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Laboratorio di economia, antitrust, regolamentazione

Mergers in the Dutch grocery sector: an ex-post evaluation

Assessing the effects on price and non-price dimensions of competition

A report prepared by Lear for the ACM

14th October 2015

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We wish to thank the ACM's staff for the support provided during the course of this study, in particular Ron Kemp and Martijn Wolthoff, and all the firms that have agreed to participate to our surveys. We also wish to thank: Luca Aguzzoni for his extremely valuable support during the early stage of the project and Lorenzo Migliaccio for his excellent research assistance.

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Executive summary

The aim of this study is to evaluate the appropriateness of some merger decisions undertaken by the Autoriteit Consument & Markt (ACM) by examining how market have evolved following the mergers.

We focus on the Dutch grocery shopping sector and we analyze three related merger decisions published between 2009 and 2012 and involving supermarket chains. The three decisions analyzed cleared the following acquisitions:

- merger between Jumbo and Super de Boer on December 2009;
- merger between Schuitema and Super de Boer on March 2010;
- merger between C1000 and Jumbo on February 2012.

The three mergers have all been cleared with divestitures or at least an adjusted merger proposal. In particular, the last decision (#7323) cleared the merger conditional on the divestiture of 18 stores.

We conduct both a qualitative and a quantitative analysis and examine the effect of the mergers on different dimension of competition: price, product variety, provision of qualitative and ancillary services.

In the quantitative analysis, we measure the effect of the mergers by estimating what would have been the behavior (in terms of pricing or products offering) of the merging stores in the post-merger period, absent the merger. This estimate is usually called "*the counterfactual"* or *"the but-for"*. The difference between the actual behavior and the estimated counterfactual behavior provides a measure of the effect of the mergers. The estimation of a counterfactual requires the identification of a suitable benchmark. In the report, we present two analyses whose main difference lies in the benchmark used to estimate the "*counterfactual*". We finally make use of a consolidated approach in the field: the "*difference in differences*" approach.

In the qualitative analyses, we measure the effect of the mergers by collecting information from market participants. We sent detailed questionnaires to the relevant players in both the upstream (e.g. producers associations) and in the downstream market (e.g. merging chains and main competitors). We also had follow-up calls with some of the market participants who sent back completed questionnaires. The qualitative evidence collected is presented in the report by means of histograms or other explanatory graphs and it also represents a precious source to interpret the results of the quantitative analysis.

IRI provided us monthly data on turnover and volume from 2009 to 2013 for a sample of selected stores (including both competitors and merging parties). We also collected quarterly and qualitative data on the provision of ancillary services over the same interval. We finally collected quarterly data on product variety (expressed as the number of SKUs per product's category) from 2010 to 2013.

The analysis of the last merger (#7323, Jumbo – C1000) is the most complete. The availability and the nature of the data allow us to study the effect of the merger on both price and non-price dimensions. For the remaining two mergers, we only study the effect on prices.

Overall, the results of our quantitative and qualitative analyses suggest that the three mergers did not have any effect on prices. Moreover, the merger #7323 did not cause any reduction in the provision of ancillary services. The effect on product variety, however, are less reassuring. According to our analyses, following the merger #7323, C1000 and Jumbo reduced the depth of their assortment and consumers had less choice. We corroborate these findings by also econometrically testing 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 should have probably required a greater number or more intense divestitures.

To conclude, this report innovatively contributes to the ex-post merger evaluation literature. It indeed evaluates the effect of the mergers not only on prices, but also on other non-price dimension of competition such as product variety and the provision of ancillary services. Furthermore, the empirical strategy adopted in the report allows to (i) evaluate the price effects of the merger under both the assumption of local and national pricing, (ii) disentangle the overall effect of a merger from the effect of previous or subsequent local mergers (iii) analyze the countervailing effect of the structural remedies required by the competition authority.

PART I – INTRODUCTION

1. The ACM's request

The Autoriteit Consument & Markt (ACM) asked Lear to undertake an ex-post merger evaluation of merger decisions "in sectors that are of particular relevance to the Dutch economy and/or in sectors in which mergers occur more frequently and/or that were somehow considered controversial".

During the preliminary phase, the ACM and Lear examined a list of candidate sectors and merger decisions, including flower auctions, publishing and advertising, savory snacks, healthcare and grocery shopping. Among other reasons, due to its relevance to the authority's activities (both past and prospective), the grocery sector was selected. The choice was reinforced by data availability considerations.

In the grocery shopping sector, the ACM identified five related decisions, referring to mergers that took place between 2009 and 2012 and involving various supermarket chains:

- Decision #6802 - Jumbo - Super de Boer;
- Decision #6879 - Schuitema - Super de Boer;
- Decision #7323 - C1000 – Jumbo;
- Decision #7429 - Coop - Various Jumbo assets Supermarkt Schoonebeek; and
- Decision #7432 - Ahold - Jumbo Assets.[1]

Lear has been asked to undertake an ex-post evaluation of the first three merger decisions (#6802, #6879, #7323). The budget and data constraints would have not allowed studying the effects of all the five acquisitions. Furthermore, the last two acquistions are direct consequences of the divestitures issued with the third mergers (#7323) and it would have been difficult to isolate the effect of each individual merger. More specifically, the ACM required: (i) a quantitative analysis (i.e. a difference-in-differences analysis) of the effects of the mergers both on price and on non-price dimensions of competition; (ii) a qualitative analysis, carried out through a survey of market participants.

The objective of this study is to review the consistency between the ACM's conclusions on the market developments in the above-mentioned merger cases and the actual market developments.

This report describes how Lear fulfilled the ACM requirements.

2. The ex-post assessment of merger decisions

The assessment of the consistency between the ACM's conclusions on the prospected market developments in the merger cases under scrutiny and the actual market developments, involves two steps:

- identify (coherent) alternatives to the authority's final decision (i.e. the appropriate counterfactuals); and
- compare consumer welfare achieved by the actual and counterfactual decisions.

[1] The decisions are available on the ACM website: https://www.acm.nl/nl/download/bijlage/?id=2955; https://www.acm.nl/nl/download/publicatie/?id=10584; https://www.acm.nl/nl/download/publicatie/?id=10585.

In general, determining appropriate counterfactuals depends on the actual decision taken by the authority. If a merger is cleared and no remedies are proposed, the appropriate counterfactual is the prohibition of the merger. If instead the clearance is conditional on some behavioral or structural remedies, than two counterfactuals shall be considered: a clearance with no remedies and a prohibition.

Once the relevant counterfactuals are defined, the level of consumer welfare that results from the actual decision and that resulting from the counterfactual scenario(s) shall be compared.

Consumer welfare depends on a number of market variables: the prices at which the goods are exchanged; transactions' volumes; the quality and the variety of the goods; consumers' preferences. To obtain a more comprehensive understanding of how consumer welfare changes following a merger decision, it is important to analyze the evolution of all these market variables, from the decision of the competition Authority onwards.

In principle, determining how consumer welfare changes after a decision is not sufficient to reach a conclusion on the appropriateness of the decision itself. The researcher should control for factors other than the merger itself. For example, an ex-post-merger decrease in consumer welfare could depend on shocks other than the decision itself, such as an exogenous increase in costs. Conversely, even in the presence of an increase in consumer welfare, one cannot *a priori* exclude that consumers would have been even better off had the decision been different.

The economic literature suggests several empirical and econometric techniques that can be employed to disentangle changes in key variables due to merger decision from those that are not related to it.

These methods are:

- difference-in-differences analysis,
- before-and-after analysis,
- structural models, and
- surveys of industry participants and/or of final consumers.

Each method has strengths and weaknesses. One should ideally look at more than one when assessing a decision (these methods are not mutually exclusive). However, data availability is often a major concern in ex-post-merger evaluation exercises. Outside a formal investigation, competition Authorities do not usually have the power to request companies to provide data. Buying data from specialized providers, when feasible, can be expensive. Budget considerations may prevent competition Authorities from undertaking systematic studies and force them to severely narrow the scope for those they decide to carry out.

The methodological approach underpinning this study is thoroughly described in a study undertaken by Lear for the Directorate General for Competition of the European Commission, (Buccirossi et al., 2007).[2] The methodology has already been applied, for example, in a study undertaken by Lear for the UK Competition Commission (Aguzzoni et al., 2011).[3]

[2] Other methodological studies on the same subject are: Pricewaterhouse Coopers (2005), Deloitte (2009), Farrell et al., (2009), Allain et al., (2013); Ashenfelter et al., (2011); Jiménez and Perdiguero, (2014)

[3] See the Appendix B for a detailed review of the main studies and empirical techniques adopted in the field of ex-post evaluation.

2.1. *Empirical approaches adopted in this study*

In this study, we apply program evaluation methods. In particular, we implement a *difference in differences* (DiD) approach. 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"). By applying this methodology, we compare the difference in the average behavior and outcomes of the treated group, before and after the merger decision, with the difference in the average behavior of the control group, during the same time horizon. 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, thereby allowing the identification of the average effect of the merger on the prices and products variety of the merging entity.

Compared to before and after or yardstick approaches, DiD exploits both the cross sectional and the time series variation and it is likely to provide more robust estimates of the treatment. DiD has been widely adopted in ex-post-merger evaluations and represents state of the art in this field.

We implement the econometric analysis using store level data for an appropriately selected sample of stores. Some ex–post evaluation studies are based on Homescan data. Homescan data tracks consumers' grocery purchases. Consumers are asked to scan barcodes of purchased products at home, after each shopping trip. One of the main advantages of Homescan data is that it covers purchases at retailers that traditionally do not cooperate with data collection companies, such as hard discounters. On the other hand, this type of data may be less reliable, given that prices are self–recorded.[4] Moreover, the location of the stores where products have been purchased is not always recorded.

We include in our sample both stores of the merging parties and of competitors, selected both from cities where the merging parties overlap and from comparable cities with non-overlap. We pairwise match cities where the merging parties overlap with non-overlap cities by applying the propensity score matching approach, a technique that allows collapsing a set of different characteristics to a single dimension (see section 4.2 for further details on the selection of areas and stores).

The sample selection approach adopted allows us to explore different identification strategies of the effect of the mergers. In particular, we evaluate the effect of the mergers making comparisons *across areas* and *across chains*. Section 4.1 provides a first overview of the different identification strategies explored.

For the selected stores, we consider the following variables: (i) the price of ten selected products' categories; (ii) the total number of available stock keeping units (SKUs) per category (a measure of available product variety in store).[5] Products included in our study are selected according to a number of criteria (see section 4.3). In particular, we include both branded and private label goods and match specific SKUs whose main characteristics are comparable. This allows us to avoid the additional complexity of an explicit hedonic approach.[6]

To sum up, we implement:

- quantitative estimates of the change, if any, resulting from the mergers on prices.
- quantitative estimates of the change, if any, resulting from the mergers on product variety.

[4] See Einav et al., (2008).

[5] We consider the categories defined by the data provider. The definition of the categories is constant over time and it's the same for all the supermarket chains analyzed.

[6] Products' characteristics are taken into account at the sample selection stage, not during the econometric analysis.

In addition, we complement the quantitative analyses with qualitative and graphical analyses of a number of other non-price characteristics of the retail offer of supermarkets (e.g. availability of specific ancillary services such as bakery, agrifood counters, etc.).

Furthermore, we collect answers to a questionnaire submitted to a list of market participants through phone interviews. The aim is to explore the evolution of the sector under scrutiny (e.g. long term trends and possible shocks at the time of the analysis) as well as views of market participants on the effects of the mergers. Both activities provide important insights to validate the quantitative analyses performed.

2.2. The structure of the remainder of the report

This report contains five additional Parts and a set of Appendices.

Part II broadly describes the three mergers under study as well as the methodological approaches implemented and data used.

Part III describes the analysis performed to assess the effects on prices of the full acquisition of C1000 by Jumbo (merger #7323).

Part IV describes the analysis performed to assess the cumulative effects on prices of the three mergers and the effect of the first two mergers jointly considered.

Part V describes the effect of the merger #7323 on the depth of assortment (product variety).

Part VI describes the other non-econometric analyses performed. These are: (i) an exploratory graphical analysis of the effects of the three mergers on a number of non-price characteristics of the retail offer of supermarkets; (ii) an analysis of the replies to questionnaires and phone interviews.

Part VII summarizes our conclusions and highlights the lessons learned.

The Appendices provide additional details.

- Appendix A lists relevant references.
- Appendix B presents a review of the relevant literature.
- Appendix C details the area selection process based on propensity score matching technique.
- Appendix D lists the selected products (SKUs).
- Appendix E describes the data cleaning process.
- Appendix F presents additional estimates and robustness checks.

PART II – THE PROBLEM AND DATA

3. Overview of the three cases

Lear's analyses focus on three related decisions:

- Decision #6802 - Jumbo - Super de Boer;[7]
- Decision #6879 - Schuitema - Super de Boer;[8] and
- Decision #7323 - C1000 – Jumbo.[9]

However, given the specificities of the market, two additional decisions has to be accounted for in defining the identification strategy for the econometric analyses proposed. These are:

- Decision # 7429 - Coop - Various Jumbo assets Supermarkt Schoonebeek; and
- Decision # 7432 - Ahold - Jumbo Assets.[10]

Further details are provided in the following sections.

3.1. Mergers

The first case refers to the acquisition by Jumbo of the full Super de Boer (SdB) supermarket chain (#6802, December 2009). The ACM cleared the merger conditional on the issuance of one divestiture (in Bunde/Meersen area). Following the acquisition, former SdB stores, initially, continued to operate with the SdB brand (to be eventually rebranded under Jumbo's own brand).

The second case (#6879, March 2010) concerns a subset of SdB stores, recently acquired by Jumbo, which were sold to Schuitema (and rebranded as C1000). The majority of the other SdB stores continued to exist, although under Jumbo's own brand (who sold the remaining stores to other players). During the notification phase, the parties adjusted their merger proposal and offered the divestiture of five stores (three Sdb and two C1000) in five different areas.[11]

The third case (#7323, February 2012) refers to Jumbo's acquisition of over 400 Schuitema locations (the entire C1000 supermarket chain). That means approximately 330 "historical" C1000 locations and the approximately 80 SdB stores previously sold by Jumbo itself to Schuitema. C1000 stores initially continued to operate under the C1000 sign, to be rebranded under Jumbo own insignia brand. At the time of the analysis, the relabeling from C1000 to Jumbo was not completed yet.

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[7] https://www.acm.nl/nl/publicaties/publicatie/2467/Jumbo-Groep-Holding-BV--Super-de-Boer-NV/

[8] https://www.acm.nl/en/publications/publication/6397/NMa-conditionally-approves-the-acquisition-of-79-stores-of-Dutch-supermarket-chain-Super-de-Boer-by-a-rival-chain/

[9] https://www.acm.nl/en/publications/publication/6728/NMa-conditionally-clears-acquisition-of-Dutch-supermarket-chain-C1000-by-rival-chain-Jumbo/ and https://www.acm.nl/nl/publicaties/publicatie/4634/Jumbo---C1000/

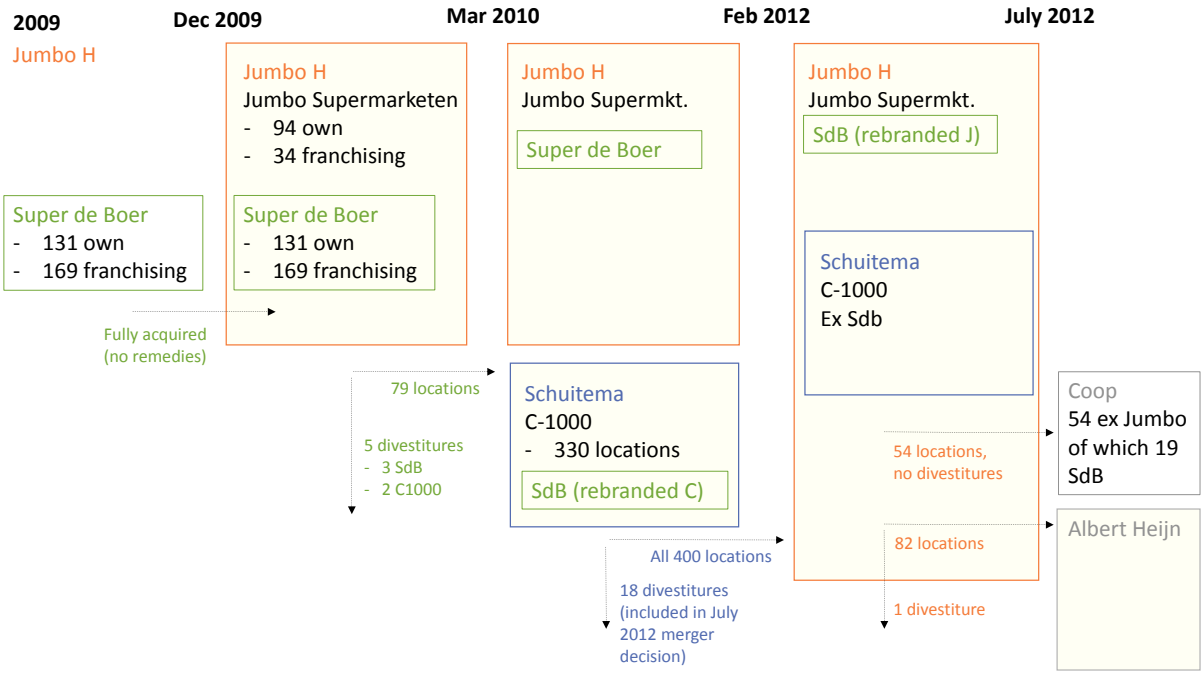
[10] https://www.acm.nl/en/publications/publication/10813/NMa-Acquisition-of-locations-of-supermarket-chain-Jumbo-by-two-rivals-cleared/

[11] To be approved, Schuitema had to divest locations in the towns of Beneden-Leeuwen, Bennekom, Bunschoten-Spakenburg, Damwald and Westerbork.

The Jumbo-C1000 merger approval was conditional on the divestiture of eighteen stores.[12] Jumbo complied in July 2012 to this set of remedies by selling the eighteen locations – along with additional stores – to Coop and Ahold. In particular, 54 Jumbo location (of which 19 were SdB) were sold to COOP following the approval of the ACM (Decision #7429). Ahold, owner of the Albert Hejin market chain, acquired 82 Jumbo locations, following the approval by the ACM conditional upon one divestiture (Decision # 7432).

A graphical synthesis of the five operations discussed above is presented in the following picture.

Figure 3.1: Mergers under examination



Lear elaboration on ACM data

Each color identify a supermarket chain (orange for Jumbo, green for Super de Boer, blue for Schuitema/C1000, grey for Coop and Albert Heijn). Boxes included in other bigger boxes represent acquisitions.

3.2. Market definition

In this section, we briefly review the product and geographic market definition adopted by the ACM for the cases considered in this study.

Product market

With respect to the product dimension, the relevant markets defined by the ACM (in each decision) include supermarket chains and hard discounters.

[12] For the merger to be approved, Jumbo was required to divest locations in following towns: Baarle-Nassau, Beilen, Bleiswijk, Bunschoten-Spakenburg, Dedemsvaart, Deurne, Dokkum, Grave, Heeswijk-Dinther, Kampen, Meerssen, Meijel, Oirschot, Raalte, Raamsdonksveer, Surhuisterveen, Ter Apel and Zuidlaren.

It shall be noted that many supermarket chains adopt various formulas for their stores, ranging from small convenience stores to large hypermarkets. All formulas were included in the same market. Grocery stores, instead, were excluded from the relevant market.

One stakeholder interviewed reported that, due to specific purchasing behaviors of Dutch consumers – i.e. frequent grocery shopping, up to five per weeks – grocery stores might exercise a competitive pressure on supermarkets.[13]

In our study we embrace the product market definition adopted by the ACM and do not attempt to assess its validity. As more extensively discussed in the following section, we restrict our analysis to a particular format (i.e. regular supermarket), by excluding from any different format such as the "city express", 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 the presence of hard discounters.

Geographic market

In all the decisions considered for our study, geographic markets were defined as a 15 minutes isochrone around 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. Prompted by the parties, for some specific areas, the ACM explored alternative definitions encompassing more than one town.

Our study does not investigate whether the geographic market definition adopted was correct. In our analyses (see sections 6 to 10) we adopt the definition put forward by the ACM. In practice, we study the effects of the mergers by controlling in our regressions for a number of explanatory variables (both demand- and supply-side ones) measured at the municipal level (see section 4.3.4).[14]

In addition, as it will be clarified in the following sections (see 4.2), we exclude large cities from our sample due to the difficulty in matching them with a suitable comparator.[15]

In the following sections, we use the expression "area" to identify a relevant geographic market defined as the administrative areas of a municipality.

Competitive assessment and issuance of divestitures

For each separate geographic market, the ACM determines the post-merger combined share of the merging parties in terms of "net sales floor". Net sales floor is used as a proxy for total turnover, a measure not available for all stores.

For each area where the combined market share is greater than 50%, the ACM carries out an in-depth assessment of the competitive conditions,[16] accounting for the specificities of each local market and for potential disciplining forces originating from neighboring areas. Following this exercise, the ACM

[13] The data provider informally confirmed this circumstance, however, we do not have definitive evidence on this issue.

[14] Although in principle it would have been interesting to repeat the analysis under the hypothesis of a pure "15-minutes isochrones" market definition, data availability would have proved an issue. Furthermore, our study focuses on measuring the effect of the mergers and does not attempt a comprehensive assessment of the decisions of the ACM. A similar assessment would have required a different approach, as explained in Buccirossi et al. (2007).

[15] Based on the information provided by the ACM, concentration levels are low in large cities and higher in smaller town. Hence, we account for the risk of over-estimating the effect of the mergers when interpreting the results of our analyses.

[16] ACM computed market shares on the basis of Net Sales Floor data and it carries out an in depth assessment also in the areas where the combined market share is computed on the basis of partial information on the Net Sales Floor and it is greater than 40%.

identifies a list of some "problematic areas", for which a divestiture has been deemed necessary to solve anticompetitive concerns.

In our sample, we include both problematic and unproblematic areas. Furthermore, for the third merger, we include areas where a divestiture was requested.

3.3. The parties

In this section, we briefly describe the various supermarket chains, starting with the merging parties and including some of the most relevant players active in the market. Information provided below is based on public sources, the views of the market participants interviewed as well as conversations with the data provider.

As a general note, all chains tend to differ in their assortment (e.g. some chains focus more on fresh food and vegetables) and in their promotional strategies.

The description does not attempt to be comprehensive. Instead, we provide the most relevant elements necessary to define the appropriate identification strategy for our econometric analyses.

The merging parties

Super de Boer was a full service Dutch supermarket chain, which operated across the country. It was part of the buying alliance Superunie.

C1000 was a full service supermarket formula, which operated across the country. Its core strategy was reportedly focused on deep, short-lived promotions (including on products like beer). Its assortment was reportedly smaller than Jumbo and Albert Heijn.[17]

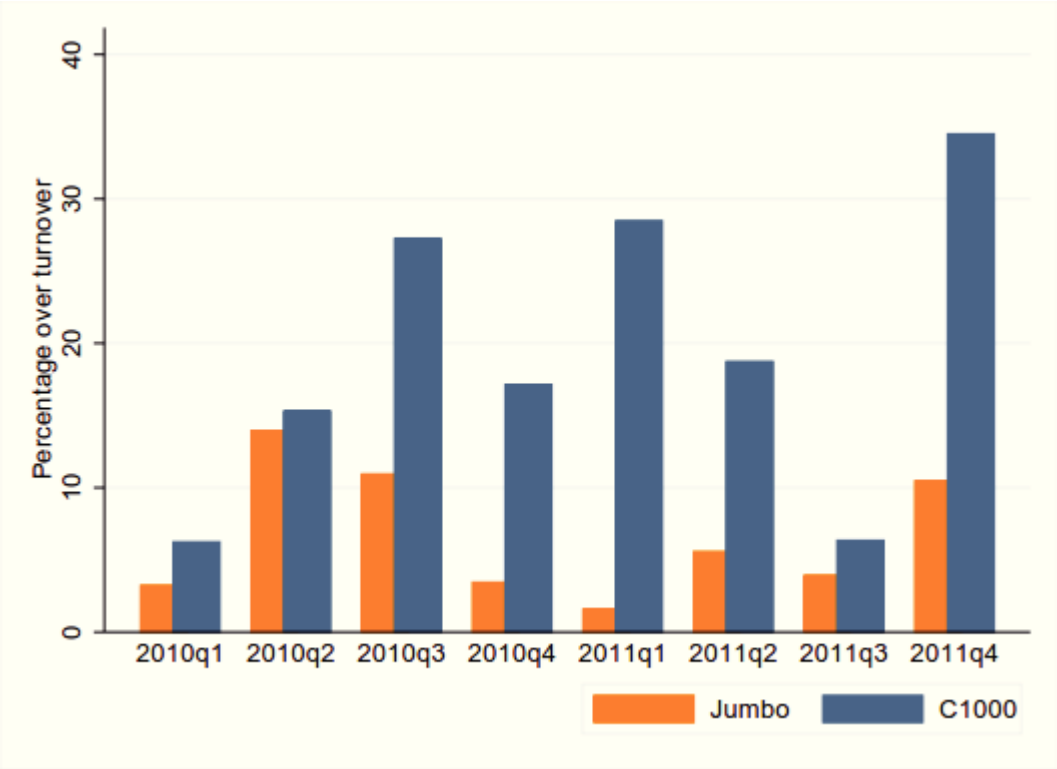
Jumbo is a full service supermarket formula operating across the country (it used to have a strong position especially in Southern Netherlands, and has considerably expanded thanks to the acquisition of SdB and C1000). The most important characteristic of the Jumbo core marketing proposition is the "every day low price" guarantee (EDLP). Contrary to C1000, Jumbo stores run few promotions.

By way of example, the following graph compares the intensity of the promotions launched for a given product by a Jumbo and C1000 store located in the same city. The graph shows the share of turnover arising from the promotional measures applied to the coffee sales by two stores in the city of Lichtenvoorde. The orange bars (representing the intensity of the promotions launched by the Jumbo store) are always lower than the blue bars (representing the C1000 store) over the period considered.[18]

[17] At the time of the writing, the relabeling from C1000 to Jumbo is not complete and some Jumbo stores are still operating with the C1000 insignia.

[18] We limit the analysis to the period before the merger Jumbo-C1000 (#7323), i.e. before the 1st quarter of 2012.

Figure 3.2 Share of total turnover of the category coffee arising from promotional measure. Comparison between a C1000 and Jumbo store



Source: Lear elaboration on IRI data

In addition, it is generally acknowledged that Jumbo stores are allowed to individually adjust their prices in order to match competitors nearby. This element, in conjunction with the analyses will be presented in the following sections, suggests that Jumbo tends to adopt a local pricing policy.

