidence presented in this paper shows that in industries where non-price dimensions of competition are key – such as the retail sector – the analysis of mergers proves to be a complex exercise. The analysis of these additional important variables, such as product variety, may reveal effects that go beyond the effect on prices, which are generally taken into account in antitrust decisions as well as in the literature on merger retrospectives. This is the major contribution offered in this paper.

We analyzed a major merger between the Dutch grocery retailers Jumbo and C1000, the last of a series of mergers that reshaped the industry between 2008 and 2012. We do not find significant price effects. Yet, we show that the merger caused a significant decrease in the average depth of assortment at the market level, especially by reducing the product variety by the merging stores

[25] For the sake of space, we do not report the results of these 125 regressions but they are available upon request.

[26] Only for one category – chilled rice and pasta– we estimate a positive but tiny (0.755) and significant effect of the merger

[27] Note that by running our model at the category level, we essentially compare the evolution of one time series across the 50 overlap areas to the 37 non-overlap areas for which we have data on the merging parties's assortment (see table 8 in appendix A. Hence, the fact that several coefficients are not significant is simply due to the limited power of our regression.

located in the overlapping areas. Indeed, the increase in product assortment of competitors, is not enough to compensate for the negative effect for the merging parties. We also find that this negative effect on assortment is particularly strong in areas where concentration is high. In these areas, even the competitors reduced their product variety. The reduction in product assortment limits consumers' choice and may ultimately harm them. As a result, it is plausible that a reduction in the depth of assortment reduces consumers' surplus and, consequently, the merger negatively affect consumers' welfare.

A different conclusion could only be drawn if the degree of variety offered by the merging stores in the pre-merger period was excessive. In principle, if we consider a total welfare standard the optimal depth of assortment might not always coincide with the largest number of items per category as this would entail costs that may be excessive.[28] The merging stores might have decided to withdraw duplicates items and invest in innovative and higher quality brands or private label.

Unfortunately, we do not have enough information to assess if the degree of variety was excessive before the merger or to understand how a change in the assortment could have affected total welfare nor which exact products were added or withdrawn as a consequence of the merger. However, the price analysis adds some insights. It shows that the merger had no impact on the prices charged by the merging stores in overlap areas. Therefore, even if the assortment adjustment promoted economies of scale and scope, synergies in marketing, IT, over- head and logistics, the related cost-savings might not have been passed on to consumers (i.e. prices did not decrease in the post-merger period). Hence, our comprehensive assessment of the effect of the merger reveals that the merger may have harmed consumers' welfare through a reduction in product variety, that was not compensated or exacerbated by a change in prices. The issuance of divestitures may have partially outweighed the negative effect of the merger: the analysis on divestitures shows indeed that, in the areas where divestitures were required, the average level of variety decreases less than in similar control areas (where none of the merging stores were divested). To conclude, if we consider the effect of the merger both on prices and on variety, it appears that the ACM correctly identified areas with potential competitive concerns and the divestitures have effectively removed the anticompetitive effect of the merger (i.e. the reduction of variety) in those areas. However, it appears that additional divestitures would have been necessary to remove completely the adverse effect of the merger on depth of assortment.

[28] While deeper retail assortment is mostly liked by costumers, it might also increase the time and effort consumers must exert when selecting an item from a category. Hence, consumers with low shopping costs might prefer larger assortment, whereas consumers with high shopping costs, might prefer instead a smaller assortment (Fox and Sethuraman (2006)).

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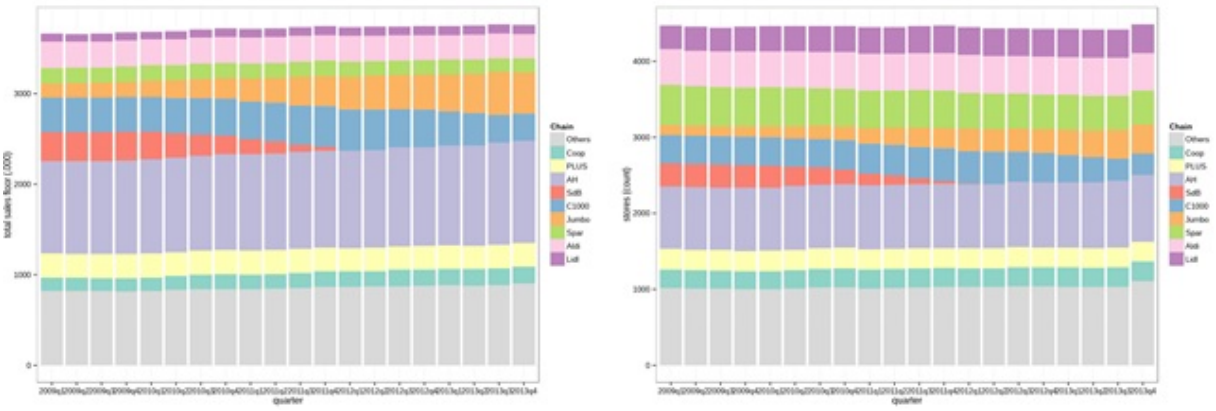
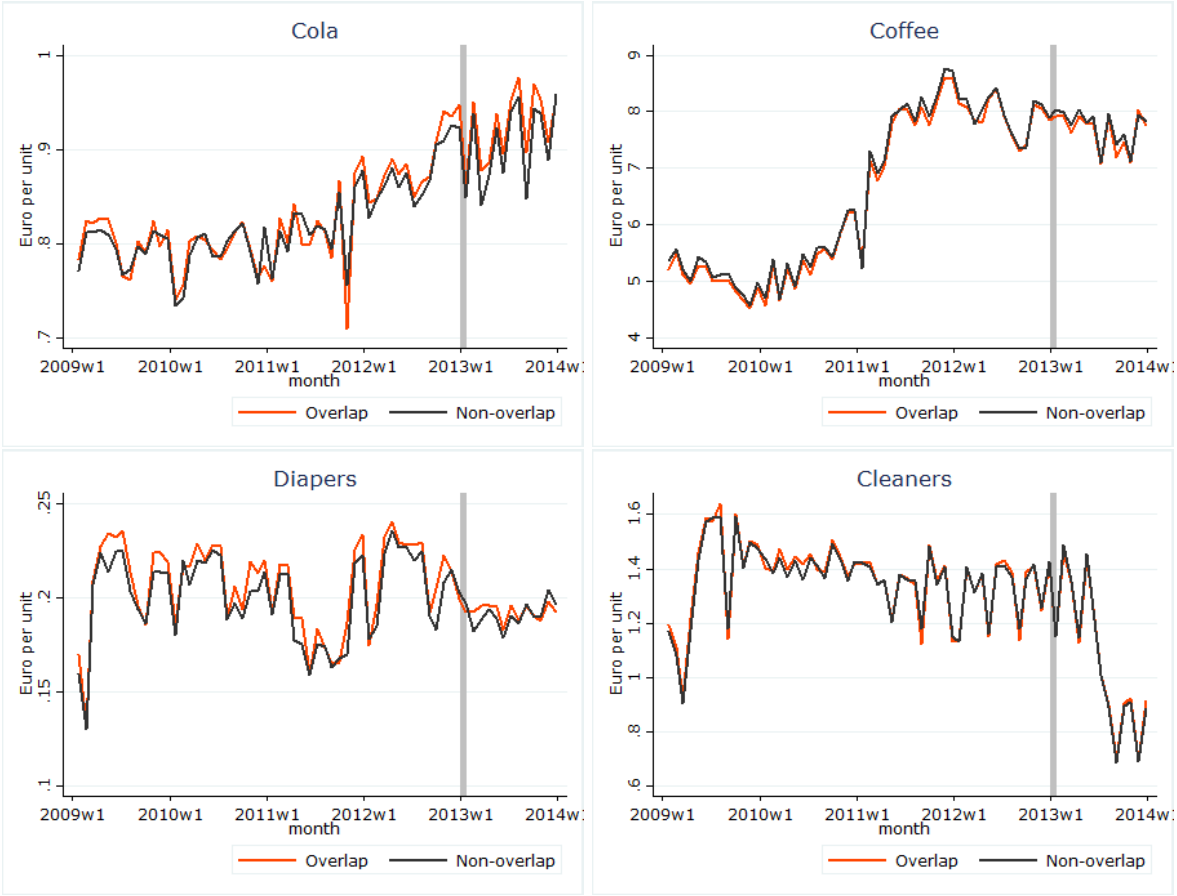
6. Figures and Tables