At the time of the mergers under scrutiny, each of the merging parties used to have a national footprint. A further important element to be taken into account at the merger assessment stage is that each chain used to operate regular supermarket stores.

Relevant national players

Merging parties faced the competition of a number of national and regional chains. Among chains with a national footprint there were (and there are): Albert Heijn and Plus, as well as the two hard discounters Aldi, Lidl.

Albert Heijn is the largest full-service supermarket chain and is perceived as the market leader.[19] It operates across the country in adopting various store formats: regular supermarkets, "AH XL" and "AH to go". [20]

[19] According to the information collected, other major supermarket chains have a tendency to monitor its commercial proposition and to attempt to position themselves below its prices.

[20] The former are very large hypermarkets, the latter are very small stores –as small as 40sqm – mostly located nearby stations with an assortment largely comprised of ready to eat food.

Albert Heijn is traditionally perceived as the most high-end and expensive of the Dutch chains. However, starting in 2003 Albert Heijn has reportedly increased its focus on cutting prices and providing "good value for the money" as a response to the lower demand it was experiencing.[21]

Albert Heijn was the first chain to establish a solid private label and is the pioneer in introducing e-commerce in the Dutch grocery sector.

According to the information collected, Albert Heijn and Jumbo currently have similar commercial offerings, especially in terms of products' variety.

Plus. Along with Albert Heijn, the merging parties (see previous section) and the hard discounters (see below), Plus is the only other major chain of supermarkets operating across the whole Dutch territory.[22]

Hard discounters. Two large hard discounters have an important presence in the Dutch market: Aldi and Lidl. According to information collected, during the last five years, 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. In general, both Aldi's and Lidl's position in the Dutch market has improved thanks both to the upgrade in their portfolio of products and to the general economic situation.

Smaller and regional players

Coop. Coop is smaller player. Even though it operates fewer stores (similar to regional players, not to national chains), it attempted to implement a "national formula". Coop has two store formats: neighborhood convenience stores (400 sqmt on average) and service supermarkets (750-800 sqmt on average). According to the information collected, Coop's market positioning in terms of pricing is similar to Albert Heijn and slightly cheaper than C1000. However, Coop offers less promotions than C1000 and market average.

A number of smaller and regional players exist, including Detail Group (that operates two separate brands: Dirk Van den Broeck – and its affiliate Bas van der Heijden, Digros and Dekamarkt), Spar (part of an international group with a stronger position in other countries), Hoogvliet and Jan Linders.

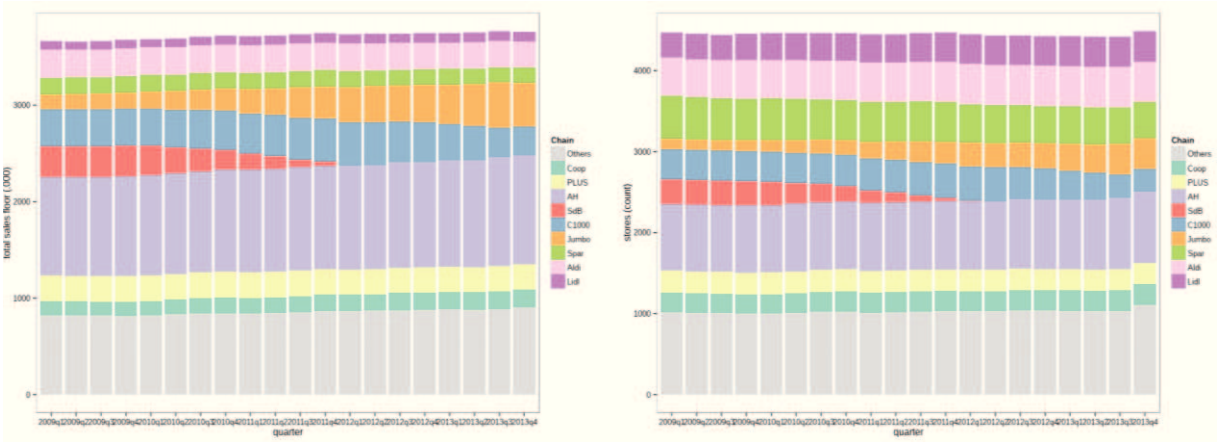
***

The figure below represents the evolution over time of the market shares (at national level) both in terms of net sales floor area (left panel) and as the number of stores (right panel) of the main supermarket chains and discounters. Prominence of Albert Heijn (hereafter also "AH") is apparent. 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 to the end of 2011.

[21] The focus on prices was complementary to greater change in its commercial proposition and communication strategy in order not to lose market shares. However, this increased attention to price is often referred as the beginning of a "price war".

[22] Plus denied access to its store-level price data, hence none of its stores were selected for this study.

Figure 3.3: Stores' market position (national level) over time: net sales floor area (left) and number of stores (right)



Source: Lear elaboration on Supermarket Gids data

3.4. General information about the Industry

The evidence collected through the questionnaires and the interviews shed light on the characteristics of the industry under scrutiny. Most of the interviewees believe that the Dutch grocery market is characterized by oversupply and that supermarkets fiercely compete on price and quality to attract consumers. According to one of the supermarkets interviewed, Dutch supermarkets charge lower prices compared to neighboring countries.

Dutch supermarkets are used to form buying alliances to centralize their purchases and get better conditions from producers. Superunie is one of the biggest buying alliances and represents stores such as Spar, Coop, Plus, Jan Linders, Deen Supermarkten and so on. Both Super de Boer and Jumbo were part of Superunie until 2009. Starting from that date, Jumbo formed a new buying alliance with C1000, called "Bijeen", and left Superunie. Bijeen became a third strong buyer in the upstream markets. At that time, Superunie had the highest market share as a buyer, followed by Albert Heijn and Bijeen.

Most interviewees reported that prices started decreasing in 2003, when Albert Heijn, the perceived market leader, adopted a new format and business strategy and lowered its prices as a response to an increase in consumers' price consciousness. Few years later, hard discounters reinforced their presence in the Dutch market, being greatly welcomed by consumers. Moreover, private labels increased their role in consumers' shopping habits.

Nowadays, the attention is shifting to quality and innovation. This circumstance, however, has not relaxed the competitive pressure on prices, according to supermarkets.

3.5. Key aspects of the cases

This subsection briefly summarizes some aspects of the merger cases under scrutiny that have a great relevance to identify the strategy to carry on our analysis:

- competition in the grocery market affects multiple dimensions and we need to identify price and non-price measures of competition;
- the mergers under scrutiny happened sequentially, therefore the same store location could have changed owner multiple times over the considered time span. We need to correctly identify the change in ownership for each store in order not to bias the estimate of the effect of each merger;

- the conversion of the acquired stores (consisting in the rebranding and contemporaneous renewal of the assortment – especially of private labels) can easily take more than 1 year. We need to separate the effect of the merger on market structure (related to the loss of a competitor) from the effect of the rebranding;
- some decisions involved divestitures, other did not;
- pricing is expected to be national but geographic markets were defined locally and divestitures were imposed to address competitive concerns at local level. We cannot rule out the possibility that the mergers may have exerted some effect at a local level;
- the product market is characterized by different supermarket formats and even within the same format, stores may be different (own stores and franchising, different NLA).[23] We need to focus on a particular format and control for any differences with proper variables;
- the range of products sold may be very different. We need to focus on a subset of products' categories and carefully select them to ensure enough variability in our sample.

4. Data and methodology

As described in the previous sections, the three mergers considered were investigated and authorized by the ACM (conditional on one or more divestitures).

Our analysis aims at evaluating the effects of the three mergers on the market. The underlying idea is to compare the competitive scenario created by the mergers with the competitive scenario that would have arisen in the absence of the merger. The mergers may have worsened the competitive conditions (increased prices, reduced quality and product variety) or, on the other side, enhanced the competitiveness in the market (reduced prices through efficiency gains). The result of the analysis of the effects of the mergers represents an insightful input to evaluate if the Dutch competition authority (ACM) adopted the correct decision by clearing the three mergers. Moreover, the analysis would also consider if the requirement of structural remedies (e.g. divestitures) has been necessary or sufficient to ensure that the mergers would have not adversely affected competition in all the areas, and it would hence also consider if the ACM correctly identified the most problematic areas, i.e. where anticompetitive conditions were more likely to arise following the mergers in the absence of structural remedies.

In order to offer a comprehensive assessment, we address the problem from multiple angles. We analyze both the price and non-price dimensions of competition; moreover, we apply quantitative methodologies but, when data quality does not support reliable econometric estimates, we perform exploratory graphical analyses. In addition, we illustrate the results of a questionnaire submitted to market participants and the views collected during phone interviews.

The retail offer of supermarkets is characterized by many dimension, hence we perform the analyses listed below.

- Quantitative estimates of the change, if any, resulting from the mergers on prices.
- Quantitative estimates of the change, if any, resulting from the mergers on product variety.
- Qualitative and graphical analyses of a number of other characteristics of the retail offer, (such as number of checkouts, availability of check out with scan, presence of bakery/butchery/fishery and so on) broadly defined as "ancillary services" (see section 4.3.3 for additional details).

[23] NLA – net leasable area

Our variables of interest (prices, variety, and ancillary services) are all measured at store level.

In principle, we are interested in both evaluating each of the three mergers individually and their cumulative effect. Individual assessment provides information on the effectiveness of each decision of the authority. A cumulative analysis, instead, can be useful both as a robustness check and as a means to explore the impact on consumers of a sequence of closely related mergers (e.g. mergers involving the same parties).

The combination of data availability and the specificities of the cases at hand, however, constrain our possibilities. In particular, the first and the second merger under scrutiny are closely related: Jumbo first acquired all Super de Boer locations and then, after only 4 months, sold a subset of them to Schuitema (C1000). The two acquisitions are hence separated by a very short time span and mostly affected the same areas. This makes it difficult to isolate the effect of the first merger from the effect of the second merger. Moreover, in the third merger, Jumbo acquired all the C1000 locations (included the Super de Boer stores previously sold). As a consequence, the areas affected by the first and the second merger have also been affected by the third merger. However, in developing an identification strategy, we can exploit the fact that a moderately long time span separates the third merger from the first two.

In the following section, we discuss each issue in details and we describe how the chosen methodological approach addresses these issues.

4.1. Empirical strategy: methodology and identification (overview)

The ex-post-merger evaluation exercise requires to identify the development of the market's competitive conditions after each of the mergers under scrutiny and estimate how the market would have developed in the absence of the mergers (counterfactual scenario). A proper comparison between the actual competitive conditions and a counterfactual scenario would provide a measure of the effects of the merger.

The development of the market following the merger is easy to observe. For the identification of the counterfactual scenario, we can exploit the fact the mergers could have different effects all over the territory (the ACM identifies local markets) and across the stores. We consider that the effects resulting from the mergers are primarily observable in the areas where there was overlap between the stores of the merging parties (*overlap store*s) and from the stores who took part to the mergers (*merging parties' stores)*. It follows that the counterfactual scenario can be provided either by those areas where there was no overlap between the stores of the merging parties or by the stores that belong to the competitors' chains and therefore were not part of the mergers. Indeed, competitors' stores may represent a valid control group. Theoretical models predict that if a merger confers some market power to the new entity resulting from the merger, its competitors will also increase prices but less than the merging parties. Similarly, if the merger creates specific efficiencies, the price charged by the merging parties will decrease more than the price of their rivals. In summary, any price variation for the merging parties (a first-order effect) should be stronger than the price variation of their competitors (a second-order effect) Thus, comparing the prices charged by the merging parties with the prices charged by the competitor may still provide an indication for the effects of the mergers.

In our analyses, we implement two different identification strategies by taking into account both insider stores (stores belonging to the merging parties) and outsider stores (merging parties' competitors).

The inclusion of outsider stores in our sample is important in order to take into account the possibility that the merging parties adopt a national pricing strategy, hence that no differences are observable for *insider stores* between areas of overlap and non-overlap. If this is the case, the treated group can

be defined as all the stores belonging to the merging parties chains (both in the overlapping and not overlapping areas) and the control group can be formed by stores belonging to competing chains (both in the overlapping and not overlapping areas).

Hence, in our first identification strategy the treated group is defined as the merging stores in the overlapping areas while the control group is formed by the merging stores in the non-overlapping areas. We call this strategy *across areas analysis.*

In the second identification strategy the treated group is defined as the merging stores all over the Netherlands (in both overlapping and non-overlapping areas) and the control group is composed by the competitors' stores all the over the Netherlands. We call this strategy *across chains analysis.*

The first strategy (*across areas strategy*) allows a precise estimation of the effect of the merger (if any) in the event of local pricing. However, it does not allow drawing any valid conclusion on the effects of the mergers if stores adopt a national pricing strategy (and hence prices do not vary across areas).[24]

The second strategy (*across chains strategy)* exploits a second order effect and can only indicate whether the merger had an impact on the merging parties prices, without conveying a precise estimate of the total effect. Its main advantage, however, is that it allows to evaluate if the merger negatively affected competition even under the assumption of national pricing strategy.

We implement the comparisons illustrated above by means of a *difference in differences* (DiD) approach. The DiD approach entails a comparison of two 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"). It then compares the differences in the average behavior and outcomes of the treated group, before and after the merger decision, with the difference in the average behavior of the control group, during the same time span. This double differencing removes the time invariant individual effects (of treatment and control group) and the common time effects that might be otherwise confounded with the effect of the merger allowing the identification of the average effect of the merger on the prices and products variety of the merging entity.

4.2. Sample selection – chains and stores

The key assumption when it comes to identifying the treated and control group is that, absent the merger, the variable of interest would have evolved identically between the two groups (Allain et al., 2013). Treated and control groups should be as similar as possible (before the merger). At the same time, it is important not to lose variability within each group, so to be able to perform better estimates. As a consequence, sample selection is a delicate phase.

In this case, one important objective of the sample selection is to maximize reusability of the units of observation across different analyses accounting for budget constraints, the need to explore different hypothesis on the type of competition as well as multiple objectives for the analysis (e.g. assessment of each merger, of their cumulative effects, of divestitures).

To identify the sample of stores to be used to implement the econometric analysis, we apply Propensity Score Matching (PSM).

We start by identifying, for each merger, the areas in which the merging parties overlapped, that is, the areas in which each merger caused the loss of a competitor and a change in the competitive scenario. As seen in the previous section, the ACM – in accordance with consolidated practice – defines many local geographic markets within the Netherlands. Geographic markets are roughly coincident

[24] The same conclusion hold when we examine product variety instead of prices.

with the administrative boundaries of each city. Having identified the overlapping areas, we apply the Propensity Score technique to match each overlapping areas with its most similar counterpart among the remaining non-overlapping areas. The more a geographic area is similar (except for the merger effects) to the area affected by the merger, the more it is likely that stores operating in these areas are comparable. We assess the level of similarity taking into account a full range of factors that could vary across areas of overlap and areas of non-overlap (both demand and supply characteristics: average density population, average store size, HHI, number of stores, average income, stores' rental cost, the presence of hard discounters). The propensity score technique allows collapsing this set of different factors to one single dimension: the propensity score. A propensity score (which ranges from 0 to 1) is attached to every area, and the overlap and non-overlap areas are then matched based on it.

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. However, we restrict the choice to two competitors' chains: Albert Heijn and COOP.[25] 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 (see section 3.3 for details).

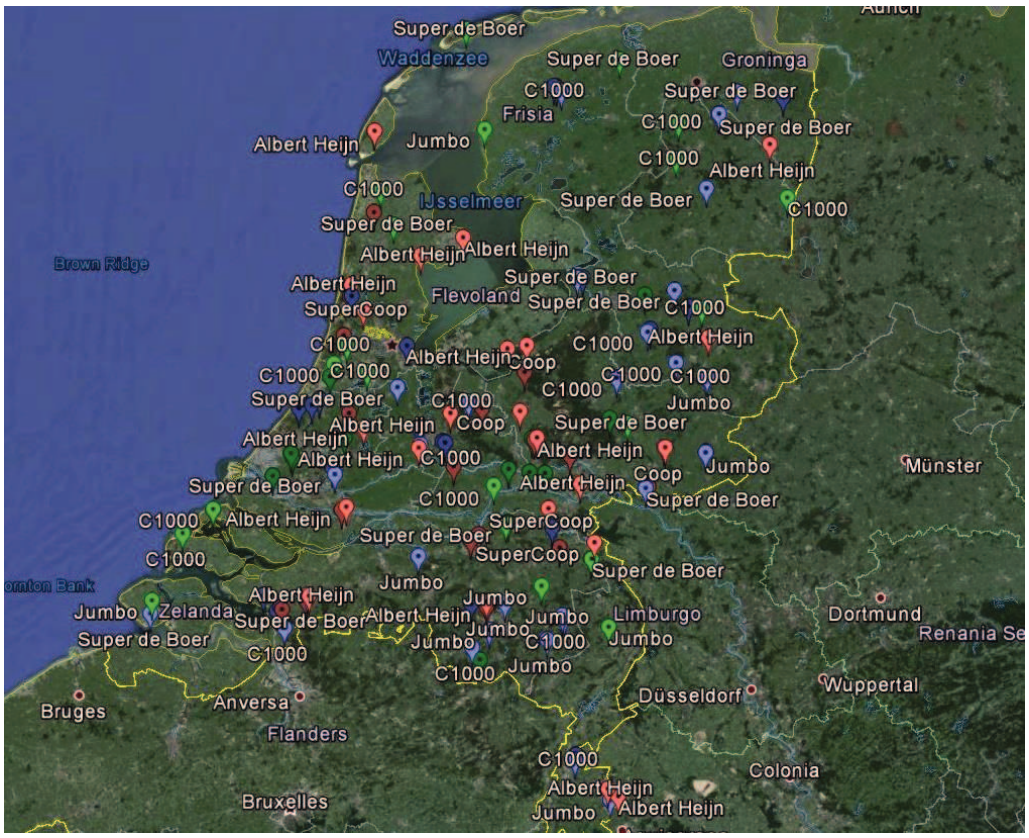
Third, we adjust our selection in order to take into account data availability issues. In particular, some supermarket chains (such as Aldi and Lidl) denied access to store level data. In addition, the data provider warned us about: (i) missing data for some supermarket chains; (ii) limited availability of private label goods in 2009 and 2010 (see next section for further details).

Furthermore, our selection also accounts for the additional criteria described below.

- Geographic coverage: we attempt to ensure a widespread coverage of the Dutch territory.
- Balanced representation: we attempt to enforce a balanced representation, across areas of overlap and areas of non-overlap, of all merging parties and of the subset of competitors selected.

[25] Hoogvliet stores were initially included in the selection but later dropped due to data quality considerations.

Figure 4.1: Geographic coverage



Lear elaboration on Supermarket gids data

Note: The blue and green flags indicate the Merging stores: the green flags refer to merging stores in non overlapping areas; the blue flags refer to merging stores in overlapping areas. The red flags indicates the competitors.

As it might be clear from the map in Figure 4.1, stores from the largest cities have not been selected. The main reason why we excluded the largest cities from our selection is related to the difficulties to match them with appropriate comparators. Data completeness proved to be another problem. Data at supply level are indeed incomplete for most of the largest cities[26]. The ACM defines a single market encompassing all supermarket formulas, including: regular supermarkets, hypermarkets and discounters. The difference between the various formulas is set mainly by the shop size. In a recent study, the European Commission adopted the following definition:

- supermarkets: stores whose size is between 400 and 2499 square meters;
- hypermarkets: stores whose size is equal or above 2500 square meters;
- discounters: all stores size.

The assortment size can be a further element of differentiation among stores: (i) hypermarkets typically have the broadest assortment (20,000 SKUs is a common figure for food products); (ii) supermarkets typically sell 5,000 to 10,000 different food SKUs; (iii) discounters have the narrowest assortment, typically between 1,000 and 2,000 SKUs.[27]

[26] Among the largest cities in Netherlands, the following cities have been excluded from our final selection: Amsterdam, Rotterdam, The Hague, Utrecht, Eindhovenm Tilburg, Groningen, Almere, Breda and Nijmegen.

[27] European Economic Community et al. (2014)

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 next section.

As anticipated, our analysis uses store level data on price and non-price measures.

4.3. Sample selection – products

None of the data providers contacted could quote the price of a representative basket of products tailored to Dutch consumption patterns. Developing an appropriate synthetic price is both time and data intensive, and was not an option for this study. Hence, we study the price effect of the merger using prices of an appropriately selected list of products.

According to the information collected, Dutch supermarket assortments usually include, for each product at least one a-brand item, one private label, and one first price item. As per store selection, it is important that the products chosen are comparable both over time and across stores (chains).

The negotiated budget allows for thirty time series (2009 to 2014), that we decide to split across 10 products: two a-brand SKUs and one private label SKU each.[28] First price items are excluded from our sample, as they may significantly differ in quality according to the data provider. Similar problems hold for fresh articles, that we exclude as well.[29]

Accounting for all the constraints, we base our selection on best practices from academic literature and ideas originating from the recent Bundeskartellamt's enquire in the food retail sector[30]. Our final selection is based on the following criteria:

- the inclusion of both "food" and "non-food" items;
- the inclusion of items belonging to the basket of goods typically consumed in the Netherlands;
- the inclusion of items whose characteristics set them apart, 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);
- the inclusion of more traditional items for which comparisons across geographic markets are easier (fresh milk, Cola).

By considering in our subsequent analyses both the average price of our bundle and individual prices of each product (see sections 6 to 10 and appendices for details), we attempt to control for some risks highlighted in the literature and we perform robustness checks.

For example, Hosken et al. (2012) warns that when the price index[31] is disproportionately composed of items that are especially sensitive to competition, the analysis may over-estimate the effects

[28] The data provider contacted collects store level data on 124 product categories.

[29] The data provider informed us that, for fresh food, stores use their own codes (PLU), which may change over time. Furthermore, assortment itself isn't stable (country of origin, weights, qualities) and stores do not always provide clear descriptions.

[30] See Haucap et al., (2015).

[31] Notice that ,differently from Hosken, we decide not to build a price index with the selected products' prices. Instead, we computed instead a pooled analysis on the prices of the final selected products and we control for the average difference between each product through properly econometric techniques.

associated with the mergers.[32] Differences in sensitivity to competition arise from a precise strategy by retailers, who, according to Hosken, are likely to offer low prices on commonly and frequently purchased products (the products consumers are most informed about) as a cost-effective mechanism to communicate to consumers a store's price level. Similarly, Ashenfelter et al. (2004) distinguish between "price-sensitive items", "leadership items," and "non-price sensitive items".[33]

Price-sensitive items include items that consumers buy often and in large quantities. Leadership items, a subset of price sensitive items, can be sold at low margins and used as price leaders to build store traffic as consumers are likely to choose a retailer based on the price of price sensitive items.

We explicitly asked the data provider to select, for each product, three time series covering the period 2009-2014. Two time series of SKUs belonging for different a-brands and one SKU for private labels in such a way to ensure:

- comparability across stores: same quality and format (e.g.: "fresh whole milk, 1 liter bottle");
- comparability over time: not mixing different SKU over time (unless necessary to ensure a sufficient coverage of the period under scrutiny).

The final list of products is provided in the table below.[34]

Table 4.1: Products

Category
Cleaner
Coffee
Cola
Diapers
Fresh milk
Frikandels
Mayonaise
Olive oil
Sanitary napkins
Shampoo
Toilet paper

Source: Lear elaboration

[32] Hosken writes: "Finally we highlight an important interpretation issue of our study. Our price index may over-estimate the price effects associated with mergers, because the retailers often pursue different pricing strategies for the different consumer products they sell. For example, studies of grocery retailing have found that retailers are more likely to place "popular products," those consumed by a large fraction of consumers and/or products that experience a predictable seasonal demand spike, on sale than other grocery items (MacDonald (1998), Chevalier et al. (2003), Hosken and Reiffen (2004b)). Retailers likely pursue this strategy because offering low prices on commonly and frequently purchased products (the products consumers are most informed about) is a cost-effective mechanism to communicate to consumers a store's price level. Low prices on infrequently purchased items (about which consumers are relatively uninformed) are less likely to increase a retailer's output, because consumers are unlikely to respond to them."

[33] Ashenfelter writes that the first category, "price-sensitive items"(PSIs), consisted of items which consumers bought often and in large quantities such as copier paper. Consumers are likely to choose a retailer based on the price of these items, so Staples price checked them often. Consumer attention, in addition to a price guarantee, made it costly to misprice this set of items. A subset of PSIs, called "leadership items," were sold at low margins and used as price leaders to build store traffic. This subset consisted of primarily low priced items such as pencils, pens and tape. The third category, "non-price sensitive items" (non-PSI), included items similar to PSIs, but were price-checked less frequently. Finally, "invisible items" consisted of items consumers purchased (such as green ink pads) that were rarely price-checked.

[34] The data provider encountered significant difficulties in matching products (SKU) for different chains according to the criteria above.

Of the products listed above, the majority of the respondents to our questionnaires characterized mayonaise, frikandels, olive oil, sanitary napkins as non-price sensitive products. Cola, cleaners and diapers have been mostly labeled as leadership products. Toilet paper and shampoo, instead, are regarded as price sensitive products. Views on coffee and fresh milk are mixed: some respondents labeled them as price sensitive products, others labeled them as leadership products.

In this section, we describe in more depth the data used to perform our study. Additional details are provided in the appendices.

4.3.1. Price

Our database, provided by IRI[35], includes total turnover (euro), volume (sales), promotional turnover (euro) and promotional share (as a percentage of total sales) measured at store level for the period 2009-2014. 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. For the sake of simplicity, we refer to these 4-weekly prices as monthly prices.

A description of the data cleaning and panel-balancing activities is provided in the Appendix E.

4.3.2. Variety

As already mentioned in the previous sections, our analysis not only focuses on the effect of the mergers on prices, but also considers other measures of competition. In order to fully assess if the mergers under scrutiny negatively affected market competition, and ultimately consumers, it is necessary to understand not only if consumers are paying higher prices for the same products they were buying before the merger, but also if, after the merger, they have the possibility to choose among the same wide range of products as before the concentration. Product variety is a non-price measure of competition worth to analyze in an ex-post merger evaluation.

For this purpose, we collected quarterly data on the number of SKUs per 125 products' category at store level over the period 2010-2013.

4.3.3. Ancillary services

Another non-price measure of competition considered in our analysis is the availability of ancillary services. In particular, we use the Supermarket Gids database,[36] a comprehensive guide on Dutch supermarkets. This database (covering the 2009-2013 period) tracks (quarterly) for each supermarket store in every Dutch city, the following measures:

- number of regular checkouts and of checkouts with scan;
- number counter tills;
- availability of agrifood counter, butchery, bakery, frozen food stand, meat counter, cheese counter, liquor counter, drug counter (each separately); and
- day of the week and time of promotional sales.