Figure 1: Stores' market position (national level) over time: net sales floor area (left) and number of stores (right)



Source: Our elaboration on Supermarket Gids data.

Figure 2: Comparison between average price trends in treated and control areas



Source: Our elaboration on IRI data.

Figure 3: Comparison between average price trends in treated and control areas

Source: Our elaboration on IRI data.

Table 1: Preliminary Statistics - Dependent variables

	Mean	St. Dev.	Min	Max
Price	2.52	3.18	0.03	40
Price A brand	2.86	3.5	0.03	40
Price Private label	1.79	2.17	0.05	10.5
Variety	93.5	109.96	0	1,689

Table 2: Description of the Control Variables

Control variables	Description	Time reference	Source
Local market features: demand side			
Population	Number of inhabitants per City	yearly	CBS - NL[1]
Population density	Average number of inhabitants per square kilometer per City	yearly	CBS - NL
Households with children	Percentage of households with children (unmarried couples with children, spouses, couples with children and single-parent households) per city	yearly	CBS - NL
Income	Weighted average of income per capita per city (weights equal to number of income recipients per city)	yearly	CBS - NL
Local market features: supply side			
Rental price	average value of residential real estate	yearly	VU University Amsterdam[2]
HHI	Hirschman-Herfindall Index per city (stores market shares are proxied by the net sales floor)	quarterly	Supermarket Gids
Number of stores	Number of stores per city	quarterly	Supermarket Gids
Net sales floor	average net sales floor of all the stores in the City	quarterly	Supermarket Gids
Aldi	Average net sales floor of all the Aldi stores in the city	quarterly	Supermarket Gids
Lidl	Average net sales floor of all the Lidl stores in the city	quarterly	Supermarket Gids
Discounter market shares	sum of the market shares of Lidl and Aldi stores (computed on the basis of the storeŠs net sales floor) in the city	quarterly	Supermarket Gids

[1] Central Bureau Statistics – Statistics Netherlands (http://www.cbs.nl/en-GB/menu/home/default.htm)
[2] Department of Spatial Economics & Spatial Information laboratory, VU University Amsterdam

Table 3: Average Treatment Effect - Price

	Full sample	Merging parties	Competitors
	(1)	(2)	(3)
Post	-0.100***	-0.0934***	-0.0617
	(0.017)	(0.020)	(0.089)
Overlap × post	0.00379	0.00536	0.0827
	(0.028)	(0.033)	(0.112)
Population	-0.00008	-0.0000007	0.0038
	(0.000)	(0.000)	(0.008)
Average income	0.00816*	0.00152	0.116
	(0.004)	(0.002)	(0.096)
Discounters market shares	0.106*	0.0804**	-0.381
	(0.043)	(0.028)	(1.362)
HHI	0.00038	0.00037	-0.00146
	(0.000)	(0.000)	(0.013)
Net Sales Floor	0.000007	0.000003	-0.00008
	(0.000)	(0.000)	(0.000)
House Value	-0.00007	0.00007	-0.00086
	(0.000)	(0.000)	(0.002)
Constant	-5.255***	-4.831***	-0.448
	(0.486)	(0.545)	(2.132)
Observations	123,107	78,762	44,345
R^2	0.9392	0.9510	0.9471

Clustered-robust standard errors at the product-insignia level in parentheses. We control for fixed effect at the product-insignia level as well as a time trend and quarterly seasonal dummies. The symbols ***, **, * denote significance level at the 1%, 5%, and 10% significance level, respectively.

Table 4: Average Treatment Effect - Variety

	Full sample	Merging parties	Competitors
	(1)	(2)	(3)
Post merger	-2.338***	-2.710***	-1.065
	(0.556)	(0.608)	(0.726)
Overlap × post	-3.067***	-4.148***	0.657*
	(0.364)	(0.492)	(0.286)
Population	-0.0762***	-0.0971***	-0.00274
	(0.011)	(0.015)	(0.017)
Average income	0.311**	-0.577***	2.027***
	(0.094)	(0.136)	(0.247)
Discounters market shares	-0.172	-6.735***	15.51***
	(1.227)	(1.807)	(2.832)
HHI	-0.0855***	-0.115***	-0.140***
	(0.011)	(0.015)	(0.038)
Net sales floor	0.00429***	0.00512***	0.00170***
	(0.000)	(0.001)	(0.000)
House value	0.0256***	0.0428***	-0.0122**
	(0.004)	(0.006)	(0.004)
Constant	58.26*	32.29	79.28**
	(22.891)	(24.217)	(25.927)
Observations	225,667	162,540	63,127
R^2	0.8809	0.8614	0.9427

Clustered-robust standard errors at the category-insignia level in parentheses. We control for fixed effect at the category-insignia level as well as a time trend and quarterly seasonal dummies. The symbols ***, **, * denote significance level at the 1%, 5%, and 10% significance level, respectively.