The idea underpinning this analysis is that availability of ancillary services might represent an important element of the value proposition and might be used to attract consumers, diverting them from competitors. If the mergers relaxed the competitive constraints, we might be able to observe a drop in ancillary services offered, hence a negative impact on consumer welfare.

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

[36] Prepared by Levensmiddelenkrant, please see http://www.levensmiddelenkrant.nl/

Given the nature of these data, we do not attempt econometric modeling. As it will be clear by looking at section 14, there's little time variation before and after the merger to implement a valid econometric analysis. We hence employ exploratory graphic analysis techniques.

4.3.4. Control variables

The objective of our analyses is to evaluate if the mergers under scrutiny had an impact on market competitive conditions. We measure market competitiveness through price, product variety and the provision of ancillary services. However, in order to correctly disentangle the effect of the mergers on the trend of these variables from the "regular" effect of the market conditions (from the supply and demand side), we collect data on demand and supply shifters and control for them in our analysis.

The following table summarizes our data on local demand and market conditions. Data have different time reference as reported in the table.

Table 4.2: Control variables

Control variables	Description	Time reference	Source
Local market features: demand side			
population	number of inhabitants per City	yearly	CBS - NL[37]
population density	average number of inhabitants per square kilometer per City	yearly	CBS - NL
number of 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[38]
HHI	HHI 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
average store net sales floor	average net sales floor of all the stores in the City	quarterly	Supermarket Gids
average net sales floor of Aldi	average net sales floor of all the Aldi stores in the City	quarterly	Supermarket Gids
average net sales floor of 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 store's net sales floor) in the City	quarterly	Supermarket Gids

[37] Central Bureau Statistics – Statistics Netherlands, please see http://www.cbs.nl/en-GB/menu/home/default.htm

[38] Department of Spatial Economics & Spatial Information laboratory.

4.3.5. *Responses to questionnaires*

Two additional sources of information we use in this study are: (i) a questionnaire specifically designed to explore the evolution of the sector under scrutiny (e.g. long term trends and possible shocks at the time of the analysis) and to collect views of market participants on the effects of the mergers; (ii) phone interviews with relevant stakeholders.

The questionnaire includes both open-ended questions and closed-ended ones (e.g. requests to rank, categorize or confirm/disconfirm a number of statements). Out of nine stakeholders who had declared their willingness to participate in the questionnaire, five submitted their responses.

Follow-up phone calls allowed us to explore a number of relevant topics in an open-discussion format.

Additional details as well as a summary of the main findings of the questionnaire are provided in section 15.

5. Local or national competition?

A preliminary issue to be addressed in order to properly evaluate the results of our analyses (under the two different identification strategies employed) is whether competition is national or local.

The choice of the most appropriate comparator to evaluate the effects of a merger strictly depends on the geographic extent of competition. If stores compete at local level, a comparison between the price (and other variables of interest) measured 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) would succeed in identifying the effect of the merger under scrutiny, if present. On the contrary, if competition were national, the previous comparison would be meaningless (i.e. all areas should be regarded as affected by the merger). Under this assumption, comparing prices (and other variables of interest) of the merging parties to the ones of their competitors (i.e. our *across chains analysis*) would suffice to determine if the merger had an impact on competition.[39]

We analyze the issue by focusing on price variability. A high price variability across areas suggests the presence of local competition. Low variability, instead, would not allow to conclude that competition is local. The test, however, is asymmetric: one cannot infer from low price variability that the competition is national.

Preliminary discussions with the ACM suggested that the competition on prices could be national. However, this issue was not fully explored during merger reviews, hence the need to a more in depth assessment, carried out examining both qualitative evidence (questionnaires to market participants and evidence collected during phone interviews) [40] and quantitative evidence (data on prices at store level).

Both the questionnaires and the interviews support the view that prices are set at national level. In addition, the majority of respondents reported that promotional measures, which affect final prices to consumers, are also set at central level and, in any case, never at store level. However, the interviews also showed that there is consensus that Jumbo allows for greater degree of autonomy in price setting at store level.

In the majority of the cases, questionnaires report that the variety of assortment isset at central level while allowing individual stores a certain degree of autonomy. Supermarket chains may have a general

[39] The rationale underpinning each separate identification strategy is more extensively discussed in sections 6.1 and 7.1.

[40] Question 1.5 of our questionnaire to stakeholders specifically explores this issue.

policy for their product assortment. However, it is reasonable to assume that the stores belonging to each chain adapt their own assortment to the local conditions of supply (in terms of competitive pressure coming from the other local players) and demand (in terms of the distribution of consumer preferences). For this reason, in the rest of the report, we assume variety decisions are set locally and we do not further investigate their geographic variability as we do with prices.[41]

As regard pricing strategies, we complement the qualitative evidence collected by analyzing 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 5.1 to Figure 5.10) 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, 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 of them reportedly adopt 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 who never changed their insignia to the Jumbo's insignia, even after the merger).[42]

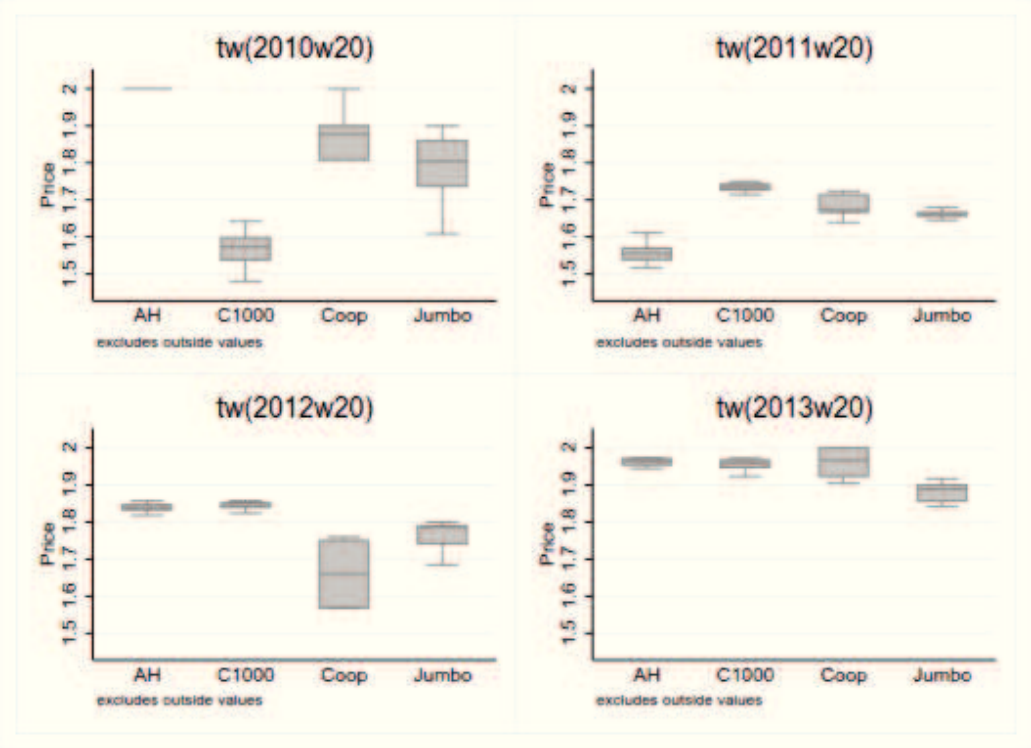
The second graph, instead, shows the cumulative distribution function of the coefficient of variation. The variation coefficient of each SKU, for each point in time and for each chain has been computed as the ratio between the price standard deviation and the average price and then plotted in a single graph, irrespectively of the moment of their measurement. The cumulative distribution function of the variation coefficient shows the cumulative probability that the variation coefficient is below a given threshold. If the distribution concentrates around zero, the variation coefficient 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 variation coefficient 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.

[41] The results of the econometric analysis on the effect of the merger on variety confirms this assumption.

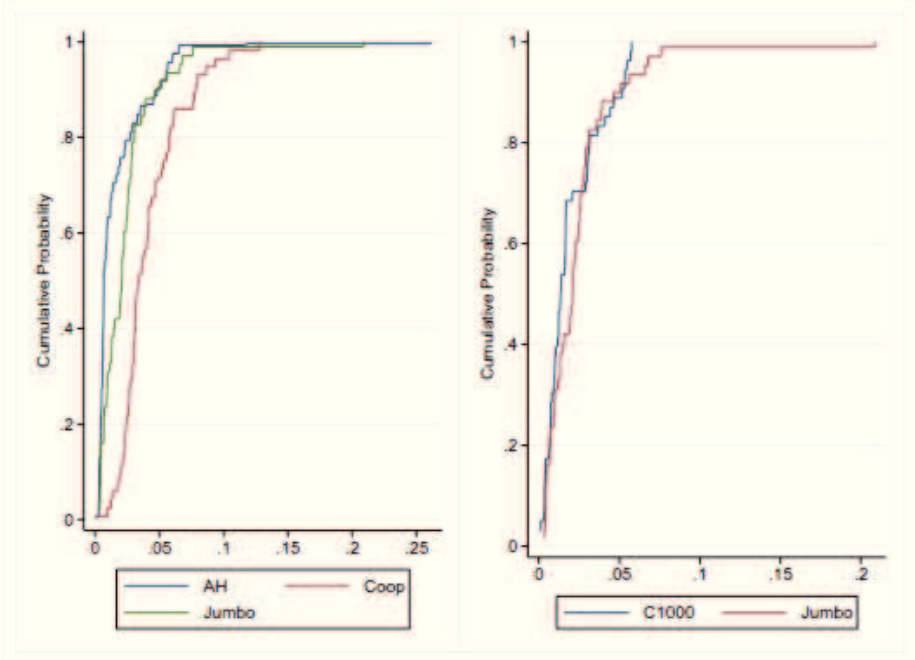
[42] The relabeling from C1000 to Jumbo after the acquisition will be completed no earlier than June 2015.

Figure 5.1: Box plots for AJAX (a cleaner brand)[43]



Source: Lear elaboration on IRI data

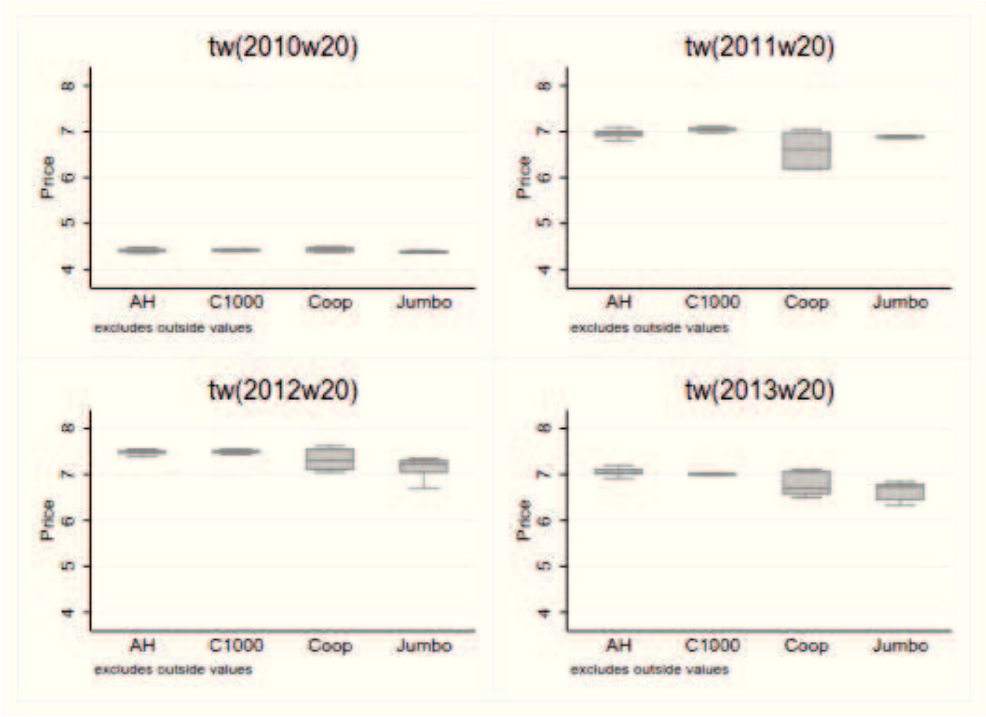
Figure 5.2: Coefficient of variation for AJAX (a cleaner brand)



[43] Notice that the box plots do not show outliers values.

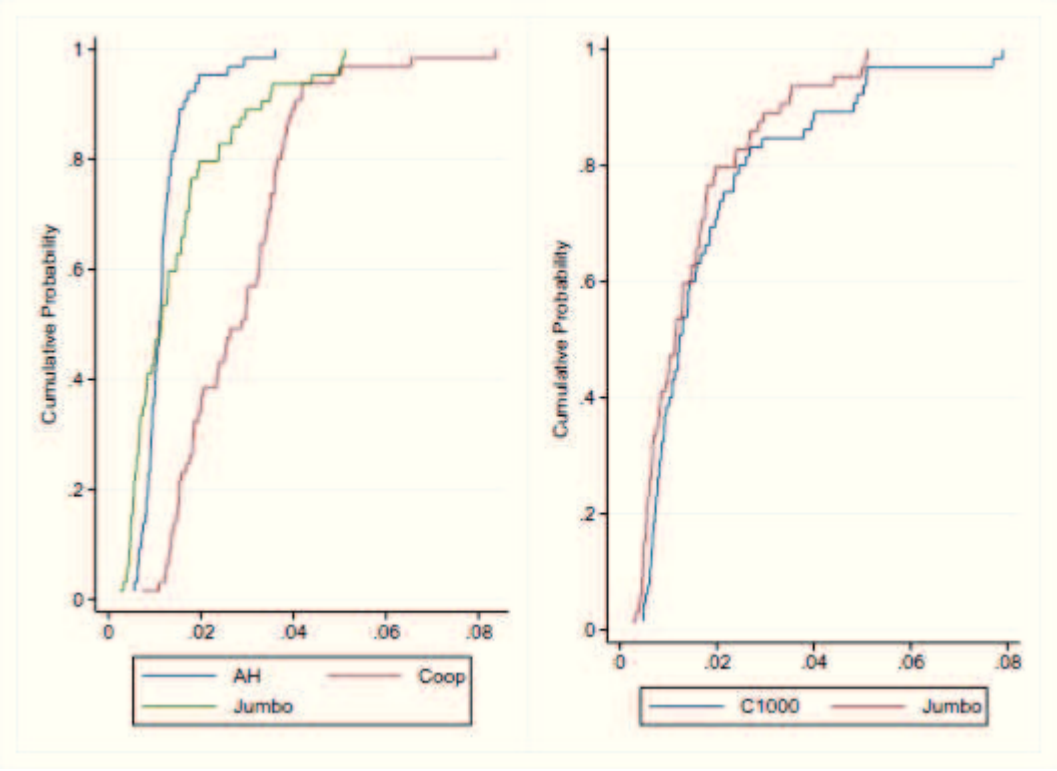
Source: Lear elaboration on IRI data

Figure 5.3: Box plots for Kanis & Gunnink (a coffee brand)



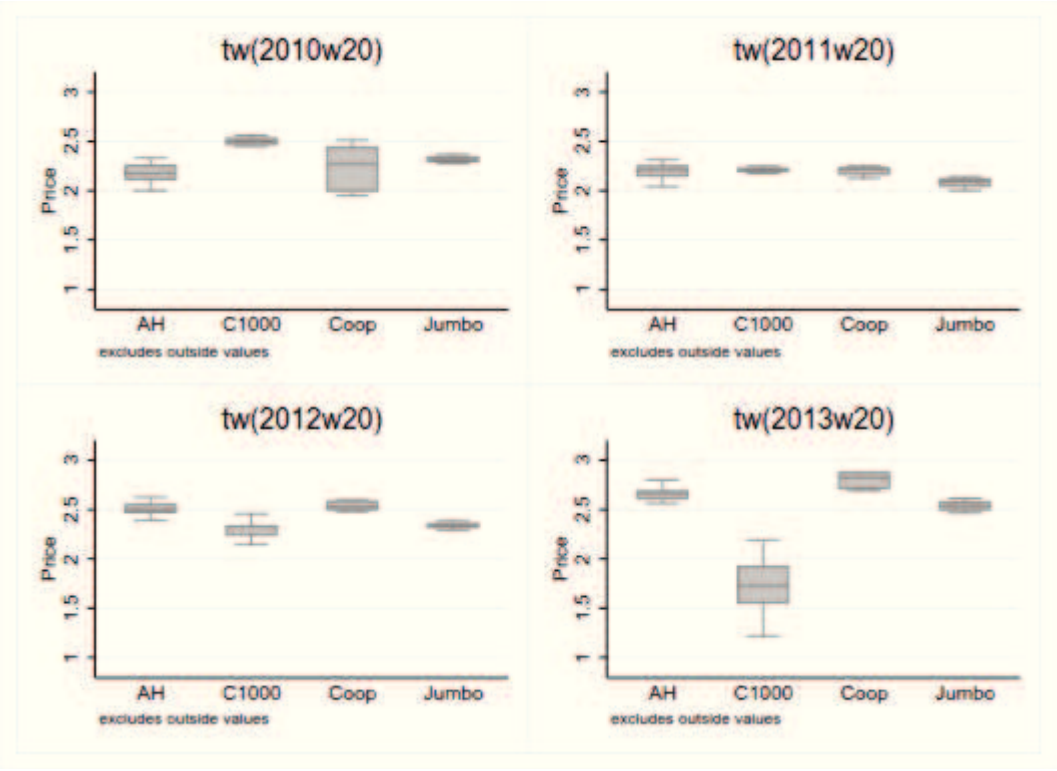
Source: Lear elaboration on IRI data

Figure 5.4: Coefficient of variation for Kanis & Gunnink (a coffee brand)



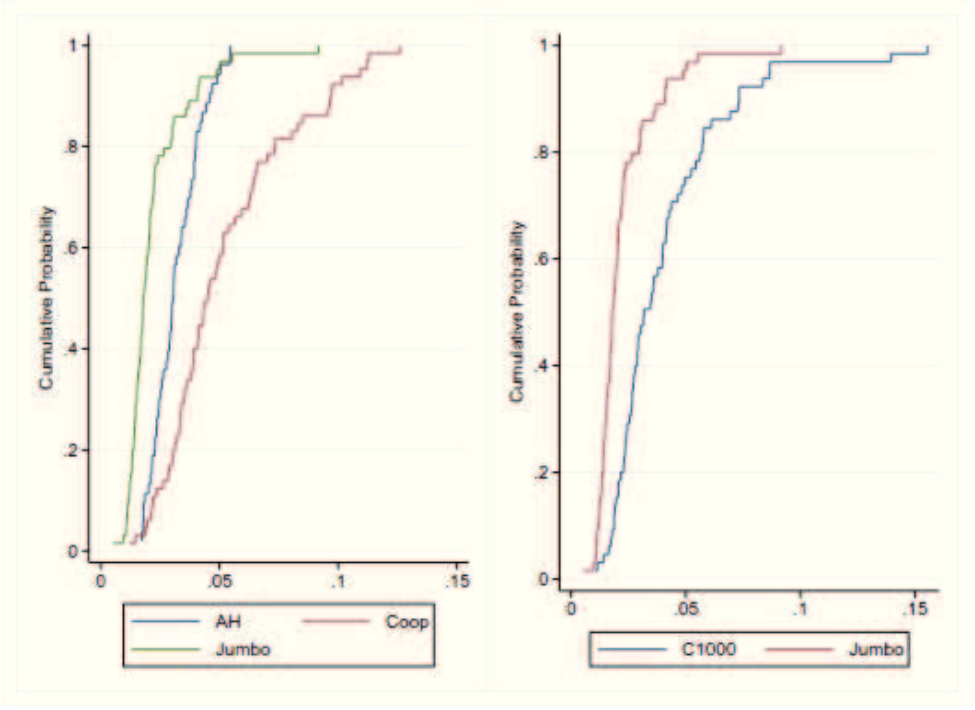
Source: Lear elaboration on IRI data

Figure 5.5: Box plots for REMIA (a mayonaise brand)



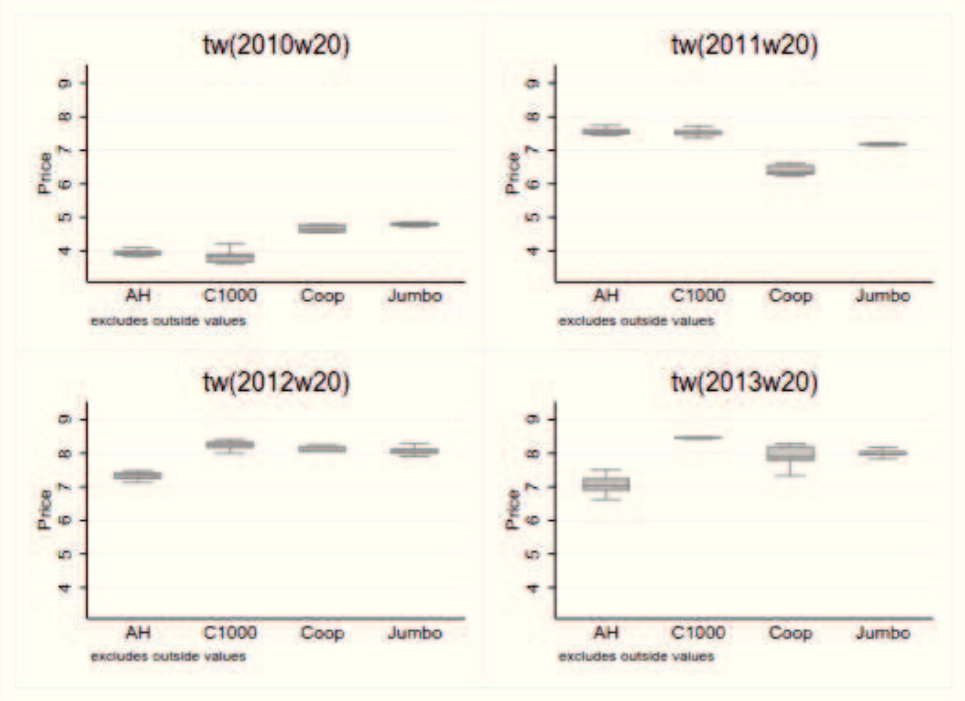
Source: Lear elaboration on IRI data

Figure 5.6: Coefficient of variation for REMIA (a mayonaise brand)



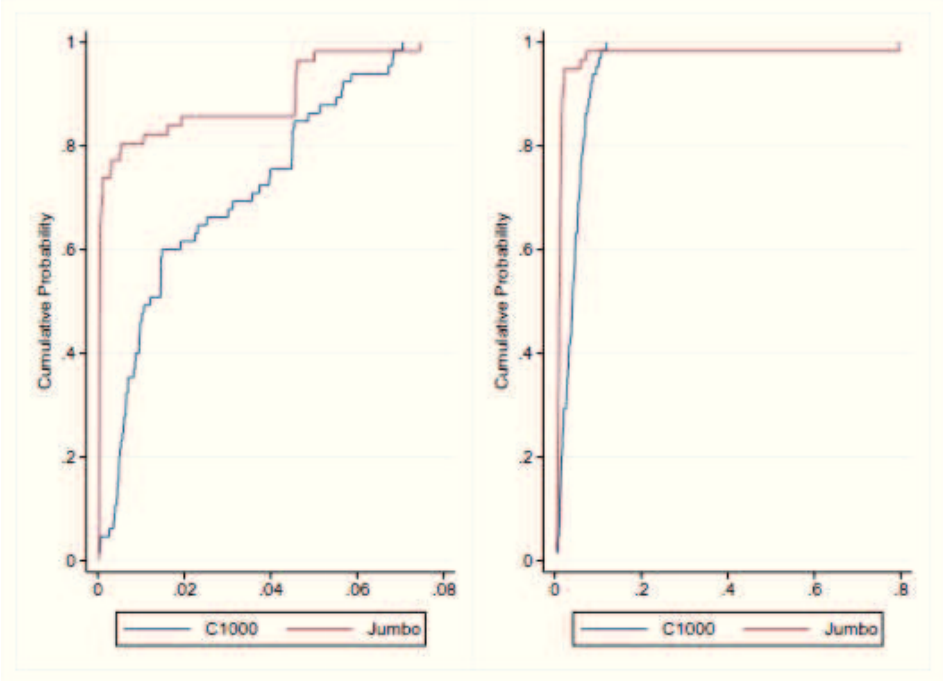
Source: Lear elaboration on IRI data

Figure 5.7: Box plots for Coffee private labels[44]



Source: Lear elaboration on IRI data

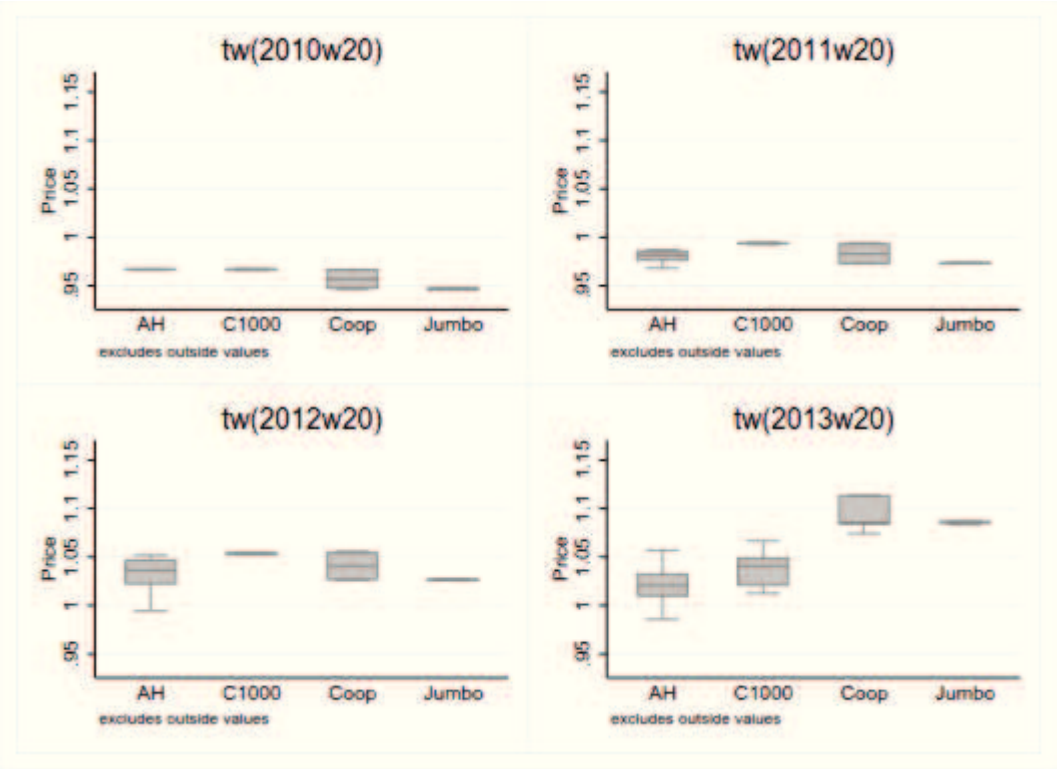
Figure 5.8: Coefficient of variation for Coffee private labels



[44] For each chain, we plotted the price dispersion of its own coffee private label. Our data on private label are comparable across chain. The selection, indeed, has been made in order to guarantee comparability across chains as much as possible.

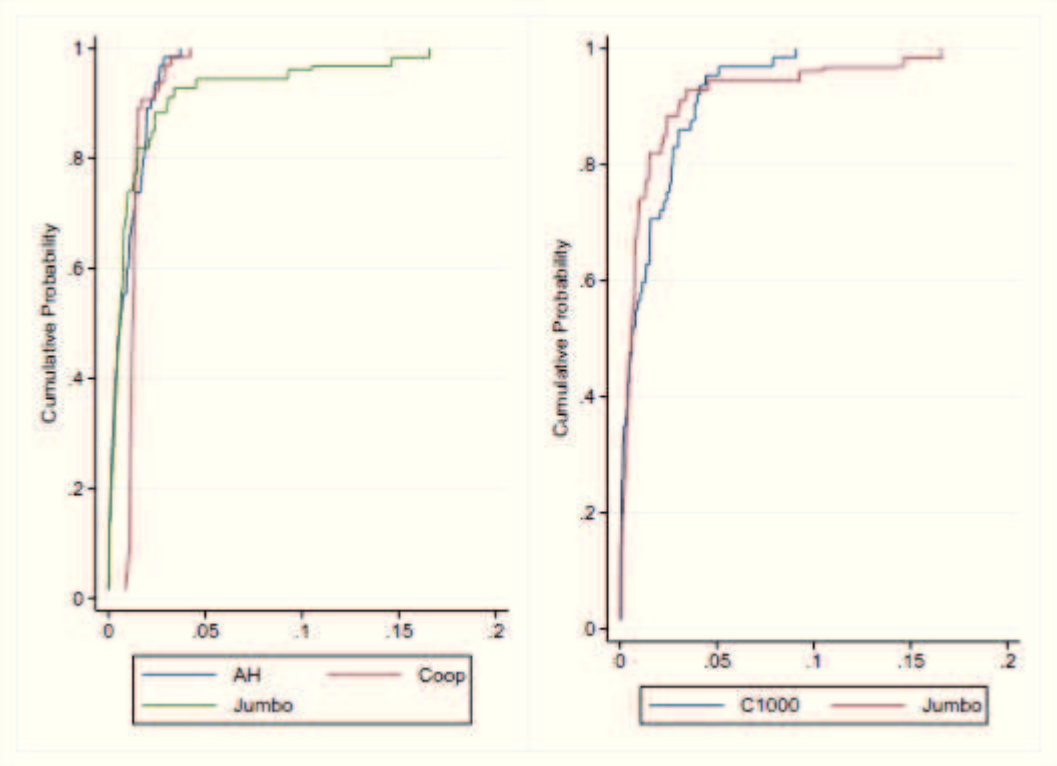
Source: Lear elaboration on IRI data

Figure 5.9: Box plot for Coca cola (brand)



Source: Lear elaboration on IRI data

Figure 5.10:Coefficient of variation for Coca cola (brand)



Source: Lear elaboration on IRI data

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. This is more intuitively apparent when looking at the boxplots. Given the asymmetric nature of the test and the existence of some variation, local competition cannot be completely ruled out. Qualitative evidence from questionnaires and interviews suggest that national pricing (hence national competition) could be the norm. It could then be inferred that the cost of implementing a local pricing strategy outweighs its potential benefit. National pricing, however, is a reversible choice. Should the cost-benefit balance change, supermarket chains can switch to local pricing. The greater degree of flexibility in their pricing strategies that – according to interviewees – franchisees enjoy, may indeed reflect this aspect.

For the reason above, whenever appropriate, we perform two sets of analyses: a first set assuming local competition (*across areas*) and, as a robustness check, a second set of analyses (*across chains*) to identify the effect of the merger (if any) in case of national competition.

PART III – ASSESSMENT OF MERGER # 7323 – PRICE EFFECT

In the following sections, we assess the effect of the last of the three mergers under examination. In this merger (#7323), which happened in February 2012, Jumbo bought all C1000 stores. The merger has been followed by some stores divestiture to Coop and Albert Heijn.[45] The rebranding process – from C1000 to Jumbo – at the time of the analysis was still ongoing.

6. Merger assessment – across areas analysis

The following sections present the analysis performed under the *across areas* strategy. Accordingly, we describe the choice of the methodology adopted, the identification of the treated and control groups, the definition of the regression equation, the econometric technique used and the results obtained.

6.1. Identification strategy

We perform an analysis of the effect of the merger with the "difference in differences" (DiD) approach, in which we exploit both time and cross-sectional variation of prices (or product variety) to identify the effect of the merger.

To effectively implement the DiD approach, one needs 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, including how competition unfolds.

This strategy is based on the underlying idea that the competitive effects of a merger, if present, are stronger in areas characterized by an overlap between the merging parties (i.e. areas were stores of both insignia were present at the time of the merger). These areas, in fact, would be the ones experiencing the stronger change in the competitive conditions: a decrease in the number of competitors (a first order effect). Other areas, instead, will at most experience second order effects. Therefore, we can attempt to identify the effect of the merger, if any, by comparing prices (and variety of assortment) of the merging parties in areas of overlap *vis-a-vis* areas of no overlap.

Our dataset contains store level data and we identify:

- A treated group composed by stores of either Jumbo or C1000 selected from areas of overlap.
- A control group composed by stores of either Jumbo or C1000 selected from areas of no overlap.

However, given the specificities of the case at hand, further refinements are needed in order to ensure that the two groups only differ by the characteristic whose effect we are interested in measuring (i.e. the merger).

To achieve this objective, we selected treated and control stores from areas appropriately identified following an approach based on the so called *Propensity Score Matching* (PSM).[46]

PSM postulates that the probability of treatment depends on observable characteristics and the actual assignment is random once one accounts for the predicted probability of treatment. It is then possible

[45] Notice that the stores that have been divested as a consequence of the ACM's decision have been excluded from the dataset.

[46] For an introduction to Propensity Score Matching see Cameron and Trivedi (2005, p. 873).

to build a control using these predicted probabilities. Applied to this case, the intuition of PSM is that the overlap and non-overlap areas may have similar probability of treatment as they share similar demand and supply conditions.

A further element to be taken into account in defining the identification strategy is that the Dutch market has been affected by three mergers in four years (2009-2012). In order to isolate the effect of the 7323 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. For this reason, we restricted the selection of treated and control stores to the subset of cities that fulfilled the following criteria:

- for the selection of treated stores, areas in which the merging parties (Jumbo and C1000) overlapped at the time of the merger and no other merger had occurred (i.e. the merging parties of the previous mergers never overlapped in these areas);
- for the selection of control stores, areas where only one of the merging parties was present (Jumbo or C1000) and no other merger had occurred (i.e. the merging parties of the 7323 merger under examination and of the previous mergers never overlapped in these areas). Among the areas available for the identification of appropriate control stores, we selected the best subset on the basis of the *Propensity Score Matching*.

To sum up, we defined treated and control areas, and matched them on the basis of their propensity score (i.e. the probability of receiving the treatment). We then selected merging parties' stores in each of the identified areas.

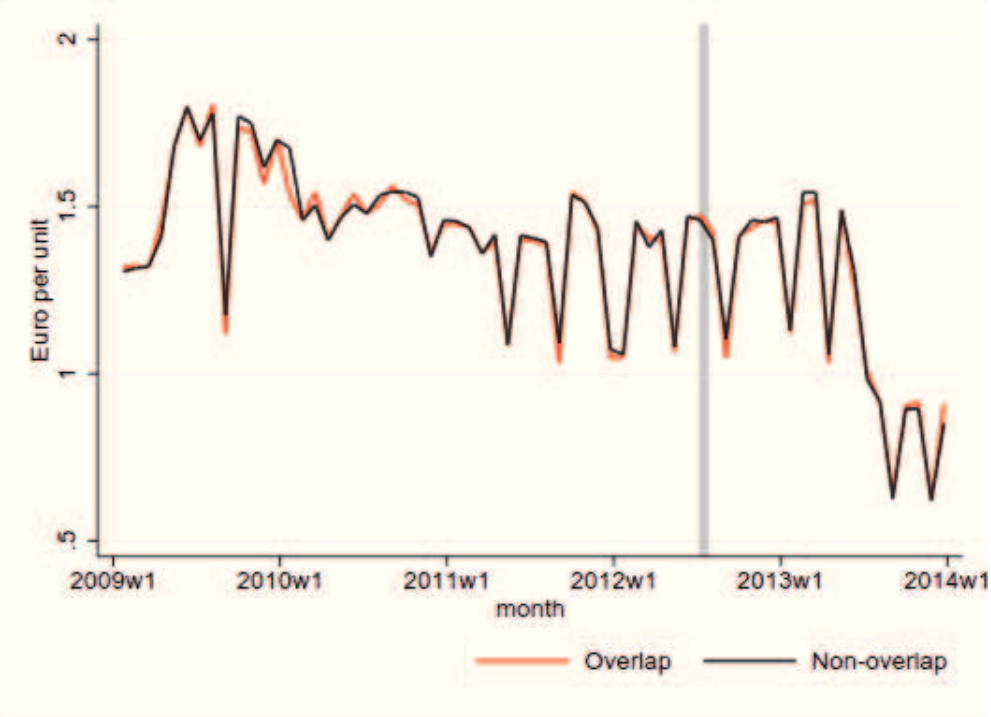
We ended up with approximately 40 stores for each group (treated and control).

An important assumption of the DiD approach is that the difference in the average behavior in the control group adequately represents the counterfactual difference in the average behavior that would have occurred had the treatment (i.e. the merger) not occurred. Hence, the DiD approach relies on the key assumption that the treatment and control group are subject to a same common trend, an assumption that should be tested with reference to the pre-treatment period. Before undertaking the econometric analysis, we also check whether the assumption underpinning the DiD approach is violated in our data, and concluded that it is not.

The following figures show, for a subset of the product categories analyzed, the average price trend for the merging stores in the overlap and non-overlap areas. The comparison between these two price trends should allow us to infer if the stores in the overlap areas (treated group) and the stores in the non-overlap areas (control group) are similar and comparable in the pre-merger period. If prices show a similar trend[47] in the pre-merger period, it can be assumed that the control stores can reasonably approximate what would have been the behavior of the treated stores in the post-merger period in the absence of the merger.

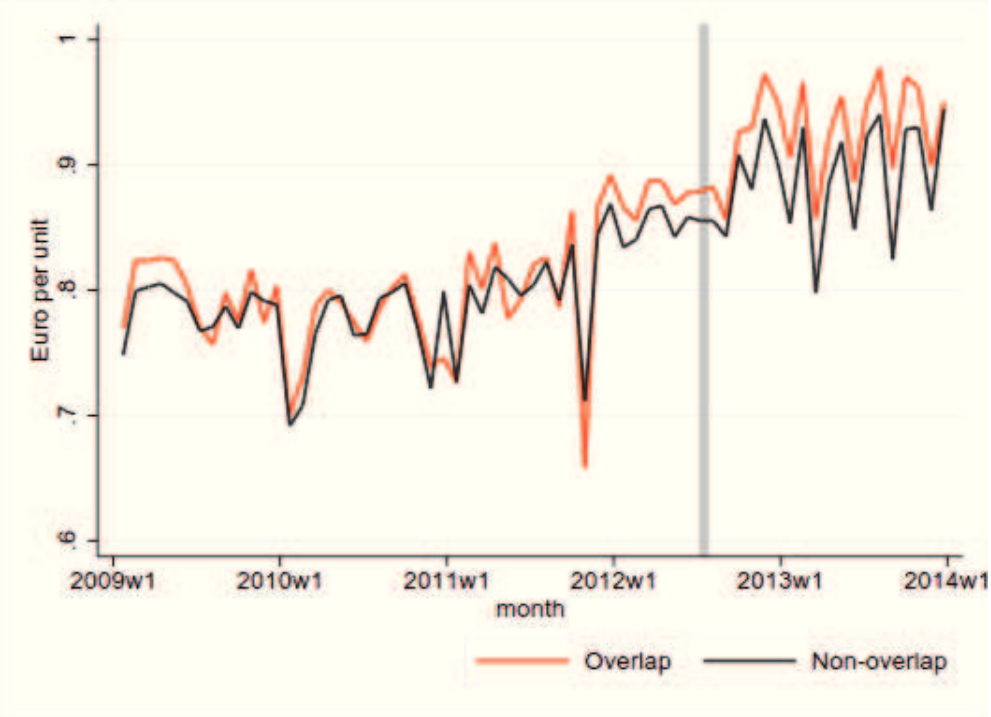
[47] Notice that the DiD approach requires that treated and control stores show a similar trend in price in the pre-merger period, and not the same level. Differently from other methodologies, such as the before and after, the DiD compares the variation in prices and not the absolute level.

Figure 6.1: Comparison between average price trends in treated and control group: cleaners



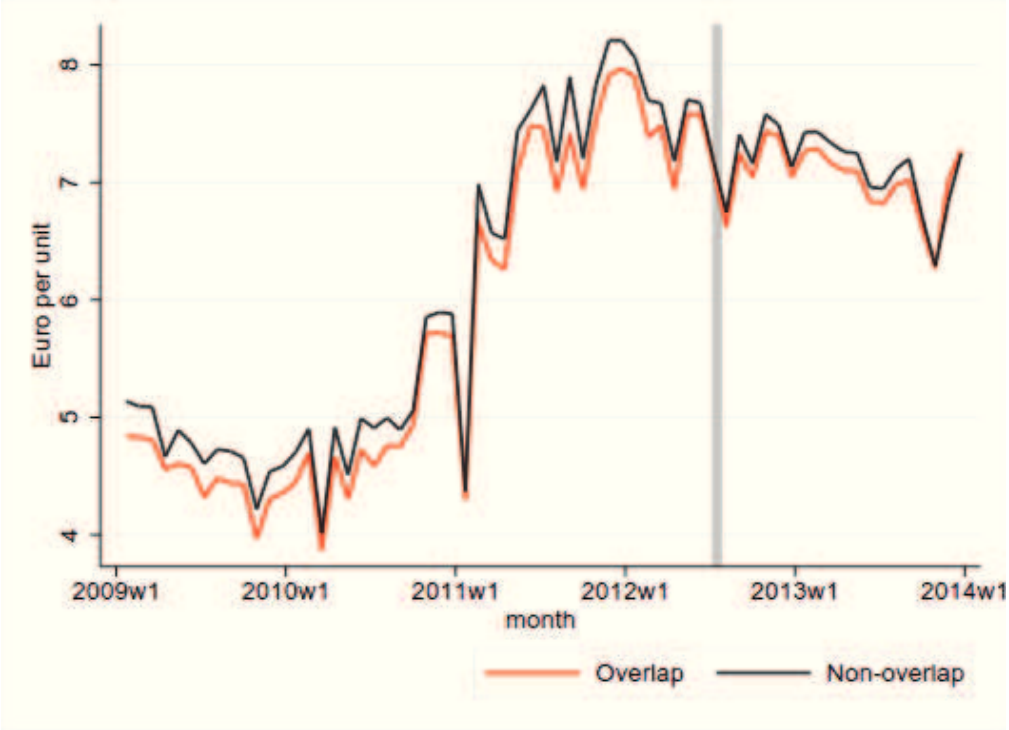
Source: Lear elaboration on IRI data

Figure 6.2: Comparison between average price trends in treated and control group: cola



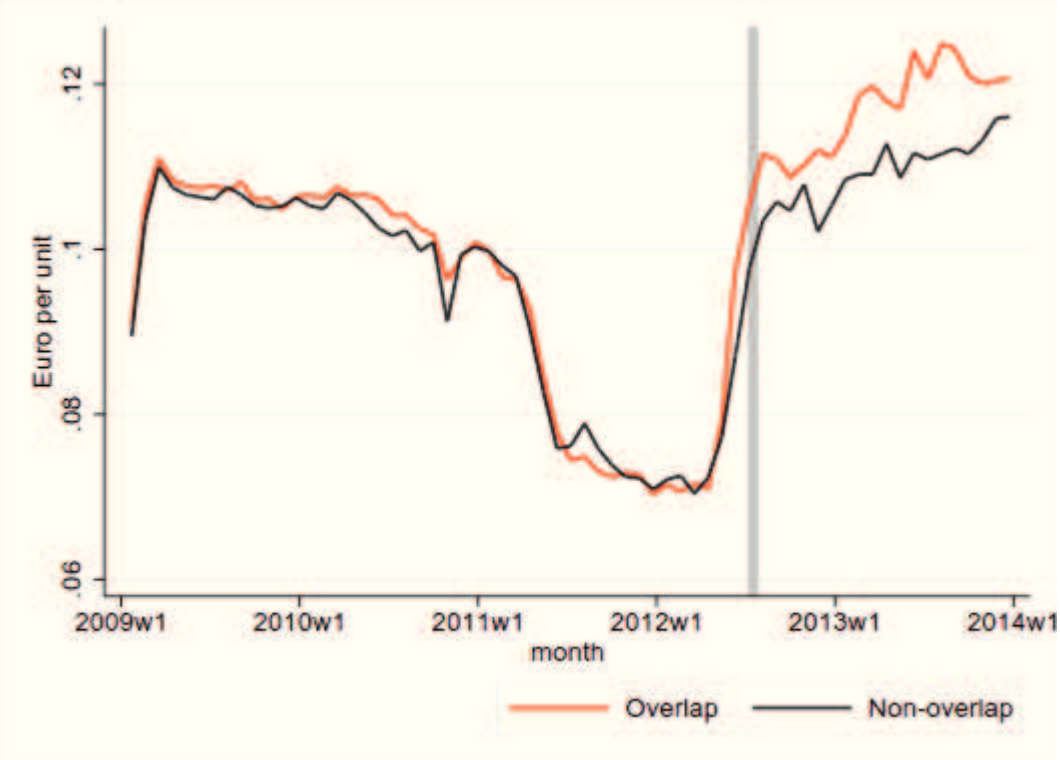
Source: Lear elaboration on IRI data

Figure 6.3: Comparison between average price trends in treated and control group: coffee



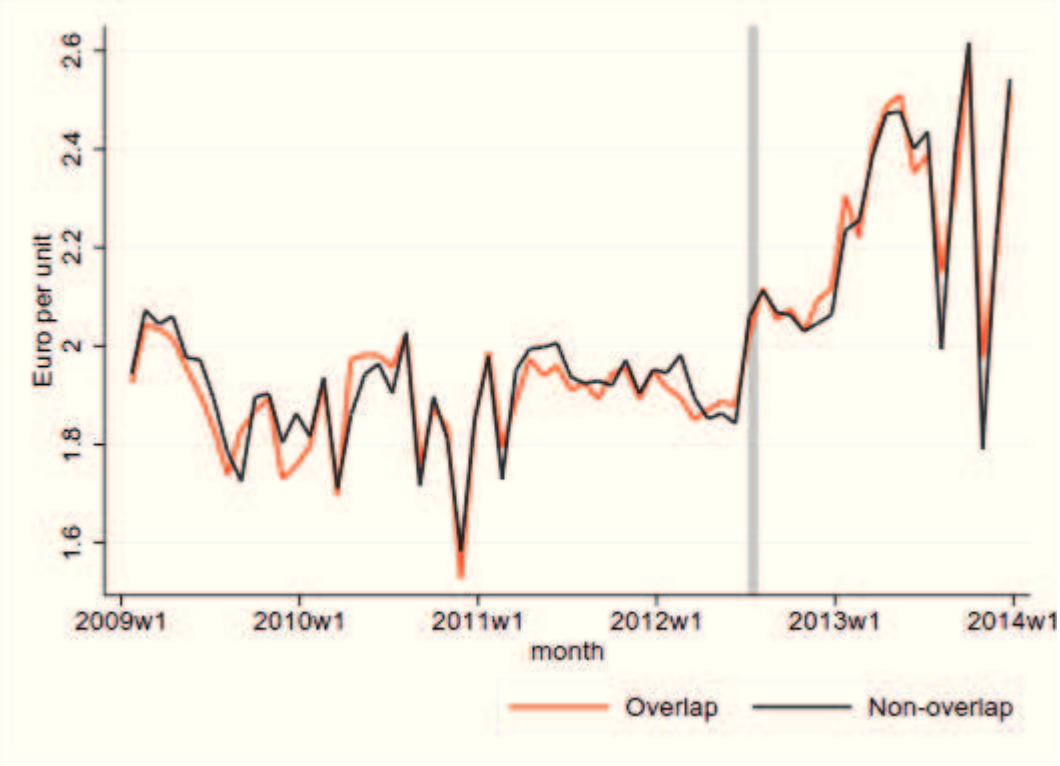
Source: Lear elaboration on IRI data

Figure 6.4: Comparison between average price trends in treated and control group: sanitary napkins



Source: Lear elaboration on IRI data

Figure 6.5: Comparison between average price trends in treated and control group: frikandels



Source: Lear elaboration on IRI data

The graphs shown confirm our expectations. In the pre-merger period, there is a common trend in price between treated and control stores. Moreover, the graphs above offer a preliminary intuition of the result for our analysis: prices in the treated and control stores maintain *the same trend and level* all over the period of the analysis.[48] If the merger had any impact on prices, we would have expected the distance between the two price trends to increase in the post-merger period.

It shall be stressed that evidence shown in the graphs above could also suggest the absence of geographic price variability. For this reason, in the following sections, we undertake a different set of analysis under the hypothesis of a national competition. In particular, we compare the prices charged by the merging stores with the prices charged by the competitors.

The following table shows the composition of the merging stores' sample.

Table 6.1: Across areas analysis: selected stores for the price analysis

Insignia		Treated group	Control group
C1000		18	15
Jumbo	*Super de Boer rebranded to Jumbo*	11	11
	Jumbo	4	4
C1000 rebranded to Jumbo		7	10
Total		40	40

Source: Lear elaboration on IRI data

[48] Except for cola and sanitary napkins.

In the control group, 15 stores have always operated under C1000 insignia in the period of analysis (2009 – 2013). Only four Jumbo stores, in the control group, have always operated under Jumbo insignia. Other 11 stores were previously Super de Boer stores and they changed insignia starting from 2011 (a rebranding process that took place as a consequence of the first merger – Jumbo/Super de Boer – at the end of 2009). The remaining 10 stores, instead, have experienced a change in the insignia from C1000 to Jumbo during the year 2013.

In the treated group, only seven of the 40 stores selected experienced a rebranding process and a subsequent change in insignia to Jumbo in the period of analysis.

Hence in the econometric analyses, we need to control for the fact that the rebranding process (i) took place long after the occurrence of the merger (ii) it also affected stores in the non-overlapping areas (iii) it affected only some of the stores in our sample.

6.2. Regression equation and regressors

To evaluate the effect of the merger 7323 across areas, we carry out a DiD analysis. We compare the change in price (and in product variety) before and after the merger in a selection of stores belonging to the merging parties that were located in overlap areas, with the change in price (and product variety) before and after the merger in other stores of the merging parties picked from the best matching non-overlap areas. The period of analysis goes from January 2009 to December 2013 and the date of the merger has been inferred from the date of the ACM merger decision, i.e. February 2012.

The following general estimating equation illustrates our model:

$$P_{ist} = \alpha + \beta * overlap_s + \gamma * post\ merger_{ist} + \delta\ post\ merger_{ist} * overlap_s + \mu * Z_{st} + \varepsilon_{ist}$$

Where P_{ist} is the monthly price charged by the store *s*[49] for the product *i* at time *t*; $overlap_s$ is a dummy variable that takes value one if the store is located in an overlap area; $post\ merger_{ist}$ is a dummy variable that takes value one if the product's price is observed in the post-merger period (i.e. after February 2012); Z_{st} is a set of variables that control for local market features (on the demand and supply side) that change over time.

The equation is estimated through an Ordinary Least Squares (OLS) model. The key variables in the regression equation are the following:

- $post\ merger_{ist}$, whose coefficient measures the change in price before and after the merger common to all the locations (treated and not);
- $overlap_s$, whose coefficient measures any idiosyncratic differences between treated and control group that are not related to the merger;
- $\boldsymbol{post\ merger_{ist} * overlap_s}$ (or *DiD*), whose coefficient measures how much of the variation in price before and after the merger in the overlap areas is due to the merger itself, i.e. the additional variation experienced by the prices in the overlap areas compared to the average price change in the non-overlap areas.

In order to control for any other factors that could bias the price effect of the treatment we include some control variables. First, we include some variables to capture the time varying demand and supply conditions in each local market (i.e. City, in line with the ACM geographic market definition) – see section 4.3.4. Second, we include a set of dummy variables to control for any differences between

[49] Each store is identified by a specific store number (as defined in the "Supermarket Gids" database).

the pricing strategy of C1000 and Jumbo and to control for any rebranding effect.[50] The following table provides a description of these latter variables:[51]

Table 6.2: Rebranding dummy variables

Control variables	Description
Chain variables	
C1000	dummy variable that takes value one if the store operates (or was operating before the rebranding) under C1000 insignia
Jumbo	dummy variable that takes value one if the store operates (or was operating before the rebranding) under Jumbo insignia
Rebranding effect control variables	
Rebranding from Super de Boer to Jumbo	dummy variable that takes value one if the store has been rebranded from Super de Boer to Jumbo from the date of the rebranding
Rebranding from Super de Boer to C1000	dummy variable that takes value one if the store has been rebranded from Super de Boer to C1000 from the date of the rebranding
Rebranding from C1000 to Jumbo	dummy variable that takes value one if the store has been rebranded from C1000 to Jumbo from the date of the rebranding

6.3. Methodological issues

Our dataset includes different products' categories and different brands for each category. It is easy to imagine that each of these different categories and brands may exhibit different price patterns over time. In order to properly estimate the effect of the merger on prices, it is necessary to control for all the SKUs-specific and time-invariant characteristics (observed and unobserved) that may affect price and are exogenous to the treatment (i.e. the merger). A pooled regression on all the products would result in an omitted variable bias: we would not control for all the unobservable variables that are correlated with the regressors and not included in the regression equation.[52] A fixed effect estimation would control for the average difference across SKUs and would allow to estimate the price variation within each SKU.