Table 5: Heterogenous Effects on Variety

	HHI			Divestiture			Re-branding		
	Full	Merging	Competit.	Full	Merging	Competit.	Full	Merging	Competit.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post	-2.060***	-2.336***	-1.297	-2.034***	-2.246***	-1.037	-2.423***	-2.615***	1.687*
	(0.533)	(0.576)	(0.769)	(0.541)	(0.591)	(0.718)	(0.558)	(0.606)	(0.875)
DiD	-2.193***	-2.938***	1.240***	-3.178***	-4.208***	1.131***	-1.163**	-0.611	-3.904***
	(0.333)	(0.446)	(0.295)	(0.383)	(0.491)	(0.257)	(0.347)	(0.426)	(0.531)
DiD × HHI > 4000	-2.567***	-3.009**	-6.991***						
	(0.672)	(0.894)	(1.589)						
Did × Divestiture				2.589***	2.346***	-7.140***			
				(0.740)	(0.669)	(2.042)			
DiD × No re-branding							-6.536***	-9.464***	17.97***
							(0.979)	(1.161)	(1.940)
Population	-0.0635***	-0.0741***	0.00195	-0.0846***	-0.104***	-0.0199	-0.0756***	-0.101***	2.09e-05
	(0.009)	(0.012)	(0.015)	(0.012)	(0.015)	(0.016)	(0.011)	(0.015)	(0.000)
Average income	0.307**	-0.524***	1.942***	0.224*	-0.746***	2.137***	0.300**	-0.502***	1.763***
	(0.091)	(0.127)	(0.242)	(0.090)	(0.143)	(0.252)	(0.092)	(0.134)	(0.231)
Net sales floor	0.00375***	0.00427***	0.00129***	0.00453***	0.00548***	0.00154***	0.00429***	0.00484***	0.00123***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
House value	0.0242***	0.0406***	-0.0168***	0.0272***	0.0463***	-0.0159***	0.0274***	0.0417***	-0.00753
	(0.004)	(0.005)	(0.005)	(0.004)	(0.006)	(0.004)	(0.004)	(0.005)	(0.006)
Discounters market shares	0.985	-3.907*	14.40***	-1.564	-8.602***	12.61***	0.132	-6.483***	19.98***
	(1.248)	(1.706)	(2.875)	(1.262)	(1.894)	(2.822)	(1.213)	(1.824)	(3.414)
HHI				-0.0955***	-0.127***	-0.147***	-0.0895***	-0.122***	-0.00120***
				(0.012)	(0.016)	(0.039)	(0.012)	(0.016)	(0.000)
HHI > 4000	-2.455***	-2.634***	0.133						
	(0.612)	(0.745)	(1.189)						
Divestiture				-10.26***	-11.28***	-5.151***			
				(1.033)	(1.108)	(0.969)			
No re-branding							-1.225**	3.461***	-4.494***
							(0.421)	(0.558)	(0.886)
Constant	55.45*	28.89	73.52**	43.55	13.33	76.01**	50.64*	23.20	146.0***
	(22.993)	(24.287)	(25.972)	(23.727)	(25.168)	(26.198)	(23.042)	(24.314)	(4.491)
Observations	225,667	162,540	63,127	225,667	162,540	63,127	225,667	162,540	53,202
R^2	0.8809	0.8613	0.9427	0.8812	0.8618	0.9429	0.8811	0.8617	0.9402

Clustered-robust standard errors at the category-insignia level in parentheses. The variable *Did* denotes *Overlap* × *post*. We control for fixed effect at the category-insignia level as well as a time trend and quarterly seasonal dummies. The symbols ***, **, * denote significance level at the 1%, 5%, and 10% significance level, respectively.

Appendices

A. Propensity Score Matching for Areas Selection and the Stores' choice

This appendix describes the methodology used to select our units of observation: the stores. The ACM provided us with historical location data on all supermarkets in the Netherlands, the 'Supermarkt gids' database, which lists geographic data (including addresses, zipcode, city, province) together with additional information (e.g., availability of parking or automatic counters). In 2013, the guide counts 6,641 stores. Our budget allowed selecting a total of 170 stores. As described in the paper, we compare the merging stores in the overlapping areas (treated stores) and the merging stores in the non-overlapping areas (control stores). To select appropriate stores for our analysis, we started by identifying the overlapping and not overlapping areas. There were 253 overlapping areas out of a total of 1,145 areas in the whole sample.

In order to identify the areas for the selection of 170 stores, we follow an approach based on the propensity score matching (PSM) methodology. PSM has been developed as a technique to correct for sample selection bias that may affect the estimation of the treatment effect in non-randomized experiments. In randomized experiments, the results in the treated and control groups may often be directly compared because the two samples are likely to be similar (the assignment to the treated and control 'status' is indeed random). In non-randomized experiments, the direct comparison between the treated and control units may be misleading because units exposed to the treatment systematically differ from the units not exposed to the treatment. Propensity score matching allows to group treated and control units according to their probability of receiving the treatment based on observable characteristics. The propensity score is defined as the conditional probability of receiving the treatment given a set of pre-treatment variables:

$$p(X) = Pr(D = 1|X)$$

The PSM technique allows for collapsing the multiple dimensions along which treated and control units might differ, to one single dimension: the propensity score. In the case under examination, the probability of receiving the treatment may coincide with the probability of being an overlapping area. We computed a propensity score for each area and grouped overlapping and not overlapping areas according to the similarity of their score. We estimate the probability of treatment running a logistic regression. The dependent variable is a discrete variable that takes value one if the area is overlapping and zero otherwise. The independent variables include

demand and supply factors that may influence the decision of a supermarket insignia to locate its stores in a given area.

We then group treated and control cities according their estimated scores. Treated and control units with exactly the same propensity score are rarely found. Instead, each treated unit is usually matched with its closest control, as indicated by the propensity score value. We had to allow for multiple uses of the same control city to maximize the number of treated cities included in our final sample (i.e., to prevent some treated cities from falling 'off support').[29]

Post matching, we then checked if treated and control areas are indeed similar in observable characteristics except for the treatment. We do that by testing the equality of means for the relevant explanatory variables and we conclude that the means across the treated and control areas are not statistically different (see Table 6).

[29] In some of the control matched cities, there were no merging stores. The empirical strategy underpinning the analysis across areas requires that at least one of the merging chains is present in the non-overlapping (control) cities. For this reason, we could not limit the match to the 'nearest neighbor', but had to extend the match to the third nearest neighbor.