However, it is necessary to point out that even the same SKU may exhibit different pricing pattern depending on the store's chain that is selling it. For instance, Jumbo adopts the so called "every day low price" strategy. C1000, instead, used to occupy a slightly higher price point mitigated by aggressive promotions. Hence, it would be necessary to control also for such differences.

For this reason, we include in our regression analysis dummy variables for any combination of chain and SKU. In this way, we control for the average difference in price between two different SKUs sold by the same supermarket chain and for the average difference in price between the same SKU sold by two different supermarket chains. Thanks to the inclusion of the fixed effects, our regression model

[50] It is important to underline that, following the rebranding, the new insignia brands (or/and private label products) are introduced in the assortment of the stores. However, we excluded from our database all the SKUs for which we observe prices only after the merger.

[51] The data for the local market features are quarterly, the insignia and the rebranding effect variables, instead, are monthly.

[52] Differently from the random effect model, the fixed effect model assume that the unobservable individual effect are correlated with the predictor or independent variables included in the model. In a random effect model, instead, the main assumption is that the unobservable individual effect are stochastic.

would be able to properly explain the average variation in price over time and to correctly isolate the impact of the merger.

Moreover, given the structure of our panel dataset, we need to relax one of the assumptions of the OLS models,[53] and allow errors to be correlated within each cluster.[54] Clustering standard errors allows us to make statistical inference and correctly evaluate the significance of the coefficients included in our analysis. We decide to cluster at SKU and storenumber level. We hence assume that any external shock to prices might differently affect each combination of storenumber and SKU. A different assumption would have required a higher cluster (such as SKU, Chain or storenumber level). However, we believe that assuming a higher level of cluster would have been too weak; it would have indeed implied assuming that in case of an external shock to prices (e.g. shock to the demand), errors are correlated across all the chains or alternatively across all the SKUs. Notwithstanding our concern, in the appendixes we present the results of the baseline specification of our econometric model, with different clustered standard errors.

We finally control for time series correlation and use Newey standard errors to allow errors to be auto-correlated up to some lag (the results of our analysis with Newey standard errors are presented in the appendix).

6.4. Results

The analysis conducted across areas show that the merger 7323 did not determine an average increase in price. In particular, the coefficient of interest DiD is always not significantly different from zero and therefore, the merger does not seem to have had a different impact in the overlap and non-overlap areas. We describe below the several analysis we conducted and we discuss in more details the results.

The following table shows the results obtained through our baseline specification. The variable of interest, DiD, measures the additional variation in prices for the stores located in the overlap areas, compared with the variation in prices for the stores located in the non-overlap areas in the period 2009-2013. The coefficient of DiD is equal to 0.00358 and it is not significant[55] (model 1). It hence indicates that there is no statistically significant difference between the variation in price experienced by the treated stores between the pre-and post-merger period and the variation in price experienced by the control stores over the same period. In other words, the merger did not have any effect on price, at least at local level.

More in detail, interesting results are that:

- the variable *post-merger* has a positive and significant coefficient: prices have increased in the post-merger period (for both treated and control stores).
- the variable *overlap*, instead, has a negative and not significant coefficient. There is no statistical difference between treated stores (located in overlapping areas) and control stores (located in non-overlapping areas).

[53] One of the assumption of the OLS model is that errors are independent and identically distributed.

[54] Under autocorrelation (across units or over time) the usual OLS estimators, although unbiased are no longer minimum variance among all linear unbiased estimators. As a result, the statistical test may not be valid. In our analysis, price observations across different products (or different brands within the same category) are expected to be correlated. At the same time, the time interval between successive observations is so short (a month) that successive price observations are likely to exhibit intercorrelations. In the Appendix F, we also provide the results of our analysis with Newey West standard errors (that control for autocorrelation over time). See Gujarati and Madsen (1998).

[55] A rule of thumb to evaluate the significance of coefficients is that if the t-statistic is greater than 2, we can reject the hypothesis that the parameter estimate is equal to zero.

- finally, the variable DiD summarize the previous two variables and measures the difference between treated and control group before and after the merger. The coefficient of DiD is positive and not significant: the treatment (merger) had no effect on prices.

Table 6.3: DiD across areas – baseline specification

VARIABLES	(1) Baseline Price	(2) Baseline Price
Post-merger	0.199	0.203
	(0.025)***	(0.025)***
Overlap	-0.0133	-0.0191
	(0.014)	(0.014)
Did	0.00358	0.00672
	(0.035)	(0.035)
Population	-2.59e-07	-2.63e-07
	(0.000)***	(0.000)***
Average income	0.00831	0.00794
	(0.002)***	(0.002)***
Discounters market share	0.0835	0.0799
	(0.024)***	(0.023)***
HHI	3.68e-06	1.24e-06
	(0.000)*	(0.000)
Rebranding from C1000 to Jumbo		-0.0127
		(0.006)**
Rebranding from SdB to Jumbo		-0.0971
		(0.034)***
Rebranding from SdB to C1000		0.00764
		(0.032)
Constant	1.589	1.611
	(0.042)***	(0.041)***
Observations	83,736	83,736
R-squared	0.947	0.947
cluster	Storenumber*SKU	Storenumber*SKU
FE	Chain*SKU	Chain*SKU

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

In model (2), we also include three binary variables to control for the rebranding effects all over the period of the analysis. If the C1000 stores experienced a variation in price over time due to the rebranding to Jumbo, this effect is isolated from the effect of the merger (measured by the DiD

variable).[56] The DiD coefficient is still not significant. The rebranding has a negative and significant coefficient for the rebranding effects from Super de Boer and C1000 to Jumbo. The conversion to Jumbo stores, indeed, seems to have caused a significant decrease in price (*-0.0971* for previous Super de Boer stores and *-0.128* for previous C1000 stores). Such decrease might be due to the different and more aggressive pricing policy adopted by Jumbo (the so called "every day low price" strategy).

In both models (1 and 2), all control variables have significant coefficients. The degree of concentration (measured through the HHI) and the average income per capita positively impact prices as expected. The variable population, instead, assumes a counterintuitive sign. The variable population is a proxy for demand and should have a positive impact on prices. However, its coefficient is negative and significant. A plausible interpretation is that population is highly correlated with the number of stores in a city. The higher the number of inhabitants in a city, the higher the expected demand, the higher the number of stores in that city and the stronger the competition on prices. The following graphs shows the correlation between the variable population, number of stores, population density and HHI. The number of stores is almost perfectly correlated with population. As population at city level increases, the number of stores increases and the HHI diminishes. The market becomes more competitive and prices may decrease.[57]

[56] At the same time, if the prices charged by Jumbo (C1000) were subject to a variation due to the rebranding from Super de Boer to Jumbo (C1000), we isolate the effect of the merger from the this secondary effect.

[57] To further investigate the sign of the variable population, we also try a different specification of the variable. We accept to loose some of the variability in the variable population by aggregating the variable in four classes (lower than 15,000 inhabitants; between 15,000 and 40,000 inhabitants; between 40,000 and 70,000 inhabitants; higher than 70,000 inhabitants). We then build a progressive variable that takes value from one to 4 for each of the population classes identified. The coefficient of this variable indicates by how much prices increase moving from a less to more populated city. As in the case of the continuous variable, the coefficient is negative.

Figure 6.6: Correlation matrix

Source: Lear elaboration on CBS and Supermarket Gids data

The variable Discounters market shares measures the competitive pressure coming from the hard-discounters (in particular Aldi and Lidl). The variable assumes a positive coefficient, 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 is counterintuitive: we would have expected that the presence of hard discounters intensifies the competitive conditions in a city, driving prices at lower levels. A possible explanation could be related to the fact that the hard-discounters might deem convenient to locate their stores in the most concentrated markets where prices are higher.[58]

As already extensively discussed, we included fixed effects for each combination of chain and SKUs and we allowed for clustered standard errors at store number and SKU level. In the appendix F, we present several specification of the baseline model in which we also experimented: (i) clustered standard errors at higher level (SKU level, Chain level. SKU-Chain level); (ii) Newey-West standard error to control for autocorrelation over time. All the analysis performed confirm the main result: the merger does not have a significant effect at local level.

Model (1) and (2) assume that the pre-merger and post-merger period are separated by the date of the ACM decision (21 February 2012). However, we do not know exactly when the two merging parties became one single entity (it could have happened right after as well as some months later the publication of the decision of the Dutch competition authority). Moreover, the competitive conditions could have started changing since the notification of the acquisition. Dropping observations for an

[58] This result might also be due to the sample composition. The areas in which the discounters stores are present, are also characterized by a strong presence of AH stores (whose prices are generally higher than the average). The variable Discounters market shares may then capture the positive impact on price coming from the high number of AH stores.

appropriate timespan around the merger is useful for controlling for transitory time-varying factors. For this reason, we also run our baseline model excluding from our dataset a **window of 3 and 6 months** before and after the merger date.

The following table shows that, even when excluding the data surrounding the merger date, the DiD coefficient is still not significant.

Table 6.4: DiD across areas: merger window

	(3)	(4)
	3 months window	6 months window
VARIABLES	Price	Price
Post-merger	0.227	0.264
	(0.027)***	(0.029)***
Overlap	-0.0126	-0.0114
	(0.014)	(0.014)
Did	0.00744	0.00489
	(0.038)	(0.041)
Population	-2.70e-07	-2.42e-07
	(0.000)***	(0.000)**
Average income	0.00694	0.00587
	(0.002)***	(0.002)***
Discounters market share	0.0708	0.0577
	(0.024)***	(0.024)**
HHI	2.97e-06	2.74e-06
	(0.000)	(0.000)
Constant	1.630	1.652
	(0.041)***	(0.040)***
Observations	74,198	64,592
R-squared	0.948	0.949
cluster	Storenumber*SKU	Storenumber*SKU
FE	Chain*SKU	Chain*SKU

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

6.5. Heterogeneous treated effects across local areas

In the following table, we show the results of some alternative estimates performed in order to strengthen the conclusions drawn on the merger, if any.

First, we evaluate if the merger has a different impact for those merging stores whose **combined market share** after the merger **is higher than 50%**[59] **(model (5))**. Compared to our baseline model (model 1), the DiD variable captures the effect of the merger on all the merging stores whose combined

[59] Or higher than 40% but still deemed as problematic by the ACM.

market share after the merger is less problematic (market share less than 50%). The variable "DiD – Higher50", instead, captures the additional effect of the merger when the combined market share of the merging stores is higher than 50% after the merger. Even in this case, the coefficients of the variables of interest are not significant, thereby indicating that not even in these areas we observe a systematic difference in the price variation caused by the merger.

In model (6) we evaluate if the merger had a different impact for those stores who experienced a **rebranding from C1000 to Jumbo**. The variable "DiD – Rebranding" should capture the additional effect of the merger for those stores who experienced a rebranding in the post-merger period. Even in this case, the coefficients of the variables of interest are not significant. Interestingly, the coefficient of the variable "Rebranding from C1000 to Jumbo" has a positive sign. This could imply that the treated stores that have been subjected to a rebranding, adopted higher prices in the post-merger period than the treated stores that did not get rebranded. However, the coefficient is not significant and we cannot infer any firm conclusion from its sign.

Table 6.5: DiD across areas: differentiating the effect of the merger

	(5) Combined mkt share > 50%	(6) Rebranding
VARIABLES	Price	Price
Post-merger	0.199	0.199
	(0.025)***	(0.025)***
Overlap	-0.0157	-0.0153
	(0.015)	(0.014)
Did	0.00503	0.00229
	(0.038)	(0.035)
Did_Higher50	-0.00535	
	(0.055)	
Did_Rebranding		0.0173
		(0.056)
Population	-2.47e-07	-2.62e-07
	(0.000)***	(0.000)***
Average income	0.00853	0.00864
	(0.002)***	(0.002)***
Discounters market share	0.0875	0.0888
	(0.025)***	(0.026)***
HHI	3.75e-06	3.46e-06
	(0.000)**	(0.000)*
Higher50	0.00834	
	(0.022)	
Rebranding from C1000 to Jumbo		-0.0132
		(0.009)
Divestiture		
Constant	1.583	1.586
	(0.043)***	(0.043)***
Observations	83,736	83,736
R-squared	0.947	0.947
cluster	Storenumber*SKU	Storenumber*SKU
FE	Chain*SKU	Chain*SKU

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

6.6. Effect of the divestitures

The issuance of a divestiture helps alleviating competition concerns in areas where the competitive conditions are expected to be harmed by the merger (because of the contemporaneous presence of a combined market share higher than 50%, high entry barriers to entry and lack of other mitigating

factors). We then evaluate if the requirement of structural remedies (i.e. divestiture) alleviates the effect of the merger at least in those areas where a store has been divested. For this purpose, we included in our model a dummy "Divestiture" that takes value one in the post- merger period if the store is located in a city where a divestiture has been made. We then interacted the variable DiD with the variable Divestiture to explore if the merger had a different effect in the areas where a divestiture has been issued.

As it is shown in model (7) Table 6.6, the variable "Divestiture" has a positive but not significant coefficient. The positive sign could have indicated that, in areas where a divestiture has been required, prices were expected to be higher in the post-merger period. In spite of that, the t-statistic indicates that the coefficient is not statistically different from zero: prices in the areas in which a divestiture has been mandated are not statistically different form prices in the remaining areas. The variable DiD should indicate the effect of the merger, isolating it from the potential benefit of the divestiture. The coefficient is positive and slightly higher than in model (1) but it is still not significant. At the same time, the coefficient of the variable "DiD – Divestiture" is not statistically different from zero. In the absence of any effect of the merger, the issuance of the divestiture might have been redundant.

Table 6.6: Effect of divestitures

VARIABLES	(7) Divestiture Price
Post-merger	0.199
	(0.025)***
Overlap	-0.0134
	(0.014)
Did	0.00595
	(0.036)
Did_Divestiture	-0.0154
	(0.050)
Population	-2.55e-07
	(0.000)***
Average income	0.00828
	(0.002)***
Discounters market share	0.0822
	(0.026)***
HHI	3.67e-06
	(0.000)*
Divestiture	0.00392
	(0.011)
Constant	1.589
	(0.043)***
Observations	83,736
R-squared	0.947
Cluster	Storenumber*SKU
FE	Chain*SKU

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

The model (7) does not allow us to draw any firm conclusion on the effect of the divestitures. The analysis shows us that in the areas in which a merging store have been divested, the effect of the merger on prices is still not significant. However, we do not have information on the counterfactual price charged by the merged entity in the case in which in that area none of the merging stores would have been divested. Therefore, we cannot conclude if the absence of effect on prices in those areas is related to the divestiture or not. For this reason, we decide to investigate the effect of the divestiture by comparing the price trend in the areas in which a divestiture has been issued with the price trend in the best comparable areas where no divestiture has been issued. We notice that in this particular case that the ACM required a divestiture in the overlapping areas in which the combined market shares of the merging stores was above 50%. We hence restrict our sample to all the overlapping areas where the merged entity holds a combined market share above 50%. We then carry on a DiD analysis in which

the treatment is the divestiture. The treated and control stores are hence comparable except for the treatment:

- the treated stores are the stores located in the overlapping areas where the combined market share of the merged entity is above 50% and a merging store has been divested;
- the control stores are the stores located in the non-overlapping areas where the combined market share of the merged entity is above 50% but none of the merging stores has been divested.[60]

To guarantee the comparability of the treated and control stores, we econometrically test if price trends are comparable in the pre-treatment period (i.e. pre-divestiture – before July 2012). The following table shows the results we obtain:

Table 6.7: Comparability across treated and control stores in the divestiture analysis

	(1) Treated and control stores
VARIABLES	Price
time	0.00232
	(0.001)***
Treated*time	-5.37e-06
	(0.000)
population	-7.02e-07
	(0.000)
averageincome	-0.000559
	(0.010)
Discounters_mktsh	-0.0191
	(0.235)
HHI	-6.07e-06
	(0.000)
Constant	-4.254
	(1.756)**
Observations	7,947
R-squared	0.946
cluster	Storenumber*SKU
FE	Chain*SKU

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

The variable "Treated*Time" measure the additional time variation in prices for the treated stores (compared to the control stores). Its coefficient is positive but not significant: in the pre-divestiture

[60] Notice that the control stores have individual market shares below 50% in the pre-merger period. They cross the 50% threshold only in the post-merger period when they combine their market shares.

period, the price trend of the treated stores is not significantly different from the price trend of the control stores. In other words, the control stores we selected are a valid control group.

We then estimate the following regression equation to assess the effect of the divestitures on prices:

$$P_{ist} = \alpha + \beta * treated_s + \gamma * post\ divestiture_{ist} + \delta\ post\ divestiture_{ist} * treated_s + \mu * Z_{st} + \varepsilon_{ist}$$

Where

- $treated_s$ takes value one if the stores is located in a city in which a divestiture has been issued and value zero otherwise;
- $post\ divestiture_{ist}$ takes value one in the period after the issuance of the divestiture (July 2012)
- $post\ divestiture_{ist} * treated_s$ (DiD) takes value one in the period after the issuance of the divestiture and if the stores is located in a city in which a divestiture has been issued.

The coefficient of $post\ divestiture_{ist} * treated_s$ is our coefficient of interest. It indeed measures the additional variation in prices in the post-merger merger period caused by the divestiture. If the divestiture has been effective, we would expect a negative coefficient: the divestiture of a merging store restores the market competitive conditions after the merger and the merging stores are forced to lower prices.

The table below shows our results. The coefficient of the variable of interest is negative but not significant. The divestitures do not cause any significant difference between the price charged by the control and treated stores.[61] This result suggest that, as far as the effect on prices is concerned, the requirement of divestitures might have been redundant.

[61] The result of the additional analysis on the effect of the divestitures gives us further insights to interpret the results of model (6). The scarce significance of the interaction variable DiD*Divestiture actually implies that, even in the absence of the divestiture, the merger would have had no effect on prices in the areas where a store has been divested.

Table 6.8: Separate analysis on the effect of divestiture on prices

VARIABLES	(1) Treatment=Divestiture Price
Post-treatment	0.174
	(0.058)***
Treated	0.0716
	(0.038)*
Did	-0.00739
	(0.082)
Population	2.59e-06
	(0.000)
Average income	0.0417
	(0.013)***
Discounters	0.696
market share	(0.280)**
HHI	3.16e-05
	(0.000)*
Constant	0.646
	(0.428)
Observations	10,761
R-squared	0.950
cluster	Storenumber*SKU
FE	Chain*SKU

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

***

The various analysis performed indicate that the variation in price for the treated stores (merging stores in overlap areas) is not statistically different from the variation in price for the control stores (merging stores in non-overlap areas), i.e. the merger has had not an effect on prices at local level. It might still be possible that the merger caused an increase in price all over the Netherlands (in the case in which stores adopt a national pricing policy). In the following sections, we present the analysis *across chains*, that, although less precise, is useful to evaluate if the merger adversely affected competition even if supermarkets set their prices mainly at national level. [62]

7. Merger assessment – across chains analysis

In the following section, we evaluate the effect of the merger 7323 *across chains*. This analysis provides valid results also in case of national pricing. Our general understanding, based on the evidence

[62] In the Appendix F, we also provide the results of our specification model for each category. Even in that case, the DiD variable is never significant.

collected with interviews and questionnaires, is that the majority of supermarket chains do adopt a national pricing strategy. On the other hand, Jumbo is known to set prices that vary across regions and to allow for some flexibility in pricing at local level. Furthermore, our analyses showed that some local variability exists; moreover, national pricing is a reversible choice. Hence, we opt for an alternative analysis *across chains* in order to successfully evaluate the effect of the merger, also in the case of national pricing.

7.1. Identification strategy

As per the analysis *across areas*, we decided to adopt the "difference in differences" (Did) approach. However, the identification of the treated and control groups in this case will follow different criteria.

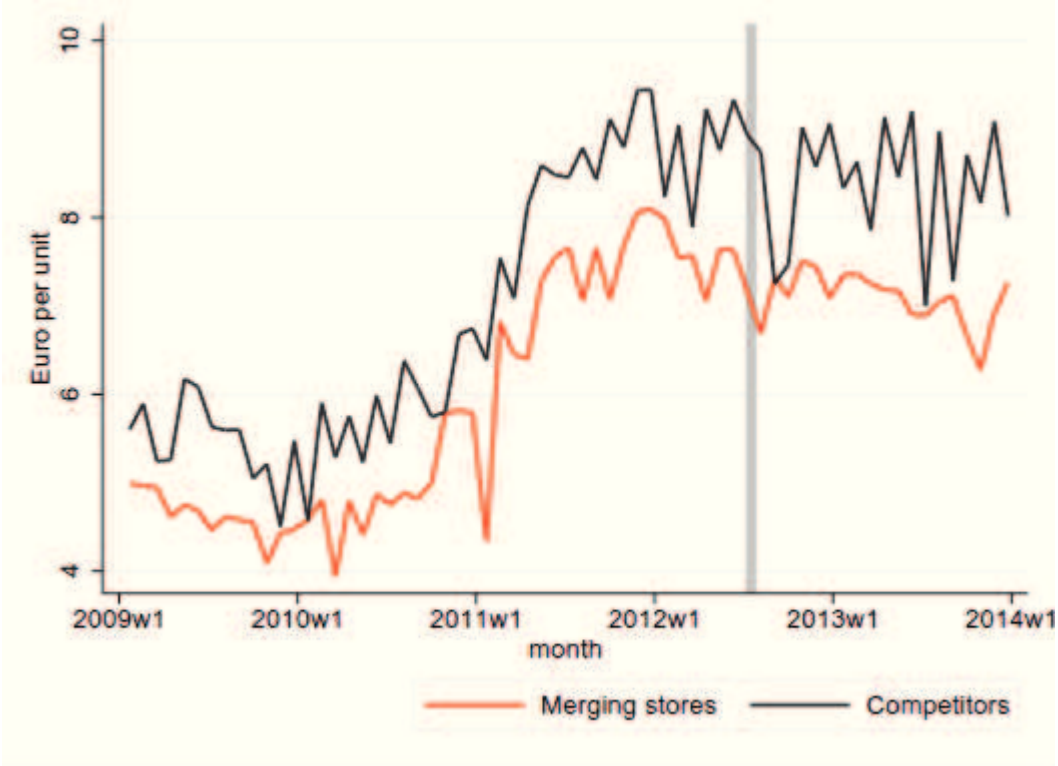
The underlying assumption of the analysis *across chains* is that a merger may have different effects across stores. In particular, the economic literature demonstrates that if the merging parties increase their prices after the merger, competitors will increase their prices too but less than the merging parties.[63] As a consequence, the treated group is represented by all the merging parties and the control group is represented by the competitors.

To be the competitors a valid control group, we should observe a common price trend before the merger. The average price charged by the control group should indeed represent what would have been the price charged by the merging parties, had the merger not occurred. This would be ensured by a similarity of the price trend before the merger date.

The following graphs depict the price trend over the entire period of analysis for the merging parties and some competitors (Albert Heijn and Coop) for a subset of the selected products' categories. They show a common price pattern in the pre-merger period for the merging stores and the competitors (except for cleaners, for which in the period 2009 – 2011, prices are decreasing for the merging parties while remaining stable for competitors). As before, the graphs allow to infer a preliminary conclusion: the distance between prices between merging stores and competitors do not increase in the post-merger period (except for sanitary napkins) and, therefore, the merger might not have had an effect even at national level.

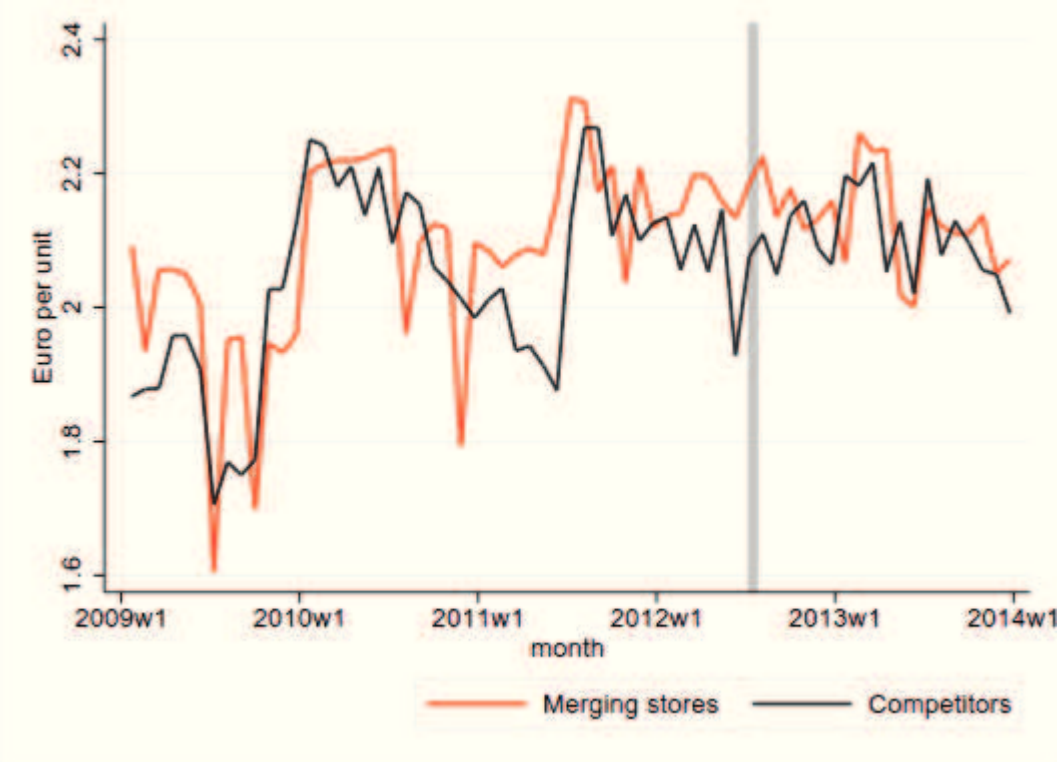
[63] See Motta (2004), Deneckere and Davidson, (1985).