Table 6: Equality of the means between treated and control areas

	Means			t-test	
	Treated	Control	%bias	t-test	p > t
Pscore	0.3906	0.3712	10.8	1.18	0.237
Average population density	13,580	11,830	8.4	0.78	0.434
Average store size	922.67	927.57	-1.6	-0.18	0.855
Average income	2,407.7	2,416.4	-2.8	-0.31	0.757
Number of stores (squared)	37.226	31.381	8.0	0.74	0.459
HHI	4,731.1	5,088.7	-11.7	-1.27	0.204
Average land price	142.34	147.41	-5.2	-0.52	0.604
HHI Discounters	1,757.2	1,776.9	-1.0	-0.11	0.916

Table 7 presents the list of areas obtained from the matching process and indicates those areas that, among the treated ones, were deemed problematic (i.e. where the merged entity had a combined market share above 50%). Moreover, we highlight in which of the former areas a divestiture was issued.

Table 7: List of matched areas

City	Province	Treated	Overlap MS>50%	Overlap MS<50%
'S-HEERENBERG	Gelderland	Treated	0	1
DEN BURG	Noord-Holland	Untreated	0	0
DEN HAM OV	Overijssel	Treated	1	0
TERSCHELLING FORMERUM	Friesland	Untreated	0	0
BARNEVELD	Gelderland	Treated	0	1
ASSENDELFT	Noord-Holland	Untreated	0	0
BEMMEL	Gelderland	Treated	0	1
BEST	Noord-Brabant	Untreated	0	0
BODEGRAVEN	Zuid-Holland	Treated	0	1
OOSTERBEEK	Gelderland	Untreated	0	0
CAPELLE AAN DEN IJSSEL	Zuid-Holland	Treated	0	1
LISSE	Zuid-Holland	Untreated	0	0
DE MEERN	Utrecht	Treated	0	1
DALFSEN	Overijssel	Untreated	0	0
LICHTENVOORDE	Gelderland	Treated	1	0
EDE GLD	Gelderland	Untreated	0	0
DIEMEN	Noord-Holland	Treated	0	1
OUDDORP ZH	Zuid-Holland	Untreated	0	0
EERSEL	Noord-Brabant	Treated	0	1
DELFT	Zuid-Holland	Untreated	0	0
ENTER	Overijssel	Treated	0	1

BERGEIJK	Noord-Brabant	Untreated	0	0
GOOR	Overijssel	Treated	0	1
GEMERT	Noord-Brabant	Untreated	0	0
GROESBEEK	Gelderland	Treated	0	1
HATTEM	Overijssel	Untreated	0	0
HARDERWIJK	Gelderland	Treated	0	1
MILL	Noord-Brabant	Untreated	0	0
HEEMSKERK	Noord-Holland	Treated	0	1
ALPHEN AAN DEN RIJN	Zuid-Holland	Untreated	0	0
HOLTEN	Overijssel	Treated	0	1
MAKKUM FR	Friesland	Untreated	0	0
HOOGERHEIDE	Noord-Brabant	Treated	0	1
ANNA PAULOWNA	Noord-Holland	Untreated	0	0
HOUTEN	Utrecht	Treated	0	1
MIDDELBURG	Zeeland	Untreated	0	0
IJSSELSTEIN UT	Utrecht	Treated	1	0
SEVENUM	Limburg	Untreated	0	0
KAATSHEUVEL	Noord-Brabant	Treated	0	1
MAASSLUIS	Zuid-Holland	Untreated	0	0
KERKRADE	Limburg	Treated	0	1
BOXMEER	Noord-Brabant	Untreated	0	0
LANDGRAAF	Limburg	Treated	0	1
HOORN NH	Noord-Holland	Untreated	0	0
LEIDEN	Zuid-Holland	Treated	0	1
EMMER-COMPASCUUM	Drenthe	Untreated	0	0
LOCHEM	Gelderland	Treated	0	1
VROOMSHOOP	Overijssel	Untreated	0	0
OMMEN	Overijssel	Treated	0	1
TIEL	Gelderland	Untreated	0	0
OOST-SOUBURG	Zeeland	Treated	0	1
NORG	Drenthe	Untreated	0	0
STADSKANAAL	Groningen	Treated	1	0
SEVENUM	Limburg	Untreated	0	0
CULEMBORG	Gelderland	Untreated	0	0
ROOSENDAAL	Noord-Brabant	Treated	0	1
ENKHUIZEN	Noord-Holland	Untreated	0	0
SAPPEMEER	Groningen	Treated	0	1
NIEUWE NIEDORP	Noord-Holland	Untreated	0	0
SITTARD	Limburg	Treated	0	1
HILLEGOM	Zuid-Holland	Untreated	0	0
SOEST	Utrecht	Treated	0	1
SMILDE	Drenthe	Untreated	0	0
SOMEREN	Noord-Brabant	Treated	0	1
ZETTEN	Gelderland	Untreated	0	0
SON	Noord-Brabant	Treated	0	1

LIENDEN	Gelderland	Untreated	0	0
STEENBERGEN NB	Noord-Brabant	Treated	0	1
EDE GLD	Gelderland	Untreated	0	0
THOLEN	Zeeland	Treated	0	1
RENESSE	Zeeland	Untreated	0	0
TWELLO	Gelderland	Treated	0	1
OOSTERWOLDE FR	Friesland	Untreated	0	0
URK	Overijssel	Treated	0	1
KROMMENIE	Noord-Holland	Untreated	0	0
VELDHOVEN	Noord-Brabant	Treated	0	1
OSS	Noord-Brabant	Untreated	0	0
VINKEVEEN	Utrecht	Treated	0	1
ZEVENHUIZEN ZH	Zuid-Holland	Untreated	0	0
WASSENAAR	Zuid-Holland	Treated	0	1
KOLLUM	Friesland	Untreated	0	0
WESTERBORK	Drenthe	Treated	1	0
OPHEUSDEN	Gelderland	Untreated	0	0
WIERDEN	Overijssel	Treated	0	1
SCHAGEN	Noord-Holland	Untreated	0	0
WIJCHEN	Gelderland	Treated	0	1
GENNEP	Limburg	Untreated	0	0
WINSCHOTEN	Groningen	Treated	0	1
EERBEEK	Gelderland	Untreated	0	0
WOUDENBERG	Utrecht	Treated	0	1
ZEEWOLDE	Flevoland	Untreated	0	0
ZELHEM	Gelderland	Treated	0	1
AALSMEER	Noord-Holland	Untreated	0	0
IJSSELSTEIN UT	Utrecht	Treated	1	0
CULEMBORG	Gelderland	Untreated	0	0
ZEVENBERGEN	Noord-Brabant	Treated	0	1
WOERDEN	Utrecht	Untreated	0	0
DEURNE	Noord-Brabant	Treated	Divestiture	0
LIENDEN	Gelderland	Untreated	0	0
GRAVE	Noord-Brabant	Treated	Divestiture	0
BERGEIJK	Noord-Brabant	Untreated	0	0
KAMPEN	Overijssel	Treated	Divestiture	0
EERBEEK	Gelderland	Untreated	0	0
OIRSCHOT	Noord-Brabant	Treated	Divestiture	0
DALFSEN	Overijssel	Untreated	0	0
RAALTE	Overijssel	Treated	Divestiture	0
VROOMSHOOP	Overijssel	Untreated	0	0
RAAMSDONKSVEER	Noord-Brabant	Treated	Divestiture	0
HILLEGOM	Zuid-Holland	Untreated	0	0
ZUIDLAREN	Drenthe	Treated	Divestiture	0
BOXMEER	Noord-Brabant	Untreated	0	0

IJSSELMUIDEN	Overijssel	Treated	1	0
BRUMMEN	Gelderland	Untreated	0	0

To conclude, the propensity score matching technique allowed us to identify the areas from which we finally selected our sample of stores. In the next section we describe this second selection exercise.

A.0.1. The choice of stores

Within areas of overlap and areas of non-overlap, we select a suitable number of stores from both the merging parties and the competing chains.[30] However, we restrict the choice to two competitors' chains: Albert Heijn and COOP. This choice is based on a number of considerations.

First, available information on chains' strategy and the economic literature suggest that it might be appropriate to include in the analyses an explanatory variable attempting to capture "chain-specific effects". As a consequence, we restrict the number of chains in order to ensure that a sufficient number of stores is available for each chain.

Second, we want to include in our selection both a national competitor and a local competitor, to exploit any differences in their responses to a change in competition.

Third, we adjust our selection in order to take into account data availability issues. In particular, some supermarket chains – especially discounters like Aldi and Lidl – denied access to store level data. In addition, the data provider warned us about (i) missing data for some supermarket chains; and (ii) limited availability of data on private label goods in 2009 and 2010.

Our selection also attempts to ensure a widespread coverage of the Dutch territory as well as a balanced representation of merging parties and of the subset of competitors selected, across areas of overlap and areas of non-overlap. Moreover, we do not select stores from the largest cities. The main reason why we excluded the largest cities from our selection is related to the difficulties of matching them with appropriate control regions. Data completeness proved to be an additional problem as supply level data are incomplete for most of the largest cities.

Concerning the kind of stores, the ACM defines a single 'product' market encompassing all supermarket formulas, including: regular supermarkets, hypermarkets and discounters. The difference between the various formulas is determined mainly by the shop size.[31] The assortment size can be a further element of differentiation among stores. Hypermarkets typically have the broadest assortment (20,000 SKUs is a common figure for food products). Supermarkets typically

[30] Among the stores of the merging parties, we wanted to have stores from the acquirer Jumbo and the targets C1000 and SdB. Moreover, we also tried to have stores that were re-brandend –i.e., adopted the Jumbo insigna – as well as stores that were not re-branded.

[31] In a recent study, the European Commission adopted the following definition: i) supermarkets: stores whose size is between 400 and 2,499 square meters; ii) hypermarkets: stores whose size is equal to or greater than 2500 square meters; iii) discounters: all stores size.

Table 8: The sample of Stores

		Price		Variety	
		Overlap	Non-Overlap	Overlap	Non-Overlap
C1000	Rebranded to Jumbo	7	9	7	10
	Not rebranded	19	13	20	13
Jumbo	SdB rebranded to Jumbo	12	10	1	3
	Jumbo	9	4	22	11
Competitors	Albert Heijn	14	15	14	15
	Coop	3	3	5	3

sell between 5,000 and 10,000 different food SKUs. Finally, discounters have the narrowest assortment, typically between 1,000 and 2,000 SKUs. In our study, we follow a different approach. For each supermarket chain, we limit our selection to regular formula only, in order to focus on the stores that are the closest substitutes.

Our final selection includes over 171 different stores representing the merging parties' chains and two competitors (Albert Heijn and Coop). For this list of stores, we asked for data on turnover, volume, promotional turnover, promotional share and variety on a selection of products, as described in the data section. Note that we have a slightly different sample for the price and variety specifications. Table 8 reports the sample of stores used in our regressions.

B. List of SKUs

The following table presents a list of the selected SKUs per products' category used in the price analysis. In the cells we report the number of stores for which we have information on that particular product.

Table 9: Selected SKUs per Product Category – Price Analysis

		PRODUCTS	CHAINS				
Category			C1000	Jumbo	SdB	Coop	AH
Cleaners	A-brand	Ajax	61	66	37	10	50
		CITRONELLA			37		
		WITTE REUS	61	66		10	50
	Private label	Albert heijn					50
		C1000	61				
		JUMBO		66			
		MARKANT				10	
		O'LACY		66			
		PERFEKT					
		SUPER			37		
Coffee	A-brand	Douwe egberts			37	10	50
		KANIS & GUNNINK	61	66	37	10	50
		VAN NELLE SUPRA	61	66			
	Private label	C1000	61				
		HOOGVLIET					
		JUMBO		66			
		MARKANT				10	
		PERLA					50
		SUPER DE BOER			37		
Cola	A-brand	Coca cola	61	66	37	10	50
		PEPSI	61	66	37	10	50
	Private label	Albert heijn					50
		C1000	61				
		JUMBO		66			
		MARKANT				10	
		O'LACY		66			
		PERFEKT					
		SUPER			37		
Diapers	A-brand	Huggies super dry		66			50
		HUGGIES SUPER FLEX		66			
		PAMPERS BABY DRY		66	37	10	50
		PAMPERS NEW BABY	61				
	Private label	Albert heijn					50
		BUMBLIES				10	