Figure 7.1: Comparison between average price trends in treated and control stores: coffee



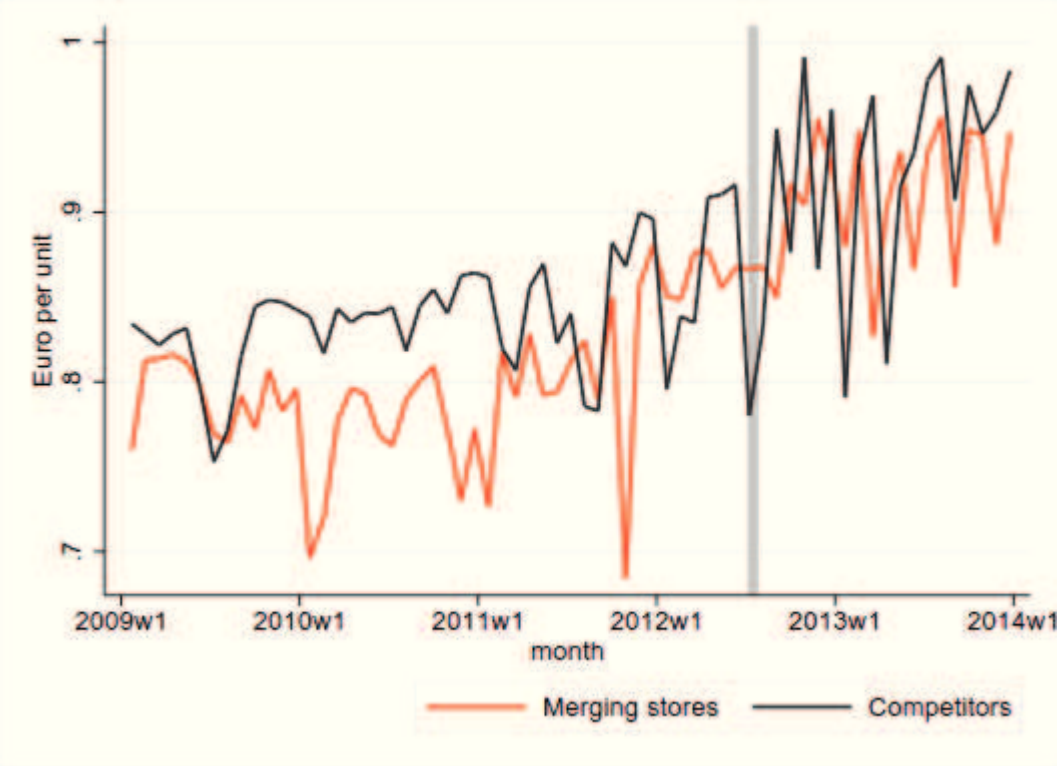
Source: Lear elaboration on IRI data

Figure 7.2: Comparison between average price trends in treated and control stores: mayonaise



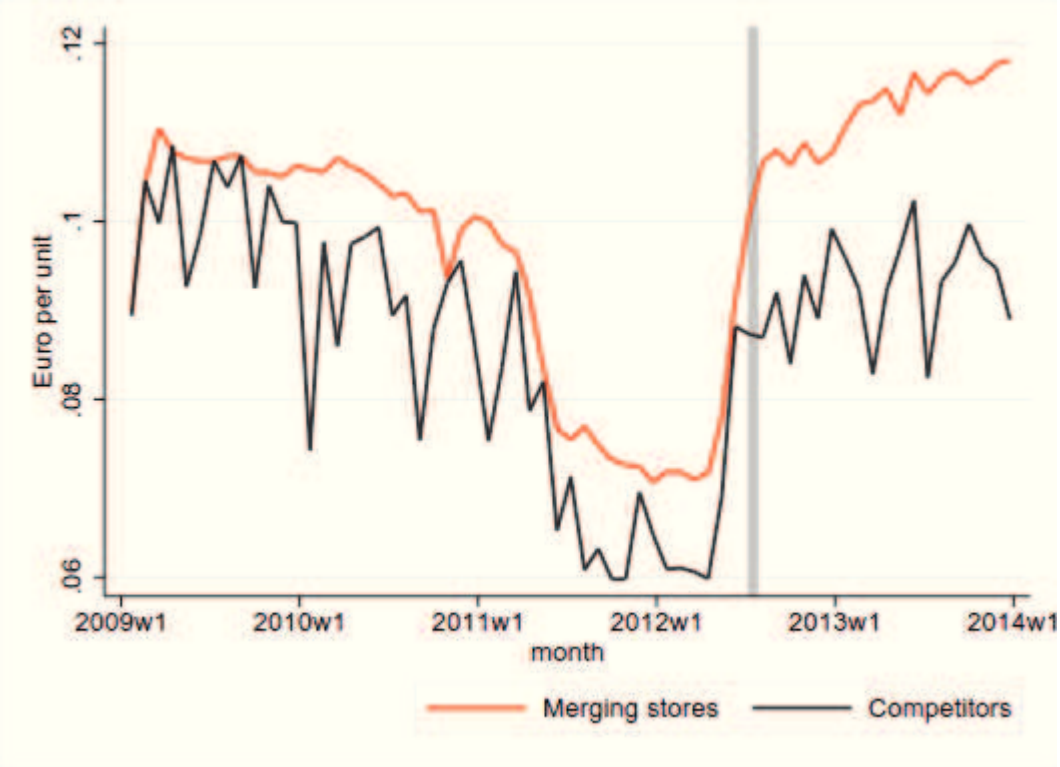
Source: Lear elaboration on IRI data

Figure 7.3: Comparison between average price trends in treated and control stores: cola



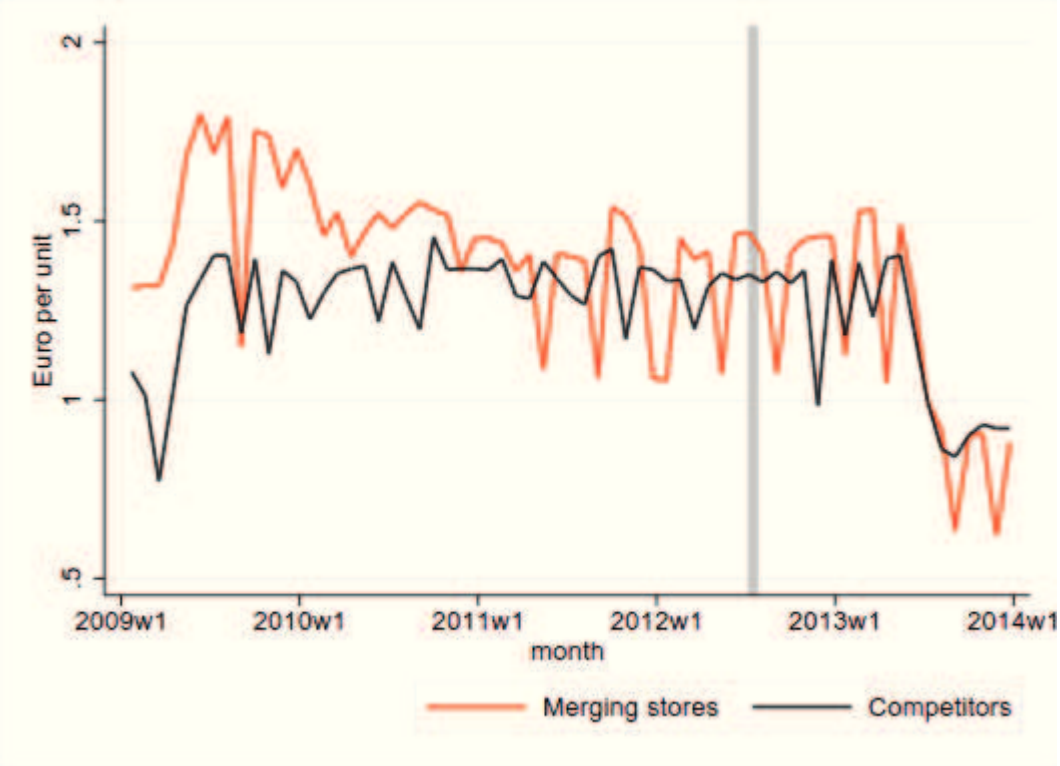
Source: Lear elaboration on IRI data

Figure 7.4: Comparison between average price trends in treated and control stores: sanitary napkins



Source: Lear elaboration on IRI data

Figure 7.5: Comparison between average price trends in treated and control stores: cleaners



Source: Lear elaboration on IRI data

Moreover, to further test if competitors' stores are a valid control group for the merging stores and hence share a similar price trend in the pre-merger period, we estimate the following regression equation (only in the period before the merger):

$$P_{ist} = \alpha + \beta * time\ trend_t + \delta * time\ trend_t * Merging\ Stores + \varepsilon_{ist}$$

where the variable $time\ trend_t * Merging\ Stores$ takes value one if the stores belong to the merging parties, zero otherwise. The coefficient δ should hence capture any difference in the time trend in the pre-merger period between the merging stores and the competitors. The following table provides the results of the analysis.

Table 7.1: Comparison of the average price trend between treated and control stores – pre merger period

VARIABLES	(1) Price
Time	0.00334
	(0.00208)
Time*Mergingstores	-0.000768
	(0.00178)
Population	2.83e-08
	(0.00000)
Average Income	0.00539
	(0.00497)
Discounters market share	0.0862
	(0.05514)
HHI	2.04e-06
	(0.00000)
Rebranding from C1000 to Jumbo	-0.00147
	(0.00524)
Rebranding from Super de Boer to Jumbo	-0.0548
	(0.03747)
Rebranding from Super de Boer to Jumbo	0.00292
	(0.01874)
Constant	-7.137
	(5.47177)
Observations	80,993
R-squared	0.934
Cluster	SKU
FE	Chain*SKU

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

The coefficient of the interacted variable is not significant, thereby indicating that there is no statistical difference between the price charged by the merging stores (treated group) and the price charged by the competitors (control group) in the pre-merger period.[64]

The qualitative evidence collected through the graph and the results obtained through the regression analysis allow us to conclude that the competitors are a valid control group to test if the merger had an effect on the price charged by the merging stores.

[64] Notice that the variable Time is significant with a p-value of 0.113 whereas the variable Time*Merging stores is definitely not significant (p-value of 0.668).

Finally, the treated group will be composed by all the merging parties (80) and the control group will be instead composed by the competitors (32 stores for Albert Heijn and 6 stores for Coop)[65].

7.2. *Regression equation and regressors*

The general regression equation is the following:

$$P_{ist} = \alpha + \beta * merged_s + \gamma * post\ merger_{ist} + \delta\ post\ merger_{ist} * merged_s + \mu * Z_{st} + \varepsilon_{ist}$$

P_{ist} is the monthly price charged by the store *s*[66] for the product *i* at time *t; $merged_s$* is a dummy variable that takes value one if the store belongs to the merging parties or competitors' chains; $post\ merger_{ist}$ is a dummy variable that takes value one if the product's price is observed in the post-merger period (i.e. after February 2012); Z_{st} is a set of variables that control for time-varying local market features (on the demand and supply side).

The key variables in the regression equation are the following:

- $post\ merger_{ist}$, whose coefficient measures the change in price before and after the merger common to all the stores (treated and not);
- $merged_s$, whose coefficient measure any idiosyncratic differences between treated and control group that are not related to the merger;
- $\boldsymbol{post\ merger_{ist} * merged_s}$ (or *Did*), whose coefficient measures how much of the variation in the price charged by the merging parties before and after the merger is due to the merger itself, i.e. the additional variation experienced by the prices in the merging stores compared to the average price change in the competitor stores.

The only difference with the analysis across areas is given by the definition of the treatment and control group: the variable $overlap_s$ has now been replaced by the variable $merged_s$.

The control variables will be the same as described in section4.3.4.

7.3. *Methodological issues*

As we did in the analysis *across areas*, the regression analysis includes fixed effects for any combination of chain and SKU in order to control for all the unobservable factors that may affect the difference between prices at SKU-Chain level and bias the estimation of the effect of the treatment.

We relax our assumptions on autocorrelation and we cluster standard errors at SKU-Chain level. In this way, we allow errors to be correlated across different stores within the same chain and SKU, i.e. we assume that stores belonging to the same chain might uniformly set prices. In the previous analysis, clusters are instead defined at SKU-storenumber level because we implicitly assume locally set prices (i.e. differing across areas).[67]

7.4. *Results*

The results of the analysis *across chains* confirmed the conclusion we inferred from the analysis *across areas*: the merger had no statistically significant impact on prices. The variation in the price charged by the merging stores before and after the merger is not statistically different from the variation in the

[65] The competitors store are disturbed all over the country, both in the overlap and not overlap areas.

[66] Each store is identified by a specific storenumber (imported by a Dutch guide of supermarkets called "Supermarket gids").

[67] In the Appendix F, we provide the results of the baseline specification model with different level of clustered standard errors. The results do not change and the same conclusion can be drawn.

price charged by the stores of competitors over the same period. We conclude that the merger did not affect price competition, and this conclusion holds both under the assumption of local and national pricing.

The following table shows the results of our baseline specification. The coefficient of the variable Post merger is positive, thereby showing that there has been an average increase in price in the post-merger period. The coefficient of the variable DiD, instead, is not significant: there is hence no significant difference between the variation in the price charged by the merging stores and the competitors. It follows that the merger #7323 had no impact on prices, even if we assume national pricing.

Table 7.2: DiD across chains – baseline specification

VARIABLES	(1) Basic regression Price
Post merger	0.248
	(0.135)*
Merged	5.712
	(0.045)***
Did	-0.0447
	(0.135)
Population	-1.01e-07
	(0.000)
Average income	0.0123
	(0.006)**
Discounters market share	0.119
	(0.057)**
HHI	2.03e-06
	(0.000)
Rebranding from C1000 to Jumbo	-0.0113
	(0.006)*
Rebranding from SdB to Jumbo	-0.0919
	(0.075)
Rebranding from SdB to C1000	0.00620
	(0.037)
Constant	1.451
	(0.156)***
Observations	131,869
R-squared	0.935
cluster	SKU
FE	Chain*SKU

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

In the following table, we enrich our baseline specification to further explore the effect of the merger *across chains*:

- in model (2) and (3), we drop respectively 3 and 6 months around the merger decision date. This is based on the assumption that the exact moment in which the parties merged, or in which market players reacted to the news of the upcoming merger, is unknown. In both cases, the coefficients associated with the DiD are not statistically significant;
- in model (4), (5) and (6), we adopt a different time horizon in the post-merger period. We assume that the effects of the merger could have been changing over time and we evaluate whether the effects (if any) have been stronger in subsequent periods. The coefficient of DiD decreases as we gradually extend the period of analysis after the merger date. A plausible interpretation might be that, right after the merger, C1000 stores got rid of their own assortment (by means of promotions and low prices) to facilitate the upcoming conversion to the "Jumbo format". Once the change in assortment is completed, the merged entity raises prices at their precedent level. However the coefficient of DiD is never significant and no firm conclusion can be inferred.

Table 7.3: DiD across chains: alternative specifications

	(2)	(3)	(4)	(5)	(6)
	3 months window	6 months window	Until september 2012	Until March 2013	Till the end
VARIABLES	Price	Price	Price	Price	Price
Post merger	0.279	0.309	0.231	0.220	0.248
	(0.145)*	(0.161)*	(0.139)	(0.135)	(0.135)*
Merged	-1.125	0.343	-1.182	5.683	5.712
	(0.044)***	(0.010)***	(0.038)***	(0.038)***	(0.045)***
Did	-0.0451	-0.0404	-0.0699	-0.0398	-0.0447
	(0.147)	(0.162)	(0.133)	(0.132)	(0.135)
Population	-9.28e-08	-4.46e-08	-1.11e-07	-1.02e-07	-1.01e-07
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Average income	0.0111	0.0109	0.0128	0.0122	0.0123
	(0.005)**	(0.006)*	(0.006)**	(0.006)**	(0.006)**
Discounters	0.109	0.112	0.108	0.105	0.119
market share	(0.053)**	(0.057)*	(0.054)**	(0.051)**	(0.057)**
HHI	1.11e-06	1.41e-06	2.82e-06	2.56e-06	2.03e-06
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rebranding	-0.0136	-0.0196	-0.00693	-0.00589	-0.0113
from C1000 to Jumbo	(0.006)**	(0.008)**	(0.005)	(0.005)	(0.006)*
Rebranding	-0.0976	-0.0925	-0.0497	-0.0699	-0.0919
from SdB to Jumbo	(0.062)	(0.048)*	(0.069)	(0.073)	(0.075)
Rebranding	0.00286	-0.00384	0.0119	0.00848	0.00620
from SdB to C1000	(0.027)	(0.021)	(0.032)	(0.037)	(0.037)
Constant	1.489	1.503	1.467	1.471	1.451
	(0.142)***	(0.144)***	(0.161)***	(0.159)***	(0.156)***
Observations	116,811	101,718	98,461	111,223	131,869
R-squared	0.935	0.934	0.931	0.933	0.935
cluster	SKU	SKU	SKU	SKU	SKU
FE	Chain*SKU	Chain*SKU	Chain*SKU	Chain*SKU	Chain*SKU

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

In almost all the analysis presented above, the variable Merged has a positive and significant coefficient thereby indicating that the price charged by the merging stores is on average higher than the price charged by the competitors over the entire period of analysis. However, the qualitative information we collected would suggest the contrary: Albert Heijn, whose stores are part of the control stores we use in the analysis, is traditionally perceived as the most expensive Dutch chain. On the other hand, Jumbo and C1000 – whose stores are part of the treated stores – pursue a different marketing

strategy, focused on low prices. In particular, Jumbo guarantees to its customer every day a low price (EDLP marketing formula) whereas C1000 offers deep and short-lived promotions on its products.

The positive, and hence counterintuitive, coefficient we obtain for the variable Merged could be related to the brand composition of our dataset. The comparison of the average products' price across different chains would have ideally required that the products' brands compared were identical. However, the selected brands had also to cover (and hence being sold by the supermarket chain) over the entire period analysis. An important requirement for the selection has been indeed, the presence of sales observations before and after the merger date. Taking into account these constraints, the final dataset we obtain include, per each category, different products' brands across chains. This may affect the price analysis when the brands compared are not in the same price/quality range. The following table shows the brands we analyze for the category sanitary napkins. The red rectangle indicates that our dataset contains price observations before and after the merger date, for the corresponding brand (indicated by the row) and chain (indicated by the column).

Table 7.4: Brand composition of the category Sanitary Napkins

PRODUCTS		CHAINS				
Category	BRANDS	C1000	Jumbo	Super de Boer	Coop	Albert Heijn
Sanitary Napkins	ALWAYS ULTRA					
	ALWAYS ULTRA NORMAAL					
	KOTEX MAXI SUPER					
	LIBRESSE INVISIBLE NORMAL					

Source: Lear elaboration on IRI data

All the supermarket chains have the brand "LIBRESSE INVISIBLE NORMAL". Moreover, for one of the merging stores – C1000, we have price observations for "ALWAYS ULTRA" and "ALWAYS NORMAAL" and we do not have price observations for "KOTEX MAXI SUPER". The same happens for the one of the competitors stores – Coop, whose turnover (and hence its relevance in the control stores sample) is, however, definitely lower than Albert Heijn. "KOTEX MAXI SUPER" is generally a cheaper brand than "ALWAYS ULTRA". Bearing this in mind, the comparison between the average sanitary napkins price charged by the merging stores and the average sanitary napkins price charged by the competitors may result in a positive difference.[68]

We control for such difference in our econometric analysis by including fixed effects at SKU level. The fixed effects capture, indeed, the average and constant difference in prices between SKUs, driven by unobservable factors (such as brand image). However, for the sake of completeness, we also carry on the *across chains analysis* on a subset of our dataset that only includes the brands for which we have price observations for all the chains. We hence included the following brands:

[68] This is also confirmed by the Figure 7.4.

Table 7.5: Brands common to all the supermarkets' chains

PRODUCTS		CHAINS				
Category	Brand	C1000	Jumbo	Super de Boer	Coop	Albert Heijn
Cleaners	AJAX					
Coffee	KANIS & GUNNINK					
Cola	COCA COLA					
	PEPSI					
Frikandels	BECKERS					
Mayonaise	REMIA					
Olive Oil	BERTOLLI					
Sanitary Napkins	LIBRESSE INVISIBLE NORMAL					
Toiletpaper	EDET SOFT					

Source: Lear elaboration on IRI data

The analysis still confirm our main result (model (7) below): the merger did not affect prices – the DiD coefficient is not statistically significant. On the other hand, the variable "Merged" assumes a significant and negative coefficient, as expected.

Table 7.6: Separate analysis on common brands

VARIABLES	(7) Baseline - Selected Brands Price
Post merger	0.237
	(0.243)
Merged	-1.677
	(0.016)***
Did	-0.0773
	(0.057)
Population	-1.65e-07
	(0.000)
Average income	0.00508
	(0.007)
Discounters	0.0655
market share	(0.050)
HHI	8.96e-07
	(0.000)
Rebranding	0.00389
from C1000 to Jumbo	(0.010)
Rebranding	-0.0433
from SdB to Jumbo	(0.058)
Rebranding	0.0226
from SdB to C1000	(0.032)
Constant	1.622
	(0.251)***
Observations	57,244
R-squared	0.935
cluster	SKU
FE	Chain*Category

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

PART IV – EX-POST EVALUATION OF THREE MERGERS – PRICE EFFECT

In the following sections, we estimate the cumulative effect of the three mergers that occurred in the Dutch grocery sector starting from December 2009 to February 2012. In the first merger (#6802), Jumbo bought all Super de Boer stores. In the second merger (#6879), which occurred only a few months afterwards (March 2010), Jumbo sold a subset of the just acquired stores to Schuitema (C1000). In the last merger (#7323), Jumbo acquired all C1000 stores (included the subset of Super de Boer stores previously sold).

The first and the second merger are almost simultaneous. In the last merger, instead, Jumbo completed its expansion by definitely acquiring all the Super de Boer and C1000 locations and assets. We have already investigated if the last and final acquisition by Jumbo had an impact on prices in the period 2012-2013.

We now investigate if the remaining acquisitions had, altogether, an impact on prices in the period 2009-2013. In addition, we explore whether the cumulative effect of the sequence of three mergers under scrutiny had an impact on our variable of interest. By combining the results of the following analysis with the results we obtained with the analysis of the 7323 merger we may also draw some conclusions on the cumulative effect of the three mergers. However, after careful consideration, we conclude that a separate econometric analysis of the first and second merger would not have been sufficiently reliable. The first and the second merger are separated by a very short time span: four months (from December 2009 to March 2010). Moreover, considering the characteristics of the two mergers, the majority of the areas and stores involved in the first merger have also been involved in the second merger. These two elements made us conclude that there were insufficient time series and cross sectional observations to disentangle the effect of the first merger from the effect of the second merger. For this reason, in the following sections, we analyze, under both our identification strategies, the impact of the first and second merger altogether (as if it were a single "treatment"). Moreover, to check the robustness of our conclusions on the effects of the sequence of mergers cleared by the ACM, we analyze (again, under both identification strategies) the cumulative effect of the three mergers.

8. Methodological issues with three merger analysis

In the following analyses, we adopt, as before, a "difference in differences" approach. When analyzing the impact of the first and second merger decisions, we consider the two mergers as a single treatment. As a consequence, we drop all the data from the first merger decision date to the second merger decision date[69] to make it possible to evaluate the variation in prices between the period before the treatment and the period after the treatment. Similarly, when analyzing the impact of all three mergers under scrutiny, we consider that the treatment is the sequence of mergers and we drop all the data from the first to the third merger decision date.[70] The latter analysis is necessarily implemented on a small subset of observations, hence it might be less robust. However, we still believe it can be used as an additional piece of evidence to corroborate our conclusions on the cumulative effects of the mergers.

[69] From December 2009 to March 2010.

[70] From December 2009 to February 2012.

9. Merger assessment – across areas analysis

In the following sections, we investigate the impact of the sequence of three mergers occurred in 2009-2012 implementing the *across areas* analysis. We start by describing the methodology employed, the choice of a proper counterfactual and we finish by summarizing the main results.

9.1. Identification strategy

As for previous analyses, we focus on the price effect of the mergers and compare the variation in price over the period 2009-2013 in the merging stores in the overlapping areas with the variation in price over the same period in the merging stores in the non-overlapping areas.

As already introduced in the previous sections, we both analyze the cumulative effect of the first and second merger and the cumulative effect of the three mergers. It is worth noticing that the majority of the areas and stores affected by the first and the second merger, have also been involved in the third merger. In the third merger, indeed, Jumbo acquired all the Schuitema (C1000) locations, including the Super de Boer stores previously sold (at the time of the second merger). Given the peculiarities of the analyses at stake, and the budget constraints on data acquisition, we decided to perform both the analyses on the subset of stores involved in all the three mergers[71] and, in order to isolate the effect of the first and the second merger from the effect of the third, we restrict the analysis of the formers to the period 2009 – 2011 (right before the publication of the third merger decision). For this reason, the identification of treated and control groups follows the same rules under both analyses.

Under the assumption of local competition, we impose the following criteria for the selection of stores affected by the merger and the identification of appropriate comparator stores:

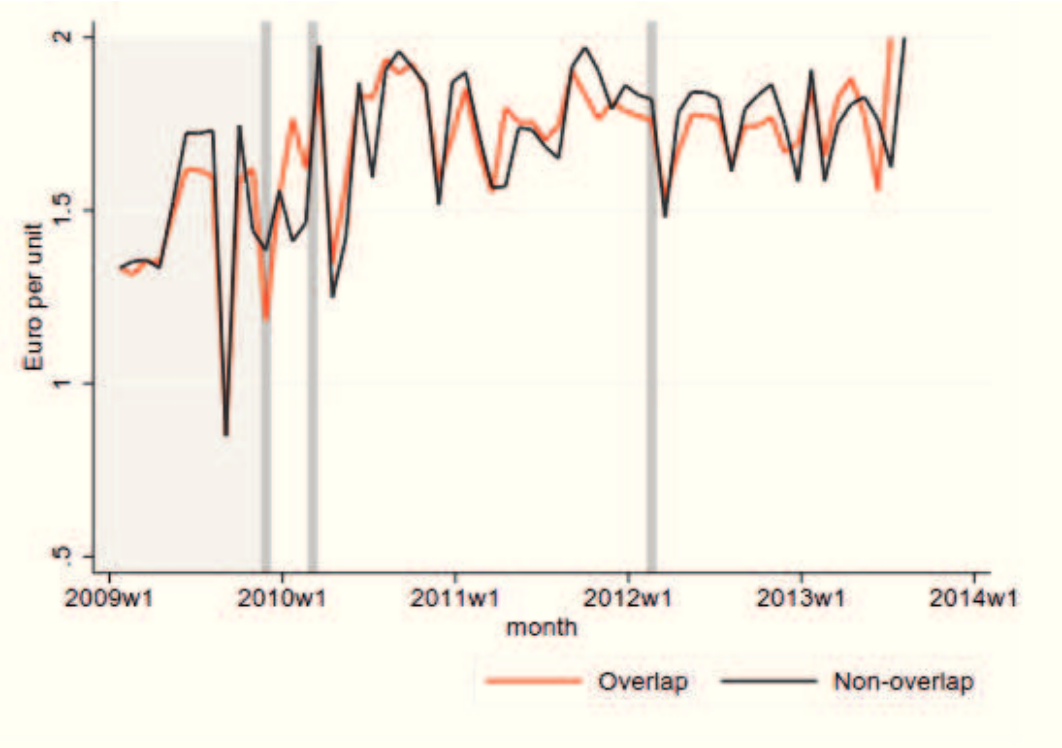
- Affected stores are a selected list of stores belonging to either Super de Boer, Jumbo and Schuitema (C1000) and located in those cities in which the merging parties overlapped for each merger under scrutiny. In other words, the treated stores are located in cities where Super de Boer, Jumbo and C1000 were all present.
- Comparator stores are selected among the stores belonging to either Super de Boer, or Jumbo or Schuitema (C1000) and located in those cities in which there was no overlap between the three supermarket chains. That is, comparator stores are stores belonging to the merging parties located in cities were only one of the three merging chains was present.