		C1000	61				
		JUMBO		66			
		SUPER			37		
		SUPER DE BOER			37		
Fresh Milk	A-brand	Arla biologisch					50
		BIO PLUS				10	
		CAMPINA	61	66	37		50
		FRIESCHE VLAG	61	66	37	10	
		VECOZUIVEL					
	Private label	Albert heijn					50
		JUMBO		66			
		MELKAN		66		10	
		SUPER			37		
		ZUIVEL	61				
Frikandels	A-brand	Beckers	61	66	37	10	50
		MORA	61		37	10	50
		VAN RIJSINGEN		66			
	Private label	Albert heijn					50
		C1000	61				
		EUROSHOPPER					50
		JUMBO		66			
		MARKANT				10	
		O'LACY		66			
		PERFEKT					
		SUPER			37		
Mayonaise	A-brand	Calve			37		
		REMIA	61	66	37	10	50
		ZAANSE MAYONAISE	61	66		10	50
	Private label	Albert heijn					50
		C1000	61				
		JUMBO		66			
		MARKANT				10	
		O'LACY		66			
		PERFEKT					
		SUPER DE BOER			37		
Olive Oil	A-brand	Bertolli	61	66	37	10	50
		BIO PLUS		66	37	10	
		BIORGANIC					
		MONINI	61				50
	Private label	C1000	61				
		EUROSHOPPER					50
		JUMBO		66			
		MARKANT				10	
		O'LACY'S		66			
		PERFEKT					

		SUPER DE BOER			37		
Sanitary Napkins	A-brand	Always ultra	61			10	
		ALWAYS ULTRA NORMAAL	61			10	
		KOTEX MAXI SUPER		66	37		50
		LIBRESSE INVISIBLE	61	66	37	10	50
	Private label	Albert heijn					50
		C1000	61				
		JUMBO		66			
		NEWWAY		66		10	
		SUPER			37		
Shampoo	A-brand	Guhl	61	66	37		50
		NEUTRAL				10	
		SYOSS SHINE BOOST					
Toiletpaper	A-brand	Edet soft	61	66	37	10	50
		PAGE KUSSENZACHT		66	37	10	50
		PAGE ZACHT EN STERK	61				
	Private label	Albert heijn					50
		C1000	61				
		JUMBO		66			
		MARKANT				10	
		PERFEKT					
		SUPER DE BOER			37		

C. Local Price Variation

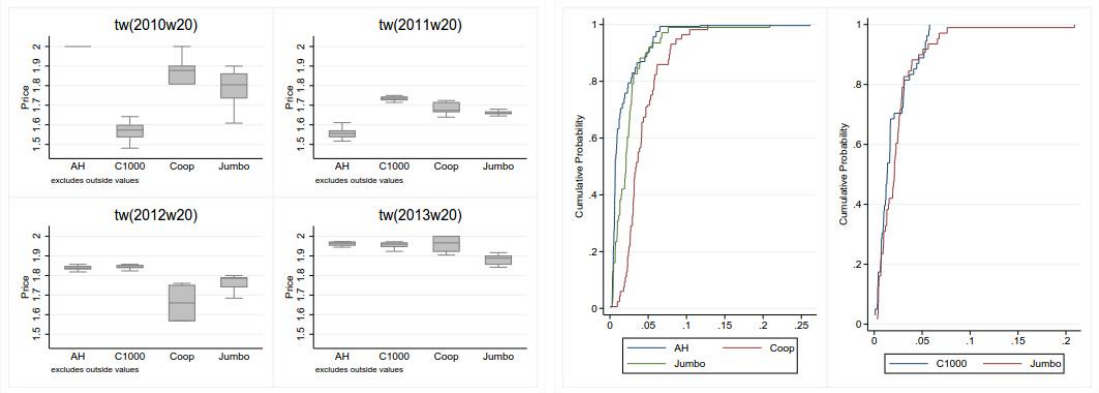
As explained in section , in this appendix we more carefully analyze the geographic extent of price variability. First, we graphically analyze the price distribution for different supermarket chains of each SKUs at different points in time by means of boxplots. Second, we compute, for each SKU and each month, the standard deviation of price from SKU's average price of that month. We then divide the price standard deviation of each SKU by the average price of that SKU in order to obtain a measure of the price dispersion (the coefficient variation) independent of the price level. Below, we present a selection of the graphs analyzed. The following figures (from Figure 4 to Figure 8) show the geographic price variability of five SKUs.

For each SKU, the first graph (boxplot) shows the price dispersion in May 2010, May 2011, May 2012 and May 2013. These graphs allows comparing the price dispersion of Jumbo with:

- price dispersion of the same SKU sold by two competitors: the market leader (Albert Heijn) and a smaller player (Coop). Both reportedly have adopted a national pricing strategy.
- price dispersion of the same SKU sold by C1000 (the merging party in the last merger – the data in the graph refer to those C1000 stores that never changed their insignia to the Jumbo's insignia, even after the merger).

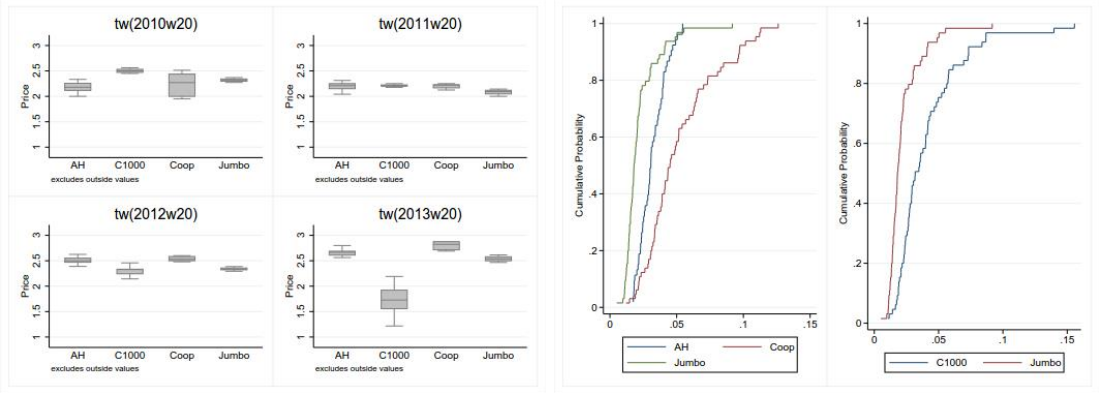
The second graph, instead, shows the cumulative distribution function of the coefficient of variation. The coefficient of variation of each SKU, for each point in time and for each chain, is computed as the ratio between the price standard deviation and the average price, and then plotted in a single graph, irrespective of the moment of their measurement. The cumulative distribution function of the coefficient of variation shows the cumulative probability that the coefficient of variation is below a given threshold. If the distribution concentrates around zero, the coefficient of variation over the period of analysis for a given chain and SKU is likely to be low; hence the conclusion is that the chain sets national prices (there is no variation across stores). A more evenly distribution, instead, shows that the coefficient of variation is higher than zero. In the latter case, we would expect local prices. The inclusion of the cumulative distribution function of different chains in the same graph allows across-chains comparisons. Chains whose curve is close to the vertical axis, are expected to set national prices with higher probability than the other chains: indeed, for that chain, the probability that the variation coefficient is around zero is higher. In the first panel, Jumbo is compared to its competitors Albert Heijn and Coop; in the second panel, Jumbo is compared to the target chain in the last acquisition: C1000.

Figure 4: Box-plot (first panel) and cumulative distribution function of the coefficient of variation (second panel) for Ajax (cleaner brand)



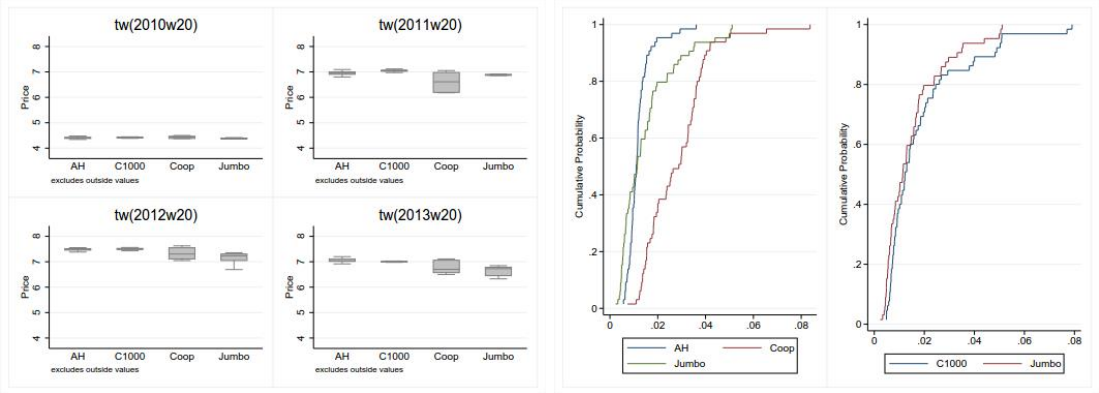
Source: our elaboration on IRI data.

Figure 5: Box-plot (first panel) and cumulative distribution function of the coefficient of variation (second panel) for REMIA (a mayonaise brand)



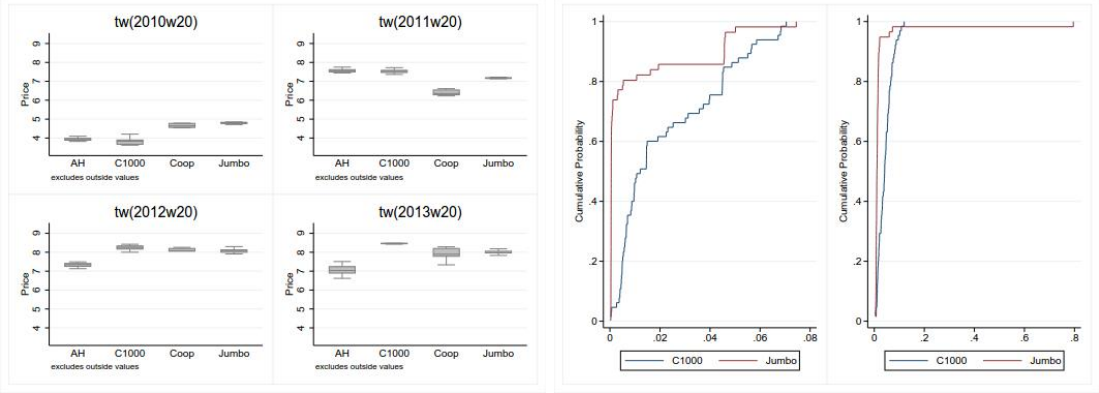
Source: Our elaboration on IRI data.

Figure 6: Box-plot (first panel) and cumulative distribution function of the coefficient of variation (second panel) for Kanis & Gunnink (coffee brand)



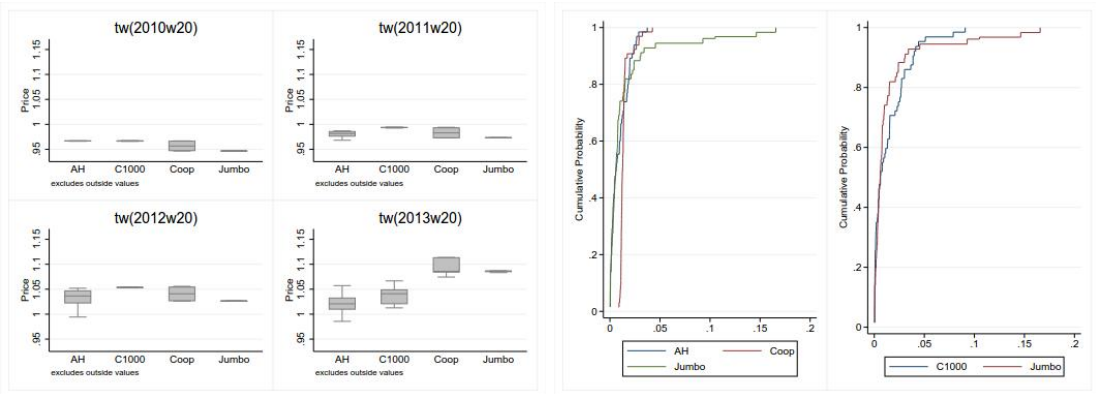
Source: Our elaboration on IRI data.

Figure 7: Box-plot (first panel) and cumulative distribution function of the coefficient of variation (second panel) for private label coffee brands



Source: Our elaboration on IRI data.

Figure 8: Box-plot (first panel) and cumulative distribution function of the coefficient of variation (second panel) for Coca cola (brand)



Source: Our elaboration on IRI data.

D. Robustness Checks

Table 10: Robustness checks on Price regressions

	Full sample		Merging parties		Competitors	
	3 months	6 months	3 months	6 months	3 months	6 months
	(1)	(2)	(3)	(4)	(5)	(6)
Post	-0.0825***	-0.0287	-0.0750***	-0.00969	-0.0954**	-0.0689
	(0.019)	(0.022)	(0.022)	(0.025)	(0.038)	(0.043)
Overlap × post	0.00503	0.0119	0.00793	0.00964	0.00338	0.0215
	(0.030)	(0.033)	(0.036)	(0.039)	(0.054)	(0.061)
Population	-9.39e-05	-7.47e-05	-1.07e-05	2.94e-05	0.000217	0.000313
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Average income	0.00824**	0.00913**	0.000819	0.000606	0.0218**	0.0237**
	(0.004)	(0.004)	(0.002)	(0.002)	(0.010)	(0.011)
Discounters market shares	0.0947**	0.0938**	0.0669**	0.0548*	0.0999	0.128
	(0.045)	(0.047)	(0.029)	(0.030)	(0.127)	(0.134)
HHI	0.000357	0.000411*	0.000340*	0.000334	-0.000275	8.85e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Net sales floor	9.73e-06	1.32e-05	3.16e-06	4.18e-06	2.20e-05	3.50e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House value	-9.19e-05	-0.000119	7.57e-05	5.73e-05	-0.000396*	-0.000429*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-4.841***	-3.872***	-4.424***	-3.447***	-5.385***	-4.657***
	(0.488)	(0.481)	(0.530)	(0.515)	(0.987)	(0.973)
Observations	108,860	94,431	69,727	60,534	39,133	33,897
R-squared	0.939	0.939	0.952	0.953	0.928	0.928

Clustered-robust standard errors at the product-insignia level in parentheses. We control for fixed effect at the product-insignia level as well as a time trend and quarterly seasonal dummies. The symbols ***, **, * denote significance level at the 1%, 5%, and 10% significance level, respectively.