As for the analysis of merger #7323, sample selection has been carried out based on the Propensity Score Matching (PSM) in order to correct for sample selection bias that may otherwise affect the estimate of the treatment effect. The level of similarity has been assessed taking into account a full range of factors that could vary across treatment and control areas (average density population, average store size, HHI, number of stores, average income, stores' rental cost, the presence of hard discounters).

The following graphs shed some light on the comparability between the average price trend for the treated and control stores. In this case the treatment is represented by the sequence of mergers (either the first two or all) and hence the pre-treatment period coincides with the period before the first merger date, i.e. before December 2009. The grey vertical lines in the graphs below indicate the date of the three mergers, the similarity between the price trends should be assessed only in the shaded area before the first line.

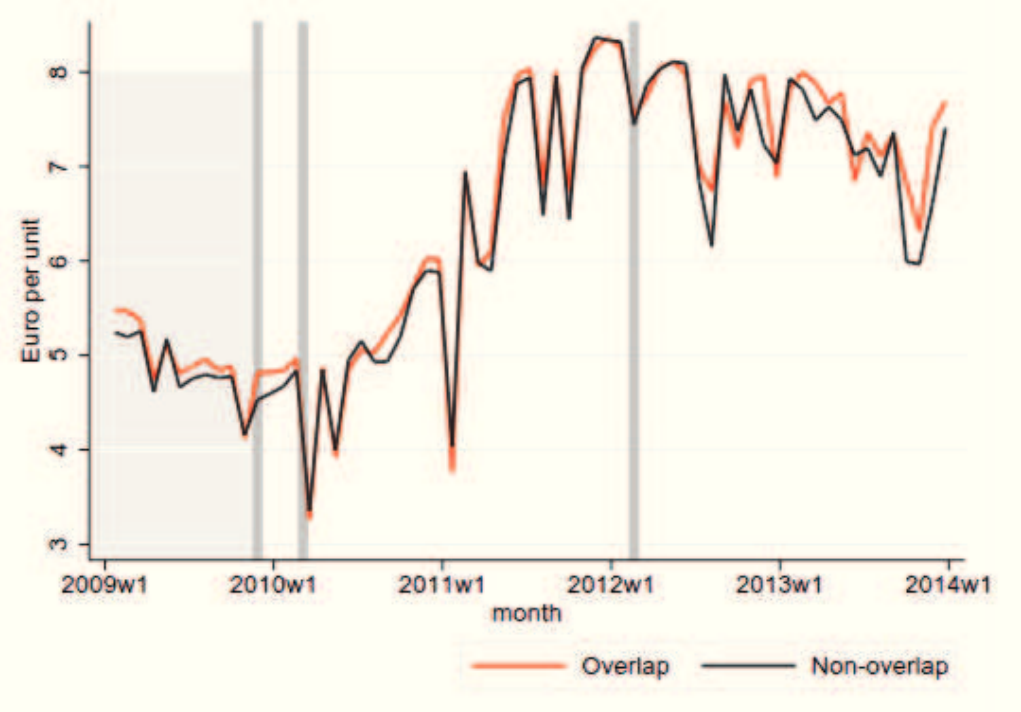
[71] Among the cities affected by the first and the second merger, only one was not involved in the third merger too.

Figure 9.1: Comparison between average price trends in treated and control group: cleaners



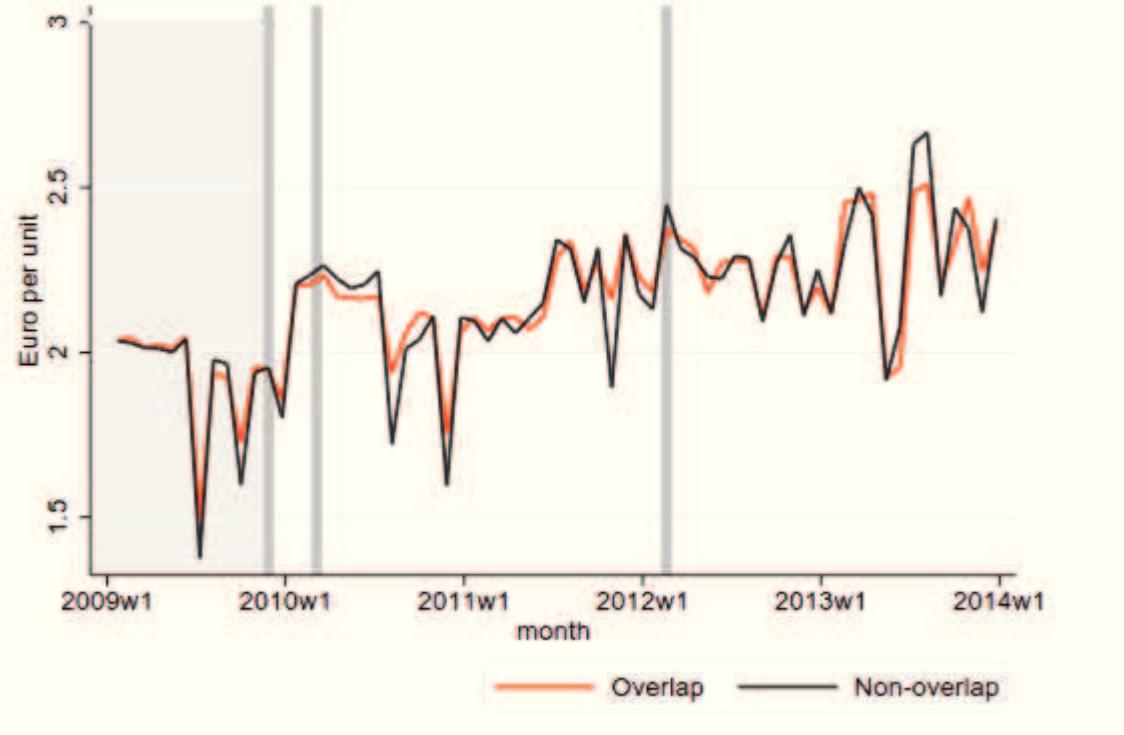
Source: Lear elaboration on IRI data

Figure 9.2: Comparison between average price trends in treated and control group: coffee



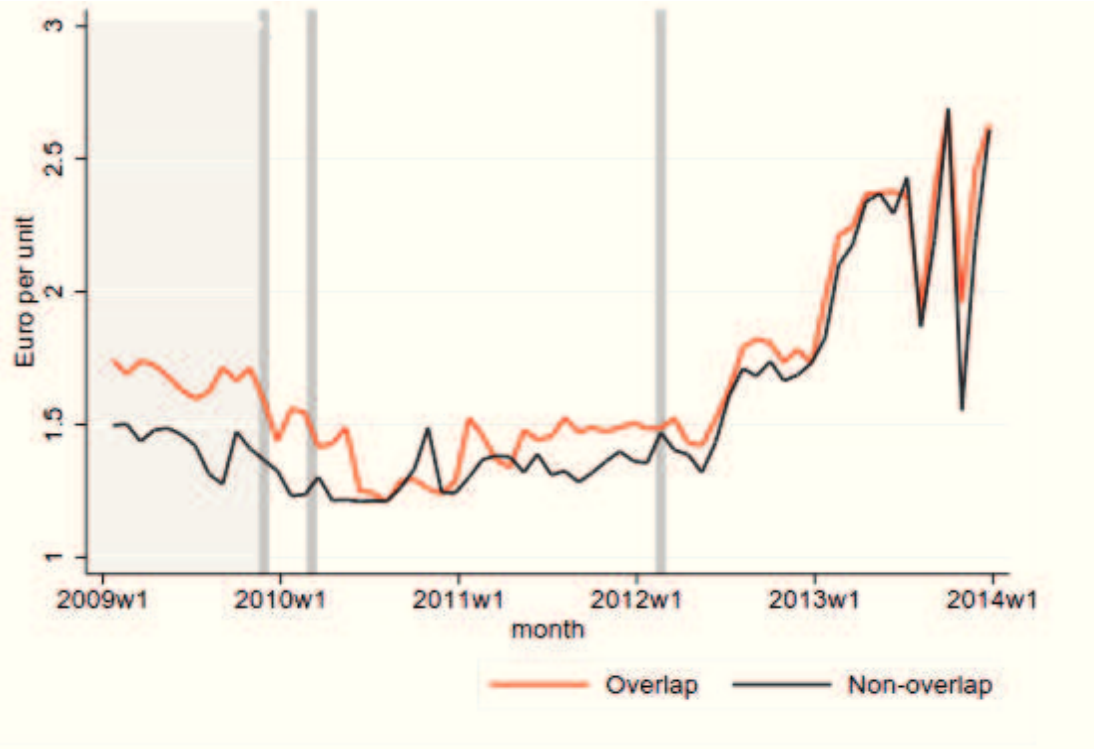
Source: Lear elaboration on IRI data

Figure 9.3: Comparison between average price trends in treated and control group: mayonaise



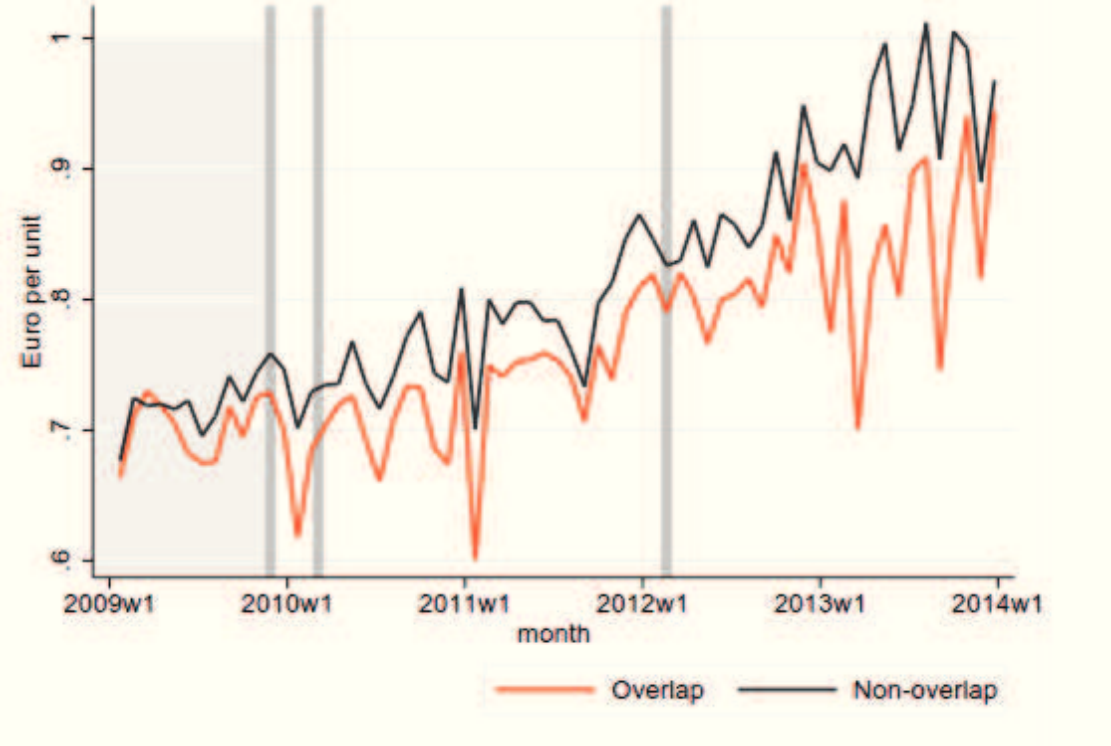
Source: Lear elaboration on IRI data

Figure 9.4: Comparison between average price trends in treated and control group: frikandels



Source: Lear elaboration on IRI data

Figure 9.5: Comparison between average price trends in treated and control group: cola



Source: Lear elaboration on IRI data

Our sample is composed by four merging stores, two in the treated group and two in the control group. We have both Jumbo and C1000 stores, but we also have some C1000 (and Super de Boer) stores, which rebranded to Jumbo.

9.2. Equation and regressors

The general regression estimation is the following:

$$P_{ist} = \alpha + \beta * overlap_s + \gamma * post\ merger_{ist} + \delta\ post\ merger_{ist} * overlap_s + \mu * Z_{st} + \varepsilon_{ist}$$

where P_{ist} is the monthly price charged by the store *s*[72] for the product *i* at time *t*; $overlap_s$ is a dummy variable that takes value one if the store is located in an overlap area; $post\ merger_{ist}$ is a dummy variable that takes value one if the product's price is observed in the post-merger period; Z_{st} is a set of variables that control for local market features (on the demand and supply side) that change over time.

The variable $post\ merger_{ist}$ takes value one starting from March 2010 (i.e from the date in which the second merger decision has been published), in those specification where we restrict the analysis to the effect of the first and the second merger; it instead takes value one starting from February 2012 when we extend the analysis at the cumulative effect of the three merger decisions.

[72] Each store is identified by a specific store number (as defined in the "Supermarket Gids" database).

9.3. *Methodological issues*

In this case, as in PART III, we include fixed effect for every combination of SKU and chains and we clustered standard errors at SKU – storenumber level.

9.4. *Results*

The *across areas* analysis allows to conclude that all the mergers under scrutiny had no impact on the price conditions in the Dutch grocery markets. The variation in price before and after the sequence of mergers in the local markets more influenced by the mergers, is not statistically different from the variation in price over the same period in the local market that are expected to be less influenced by the mergers. This does not rule out the possibility that the parties changed their pricing strategy at national level as a result of the mergers. Section 10 explores this possibility and presents the results of the analysis *across chains*.

Table 9.1: DiD across areas – baseline specification

	(1)	(2)
	DID_first two mergers	DID_all mergers
VARIABLES	Price	Price
Overlap	1.162	-0.689
	(0.445)**	(1.414)
Post merger	0.0444	0.543
	(0.073)	(0.414)
DiD	0.0359	0.140
	(0.133)	(0.292)
Population	1.74e-06	-1.24e-06
	(0.000)***	(0.000)
Average income	0.199	-0.123
	(0.070)***	(0.259)
HHI	0.000580	-0.000261
	(0.000)***	(0.001)
Constant	-4.648	5.318
	(2.320)**	(7.779)
Observations	2,829	2,565
R-squared	0.951	0.951
cluster	Storenumber*SKU	Storenumber*SKU
FE	Chain*SKU	Chain*SKU

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

The variable DiD in model (1) has a positive and not significant coefficient: the first and second merger have no significant impact on the variation of prices in the overlapping areas (compared to non-overlapping areas). The results obtained in model (1), combined with the results of the local analysis of the merger #7323, allow to conclude that the sequence of mergers cleared by the ACM had no

impact on price competition, at least at local level. To further support this conclusion, we perform the DiD analysis to evaluate the effect of the three mergers altogether (model (2)). As expected, the variable DiD is still not significant.

It is worth noticing, however, that none of the coefficients of the variables included in model (2) is statistically significant. This may probably be due to the fact that, by dropping data along the period of the three mergers, we lose a lot of time series and cross sectional observations. On the top of that, the analysis has been extended only to the merging stores involved in the sequence of mergers with a complete set of observations at SKU level (at least for the selected SKU). The number of merging stores that satisfied such criteria are only four (two in the treated areas and two in the control areas).

10. Merger assessment – across chains analysis

In the following section, we investigate the effect of the three mergers by implementing a comparison between the average behavior of the merging stores and the competitors' stores (*across chains* analysis).

10.1. Identification strategy

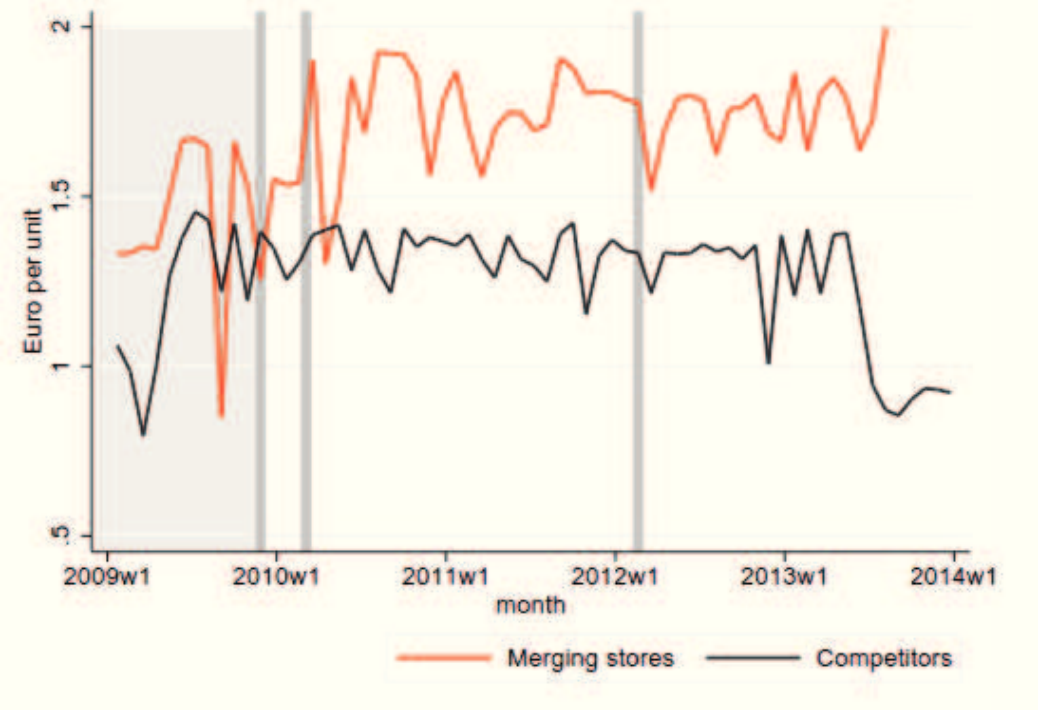
As per the *across areas* analysis, we decide to pursue a "difference in differences" approach. However, in this case, the definition of affected stores and the identification of comparator stores are changed accordingly. We adopt the following criteria:

- affected stores are selected among those belonging to the merging parties all over the Netherlands (both in overlapping[73] and non-overlapping cities);
- comparator stores are selected among those belonging to competing chains all over the Netherlands (both in overlapping and non-overlapping cities).

The following graphs shows the average price trend for the treated and control group per products' category. Once again, the similarity between trends should only be assessed in the area before the first vertical grey line (indicating the first merger date).

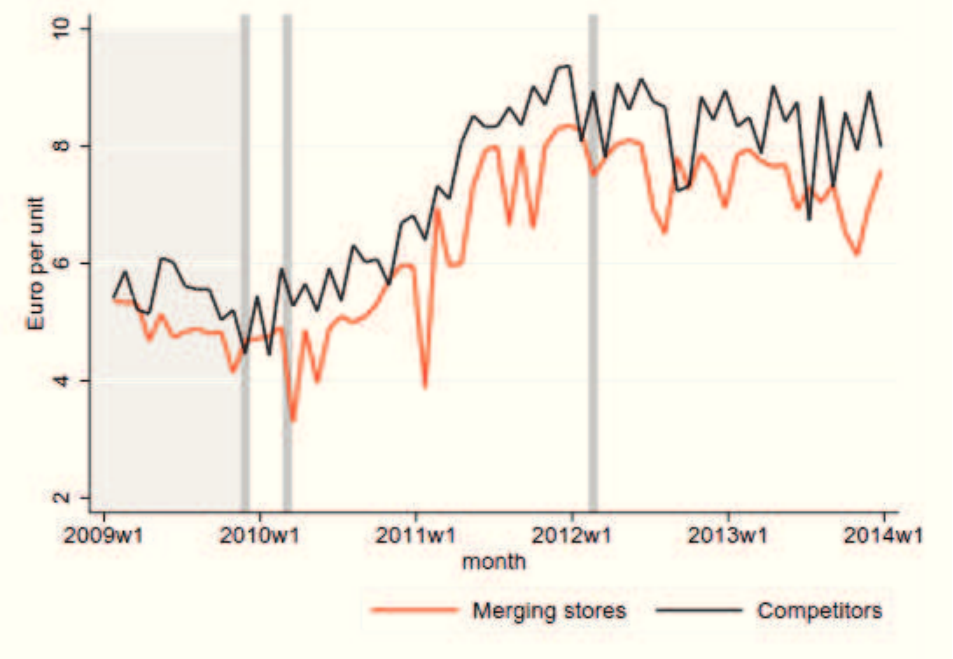
[73] In this case, the "overlapping cities" are those cities in which all the merging insignia (Super de Boer, C1000 and Jumbo) are present.

Figure 10.1: Comparison between average price trends between treated and control group: *cleaners*



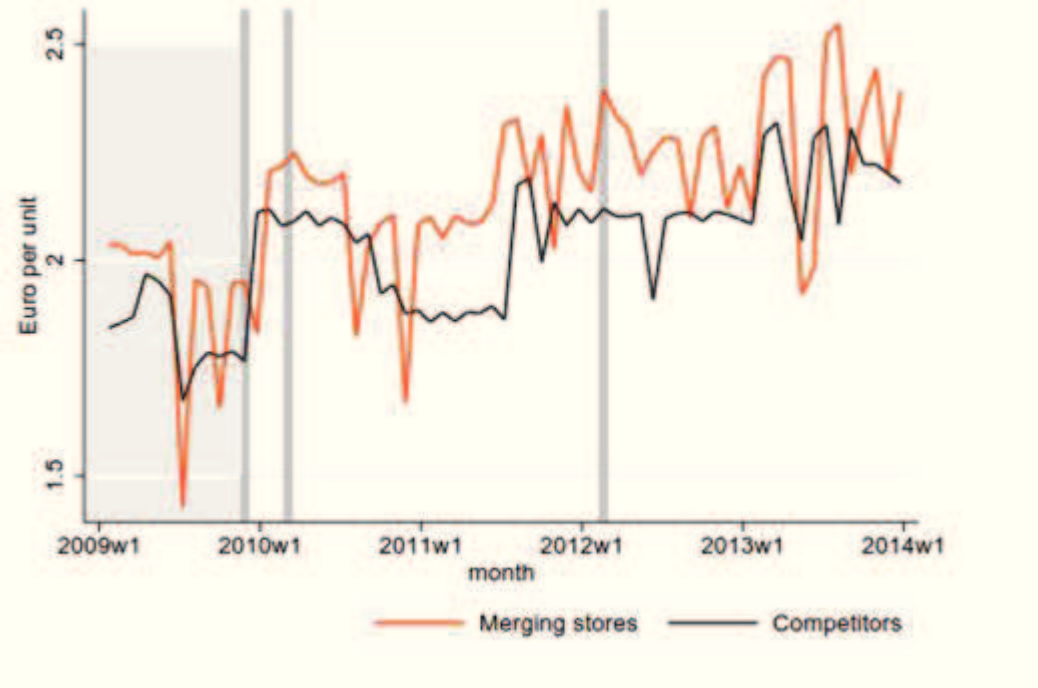
Source: Lear elaboration on IRI data

Figure 10.2: Comparison between average price trends between treated and control group: *coffee*



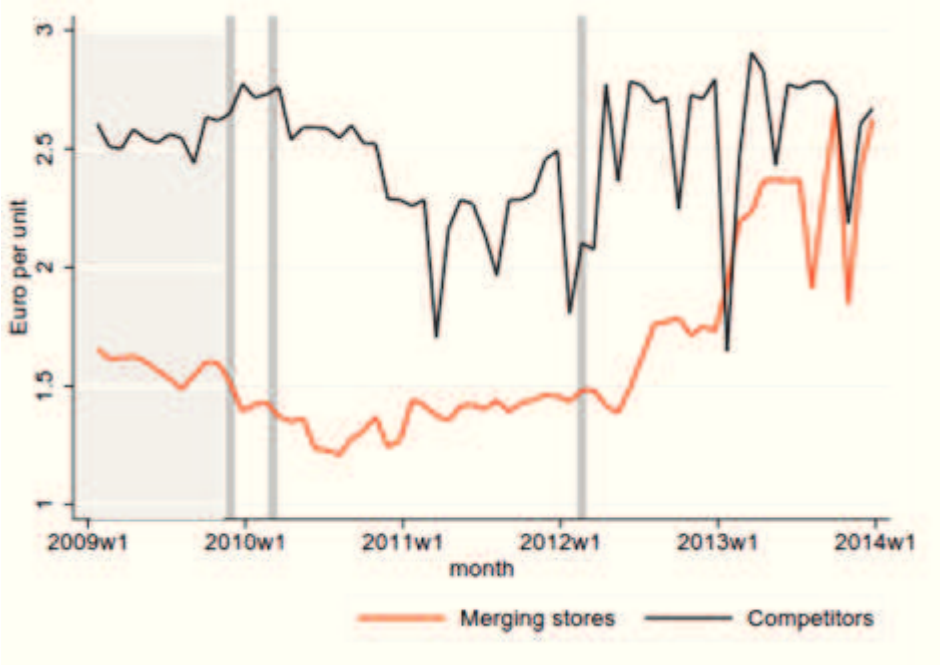
Source: Lear elaboration on IRI data

Figure 10.3: Comparison between average price trends between treated and control group: *mayonaise*



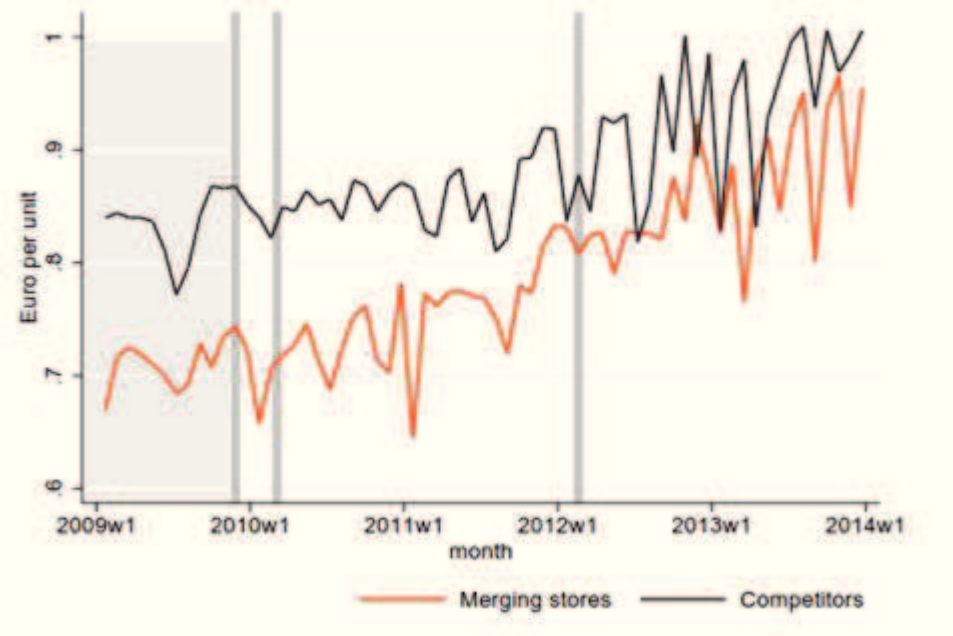
Source: Lear elaboration on IRI data

Figure 10.4: Comparison between average price trends between treated and control group: *frikandels*



Source: Lear elaboration on IRI data

Figure 10.5: Comparison between average price trends between treated and control group: *cola*



Source: Lear elaboration on IRI data

Differently from the *across areas* analysis, trends are not always corresponding in the graphs (over the period of interest). We hence investigate econometrically if there is a significant discrepancy between the two trends before the first merger date. The following table shows the results we obtain. As usual, the coefficient Time*Merging stores measures the additional time variation in the price charged by the merging stores if compared to the competitors in the pre-merger period.[74] The coefficient is not significant and we may hence deduce that there is no discrepancy between the trends, so that competitors form a valid control group (their price may correctly proxy what would have been the price charged by the merging stores, absent the merger).