Table 11: Heterogenous effects on price

	HHI			Divestiture			Re-branding		
	Full	Merging	Competit.	Full	Merging	Competit.	Full	Merging	Competit.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post	-0.0993***	-0.0974***	-0.102***	-0.100***	-0.0933***	-0.108***	-0.100***	-0.0936***	-0.108***
	(0.018)	(0.021)	(0.033)	(0.017)	(0.020)	(0.033)	(0.017)	(0.020)	(0.033)
DiD	0.00819	0.0203	-0.0109	0.00439	0.00765	0.00322	-0.00133	-0.0145	0.0154
	(0.030)	(0.036)	(0.052)	(0.029)	(0.034)	(0.050)	(0.029)	(0.035)	(0.051)
DiD × HHI > 4000	-0.0118	-0.0492	0.0933						
	(0.043)	(0.049)	(0.107)						
Did × Divestiture				-0.00531	-0.0154	0.0525			
				(0.044)	(0.047)	(0.130)			
DiD × No re-branding							0.0161	0.0437	-0.144
							(0.038)	(0.040)	(0.201)
Population	-0.000204	-0.000107	0.000322	-7.87e-05	1.02e-06	-5.76e-05	-0.000148	-8.33e-05	0.000157
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Average income	0.00760*	0.000526	0.0202**	0.00821**	0.00162	0.0218**	0.00860**	0.00220	0.0221**
	(0.004)	(0.002)	(0.010)	(0.004)	(0.002)	(0.010)	(0.004)	(0.002)	(0.010)
Discount. mkt. sh.	0.0877**	0.0600**	0.134	0.106**	0.0805***	0.0992	0.102**	0.0805***	0.0945
	(0.041)	(0.029)	(0.119)	(0.044)	(0.029)	(0.116)	(0.043)	(0.028)	(0.118)
HHI				0.000389*	0.000380*	-0.000741	0.000330	0.000362*	-0.000523
				(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Net sales floor	1.08e-05	4.59e-06	1.87e-05	7.18e-06	1.93e-06	1.29e-05	7.74e-06	4.60e-06	1.56e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
House value	-6.20e-05	8.43e-05	-0.000298*	-7.38e-05	6.75e-05	-0.000340*	-0.000101	3.83e-05	-0.000317*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HHI > 4000	-0.00319	0.0214	-0.0570						
	(0.034)	(0.039)	(0.081)						
Divestiture				0.00324	0.00622	-0.0614**			
				(0.011)	(0.012)	(0.031)			
No re-branding							0.0215**	0.0122	0.0121
							(0.009)	(0.010)	(0.096)
Constant	-5.239***	-4.792***	-5.866***	-5.255***	-4.829***	-5.793***	-5.248***	-4.810***	-5.819***
	(0.486)	(0.545)	(0.936)	(0.487)	(0.546)	(0.936)	(0.487)	(0.545)	(0.943)
Observations	123,107	78,762	44,345	123,107	78,762	44,345	123,107	78,762	44,345
R-squared	0.939	0.951	0.929	0.939	0.951	0.929	0.939	0.951	0.929

Clustered-robust standard errors at the product-insignia level in parentheses. The variable *Did* denotes *Overlap*×*post*. We control for fixed effect at the product-insignia level as well as a time trend and quarterly seasonal dummies. The symbols ***, **, * denote significance level at the 1%, 5%, and 10% significance level, respectively.

Table 12: Robustness checks on Variety

	Full sample		Merging parties		Competitors	
	3 months	6 months	3 months	6 months	3 months	6 months
	(1)	(2)	(3)	(4)	(5)	(6)
Post	-6.995***	-13.08***	-8.994***	-16.43***	-1.867	-4.399*
	(1.180)	(2.259)	(1.304)	(2.449)	(1.257)	(2.225)
Overlap × post	-4.459***	-4.267***	-6.189***	-5.879***	0.965***	0.753**
	(0.501)	(0.505)	(0.693)	(0.691)	(0.308)	(0.329)
Population	-0.0609***	-0.0640***	-0.0773***	-0.0817***	-0.00323	-0.00364
	(0.010)	(0.010)	(0.013)	(0.013)	(0.017)	(0.017)
Average income	0.273***	0.282***	-0.624***	-0.650***	2.068***	2.106***
	(0.094)	(0.097)	(0.139)	(0.142)	(0.250)	(0.252)
Discounters market shares	-0.361	-0.764	-6.947***	-7.716***	16.09***	17.15***
	(1.228)	(1.259)	(1.811)	(1.836)	(2.742)	(2.714)
HHI	-0.0665***	-0.0619***	-0.0953***	-0.0932***	-0.114***	-0.109***
	(0.010)	(0.010)	(0.013)	(0.013)	(0.037)	(0.037)
Net sales floor	0.00393***	0.00338***	0.00460***	0.00418***	0.00136***	0.000976***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
House value	0.0257***	0.0270***	0.0430***	0.0453***	-0.0134***	-0.0169***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.004)	(0.004)
Constant	-28.78	-130.4***	-93.84***	-217.0***	72.81**	28.95
	(30.949)	(47.190)	(34.355)	(51.852)	(30.779)	(44.590)
Observations	182,399	153,658	131,523	111,151	50,876	42,507
R-squared	0.881	0.878	0.861	0.858	0.942	0.942

Clustered-robust standard errors at the category-insignia level in parentheses. We control for fixed effect at the category-insignia level as well as a time trend and quarterly seasonal dummies. The symbols ***, **, * denote significance level at the 1%, 5%, and 10% significance level, respectively.

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Heinrich-Heine-University of Düsseldorf

Düsseldorf Institute for Competition Economics (DICE)

Universitätsstraße 1 _ 40225 Düsseldorf
www.dice.hhu.de

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