[74] See section 7.1 for more details on the econometric analysis.

Table 10.1: Comparison of the average price trend between treated and control stores – pre merger period

VARIABLES	(1) Price
Time	-0.00601
	(0.002)**
Time*Mergingstores	0.00272
	(0.003)
Population	-6.25e-08
	(0.000)
Average income	0.00347
	(0.003)
HHI	-1.41e-05
	(0.000)
Constant	17.40
	(6.232)***
Observations	3,097
R-squared	0.977
cluster	SKU

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

To conclude, the following table shows the composition of the stores sample we used for the current analysis. In this case, only the Albert Heijn stores are included in the comparator group.

Table 10.2: Sample composition in the cumulative analysis

Insignia	Treated group	Control group
C1000	3	
Jumbo	1	
Albert Heijn		12
Total	4	12

Source: Lear elaboration on IRI data

As before, we restrict the analysis of the first and second merger to the period 2009-2011 to get rid of the potential effects of the third merger.

10.2. Equation and regressors

The general regression estimation is the following:

$$P_{ist} = \alpha + \beta * merged_s + \gamma * post\ merger_{ist} + \delta\ post\ merger_{ist} * merged_s + \mu * Z_{st} + \varepsilon_{ist}$$

where P_{ist} is the monthly price charged by the store s[75] for the product *i* at time *t*; $merged_s$ is a dummy variable that takes value one if the store belongs to the merging parties or competitors' chains;

[75] Each store is identified by a specific storenumber (imported by a Dutch guide of supermarkets called "Supermarket gids").

$post\ merger_{ist}$ is a dummy variable that takes value one if the product's price is observed in the post-merger period; Z_{st} is a set of time-varying variables that control for local market features (on the demand and supply side).

As before, the variable $post\ merger_{ist}$ is differently structured depending on the analysis we are carrying on (the analysis of the first and second merger vs. the analysis of all three mergers).

For a description of control variables Z_{st}, see section 4.3.4.

10.3. Methodological issues

As in PART III, the estimated model includes fixed effects for any combination of SKU and Chain. Standard errors are clustered at SKU level. In the appendix F we also estimate the model with clustered error at a lower level (SKU – storenumber level) and with Newey-West standard errors to control for serial correlation. The results, however, do not significantly change.

10.4. Results

The *across chains* analysis shows that the sequence of mergers under scrutiny had no impact on price. The variation in the price charged by merging stores over the period of analysis is not statistically different from the variation in the price charged by competitors over the same period. This result is valid both under the assumption of local and national pricing.

The following table shows the result of our baseline specification.[76] In model (1), we evaluate the cumulative effect of the first and second merger. The variable DiD has a negative and not significant coefficient. As before, the results of this model combined with the results of the *across chains* analysis of the effect of the merger #7323 would allow to conclude that all the mergers cleared by the ACM had no impact on prices (regardless of the assumption made on pricing policy). However, to corroborate this conclusion we also perform a DiD analysis to evaluate the effect of the three mergers under scrutiny altogether, (model (2)). As shown in the following table, the variable DiD in model (2) is negative and not significant.[77]

[76] Notice that in this case the price analysis does not include "Shampoo" as we do not have a complete set of price observations for Shampoo for the four merging stores included in the analysis.

[77] As we showed in section 7.4, the magnitude and the counterintuive sign of the coefficient of the variable Merged is can be ascribed to the brand composition of our dataset. The brands compared across chains, indeed, may not be in the same price/quality range. The availability of data has been one of the major determinant of the composition of the sample analyzed.

Table 10.3: DiD across chains: baseline specification

	(1)	(2)
	DID_first two mergers	DID_all mergers
VARIABLES	Price	Price
Merged	13.68	13.82
	(0.102)***	(0.180)***
Post merger	0.274	0.545
	(0.158)*	(0.270)*
Did	-0.0859	-0.140
	(0.138)	(0.279)
Population	4.93e-08	-9.26e-08
	(0.000)	(0.000)
Average income	0.00349	0.00108
	(0.001)***	(0.002)
HHI	-1.37e-05	-1.13e-05
	(-1.529)	(-1.506)
Constant	1.559	1.493
	(0.152)***	(0.199)***
Observations	10,402	9,713
R-squared	0.955	0.955
cluster	SKU	SKU
FE	Chain*SKU	Chain*SKU

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

In the following table, we also investigate if the sequence of the three mergers had a different impact for different products. In particular, we analyze if the effect of the merger is different between branded goods and private labels. In the model presented in Table 10.4, the coefficient of the variable DiD captures the effect of the merger on the prices of all goods, except for branded goods (it hence measures the effect on the price of private labels). The interaction between the variable DiD and the variable Branded should instead capture the additional variation in prices for the branded goods sold by the merging stores in the post-merger period compared to the private label goods. However, both DiD and the interaction between DiD and Branded are not significant. Interestingly, the variable Branded has a positive and significant coefficient: as expected, the price of branded goods is higher than the price of private labels (over the entire period of analysis). However, it seems that the mergers did not have a different impact on the two types of goods.

Table 10.4: DiD across chains: the effect on branded goods

VARIABLES	(3) Branded Price
Merged	13.77
	(0.187)***
Post merger	0.545
	(0.270)*
Did	-0.296
	(0.396)
Did_Branded	0.267
	(0.459)
Population	-1.08e-07
	(0.000)
Average income	0.000980
	(0.002)
Branded	1.550
	(0.003)***
HHI	-1.14e-05
	(0.000)
Constant	-0.0539
	(0.194)
Observations	9,713
R-squared	0.955
cluster	SKU
FE	Chain*SKU

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

To conclude, we repeat the DiD analysis on a subset of our sample, limited to the products' brands common to all chains.[78] The aim of this additional analysis is to ensure that the results we obtain are not driven by the composition of our sample. By focusing only on the products' brands for which we have price observations for all the supermarkets' chains, we cut some of the price variability within the products' category. We still have price variability across different categories but we control it by using fixed effects at Chain-Category level. The variable of interest, DiD, still assumes a not significant coefficient. Moreover, the variable Merged assume a negative sign (model (1)) or it is very close to zero (model (2)) – indicating that the difference between the price of the merging stores and the price of the competitors is negative, as expected, or at most null.

[78] For further details, please see section 7.4

Table 10.5: Separate analysis on common brands

	(1)	(2)
	DID_first two mergers	DID_all mergers
VARIABLES	Price	Price
Merged	-1.647	0.113
	(0.156)***	(0.150)
Post merger	0.232	0.484
	(0.387)	(0.584)
Did	-0.0146	-0.142
	(0.125)	(0.202)
Population	5.60e-08	-2.23e-08
	(0.000)	(0.000)
Averageincome	0.00305	-0.00177
	(0.002)	(0.001)*
HHI	-1.35e-05	-1.30e-05
	(0.000)	(0.000)
Constant	1.601	1.604
	(0.372)***	(0.432)***
Observations	3,491	3,403
R-squared	0.921	0.931
cluster	SKU	SKU
FE	Chain*Category	Chain*Category

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

PART V – ASSESSMENT OF MERGER # 7323 – VARIETY ANALYSIS

11. Introduction

Historically, the focus of merger policy has been on the consequences of mergers on prices. However, the mergers might as well impact on non-price dimensions, such as product variety.

Decisions about product assortments and prices are among the most fundamental choices firms make. According to Draganska et al., (2009), when selecting which products to offer, a firm in a competitive environment has to weight the benefits of a "popular" product space location against the potential downside of fiercer price competition. Thus, from a competitive perspective, merger policy should impede mergers that restrains not only the firms' ability to compete on prices, but also the ability to compete on other relevant strategic variables, such as variety.

The economic literature discusses extensively the plausible effect of mergers on prices. The most common result is that when two firms merge, they internalize the negative externality they impose on each other and raise their prices. In the absence of efficiency gains, the merger benefits the merging firms and their competitors (who raise their prices but not that much as the merged entity). On the other hand, if efficiency gains are large enough, the merged entity saves on its own costs and might decide to decrease prices, so that the merger will increase both consumer and total welfare. Limited research has been done on the effect of the merger on other non-price dimensions. One of the most recent examples is Berry and Waldfogel (2001). The study uses a panel data set on 243 U.S. radio broadcast markets in 1993-1997 and documents the effect of the merger on variety by exploiting the natural experiment provided by the 1996 Telecommunications Act. The latter, indeed, relaxed the local radio ownership restrictions[79] and prompted a wave of consolidation in the industry. The authors conclude that concentration reduces station entry and, holding the number of stations constant, increases product variety (expressed as the number of programming formats). In particular, pairs of jointly owned local stations are more likely to increase programming formats variety than jointly owned non-local stations (this reflects a combination of strategic considerations and local economies). A similar result is obtained by Pofahl et al. (2010). They simulate numerous hypothetical mergers between well-known soft drink companies and find that the mergers cause an increase in price in every case and an increase in variety (measured as the product line length) in every case except one. The result they obtain corroborate the main findings of Schmalensee (1978) who finds that in the ready-to-eat cereal market, manufacturers used brand (line) proliferation as a deterrent to entry. Draganska et al. (2009) develop a framework that integrates product choice and price competition in a differentiated product market. They use a panel data set on supermarket ice cream sales and in particular, they focus on the most frequently purchased flavor – vanilla and its varieties. They conclude that along with price increases, mergers would decrease product line length in the ice cream category. Similarly, Inderst and Shaffer (2007) show in a theoretical model that retail mergers may reduce product variety. They argue that, following a merger, the retailer may want enhance its buyer power by committing to a "single sourcing" purchasing strategy. According to their results, the negative effect on variety may be emphasized by the fact that, suppliers, by anticipating concentration in the retail industry, will strategically choose to produce less differentiated products and hence, further reduce product variety.

[79] Prior to the Act, the regulation limited the number of jointly owned stations in a local market to no more than 3 or 4 stations, depending on the size of the market.

According to the literature described above,[80] the impact of a merger on product variety can go into opposite directions:

- merged firms may have no incentive to compete with each other and may then decide to move away from each other in the product space. By doing so, they increase product variety on a format level in the post-merger period;
- on the other hand, merged firms may decide to reduce substitutability and thus cannibalization between its products by withdrawing duplicates. By doing so, they reduce product variety in the post-merger period; [81]
- if potential entry matters, the merged entity may decide to crowd the product space so as to not to leave open "holes" for new entrants.[82] Even in this case, product variety may increase in the post-merger period;

The effect of a merger on variety is, hence, an empirical question. Furthermore, the ultimate impact on total and/or consumer welfare is hard to identify and has to be evaluated in conjunction with the price effect.

In the light of the potential anticompetitive effects mergers may exert on variety, in the following sections we extend the price analysis to examine the effect of the mergers cleared by the ACM on the product variety offered by the merged entities.

12. Empirical strategy

In order to study the effect of the merger on other non-price dimension of competition, we focus on depth of product assortment. In particular, we consider the number of SKUs per category.[83] This number can be interpreted a proxy for the variety available to final consumers for each category of products. A similar interpretation has been provided by Ashenfelter et al. (2011) who examine the effects of the merger Maytag-Whirlpool on product variety by exploring whether Whirlpool/Maytag changed the number of items sold per product's category after the merger.

We have quarterly data for the period 2010 – 2013. That is, available data do not cover the first merger (#6802, dates back to December 2009) and do not provide for a sufficiently long period before the second merger (#6879, happened in March 2010). Therefore, we have not enough information to study the cumulative effects of the three mergers as we did with prices and we will therefore focus on the effects of the third merger only (#7323, happened in February 2012).

In the price analysis, we implement both the analysis *across areas* and the analysis *across chains*. The latter is less precise but it can provide a valid alternative if price competition is national in scope. In the case of variety, decisions are mainly taken locally. In particular, according to the questionnaires and the interviews, supermarket stores have a greater degree of freedom on product variety (compared to price setting) and can set their preferred assortment. We therefore believe that the analysis *across areas* is sufficient to assess the effects of the merger on variety.

[80] See also Mazzeo et al. (2014) and Sweeting (2010).

[81] See Draganska et al., (2009).

[82] See Berry and Waldfogel (2001).

[83] In what follows we use indifferently the words "variety" and "assortment" to indicate the number of items within each product category. A more precise definition would require to indicate with the term *variety*, the number of available categories and with the term *assortment* the number of items per each category. In our analysis, however, the number of products categories is fixed and the composition within each category varies over time.

Moreover, variety might be subject to different competitive dynamics than prices. Market players usually choose their pricing strategy conditional on the choice of their close competitor and pricing decisions are strategic complements. A similar reasoning cannot be a priori extended to variety decisions. It follows that variety choices of the competitors' chains might not properly approximate what would have been the choices of the merging chains in the absence of the merger and that the analysis *across chains* may not represent a valid alternative in this case.

We hence evaluate the effect of the ACM's decisions on the variety developments in the Dutch grocery markets by evaluating the effect of the third merger, through an analysis across areas. As we did in the price analysis, we carry on a DiD analysis.

12.1. Identification strategy

As already mentioned in the previous sections, the analysis across areas makes a comparison between the stores of the merging parties located in the overlapping areas and the stores of the merging parties located in the non-overlapping areas. The underlying assumption is that the overlapping areas were directly involved in the merger and experienced a reduction in competition after the merger. The loss of a competitor may indeed directly influence the behavior of the stores belonging to the same relevant market.

Once again we perform an analysis of the effect of the merger with the "difference in differences" (DiD) approach, in which we exploit both time and cross-sectional variation (of product assortment, in this case) to identify the effect of the merger. As with prices,[84] we use the *Propensity score matching* technique to identify the overlapping and non-overlapping areas from which we select the stores. This approach ensures that the demand (e.g. population, income) and supply conditions (e.g. level of concentration) are similar, on average, between the two groups of areas. This in turn, guarantees that the average behavior of the stores located in the overlapping areas (treated stores) is comparable to the average behavior of the stores located in the non-overlapping areas (control stores) and that any difference might be ascribed to the merger.

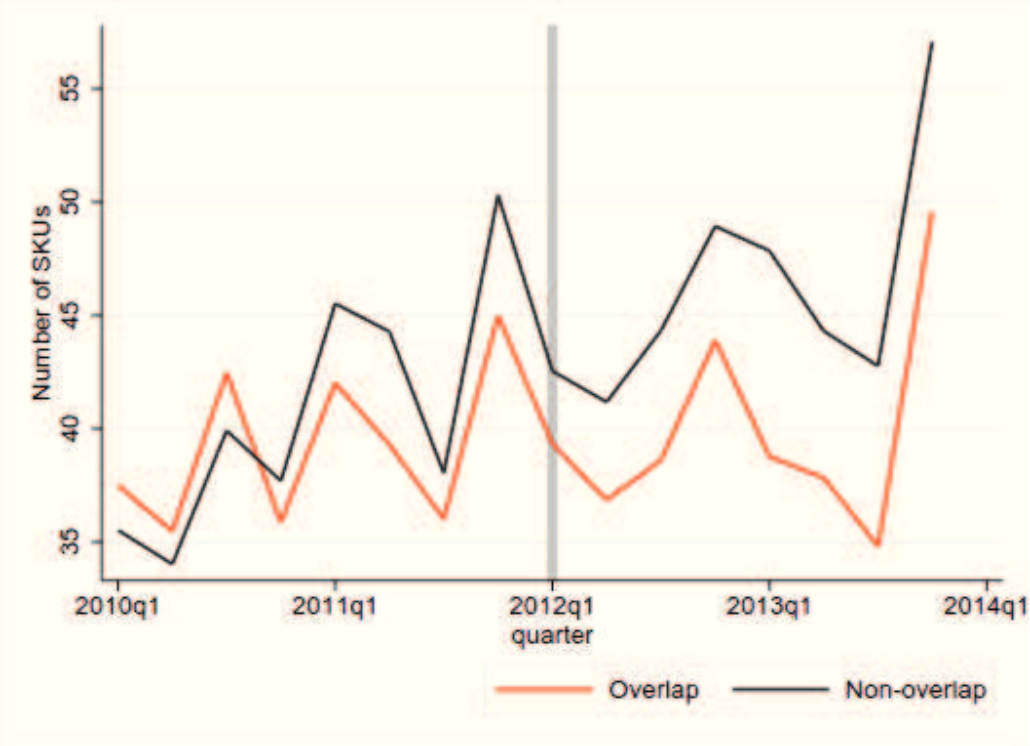
Before undertaking the econometric analysis, we check whether the assumption underpinning the DiD approach (common trend in the pre-treatment period) is satisfied in our data.[85] In the following, we first show a plot of product variety in treated and control stores, and then perform a formal test of the common trend assumption.

The following graphs compare the total number of SKUs per store in the treated and control group. Specifically, they show, for a subset of the categories analyzed, the average level of product variety measured in the stores of the merging parties selected from treated areas versus the same dimension in merging parties' stores in control areas.

[84] For further details, please see paragraph 6.1

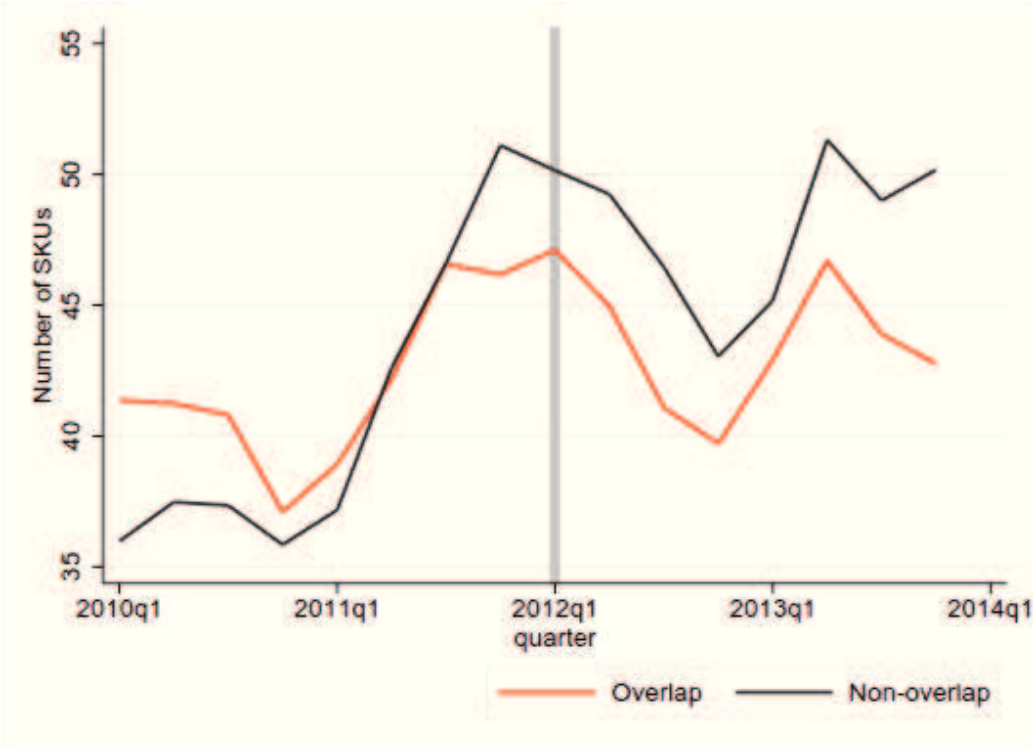
[85] Refer to previous section for a more in depth explanation of the assumption underpinning the DiD analysis, for example Section 6.1.

Figure 12.1: Comparison between average product variety trends in treated and control group: *diapers*



Source: Lear elaboration on IRI data

Figure 12.2: Comparison between average product variety trends in treated and control group: *shaving products*

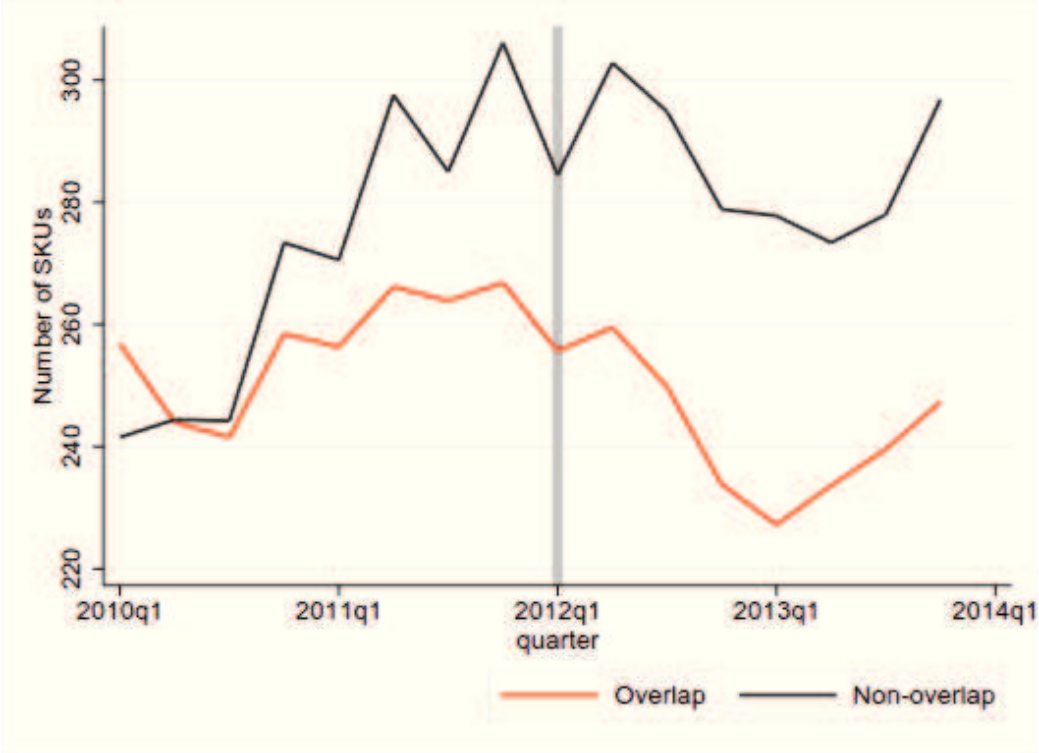


Source: Lear elaboration on IRI data

Figure 12.3: Comparison between average product variety trends in treated and control group: *chewing gum*

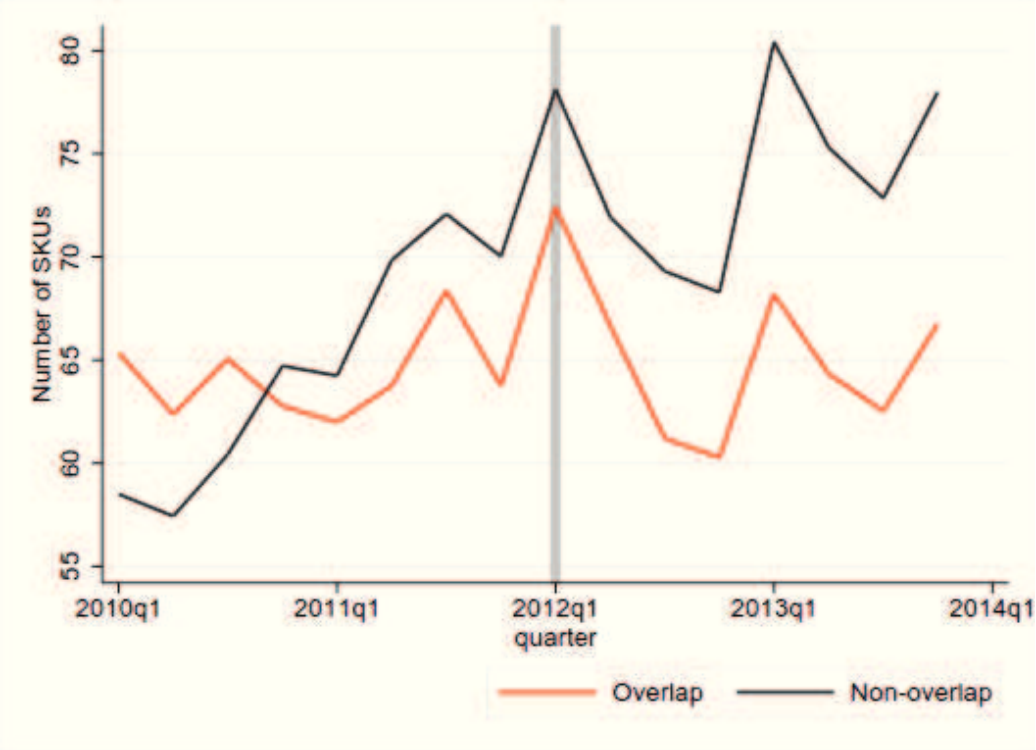
Source: Lear elaboration on IRI data

Figure 12.4: Comparison between average product variety trends in treated and control group: *wine and champagne*



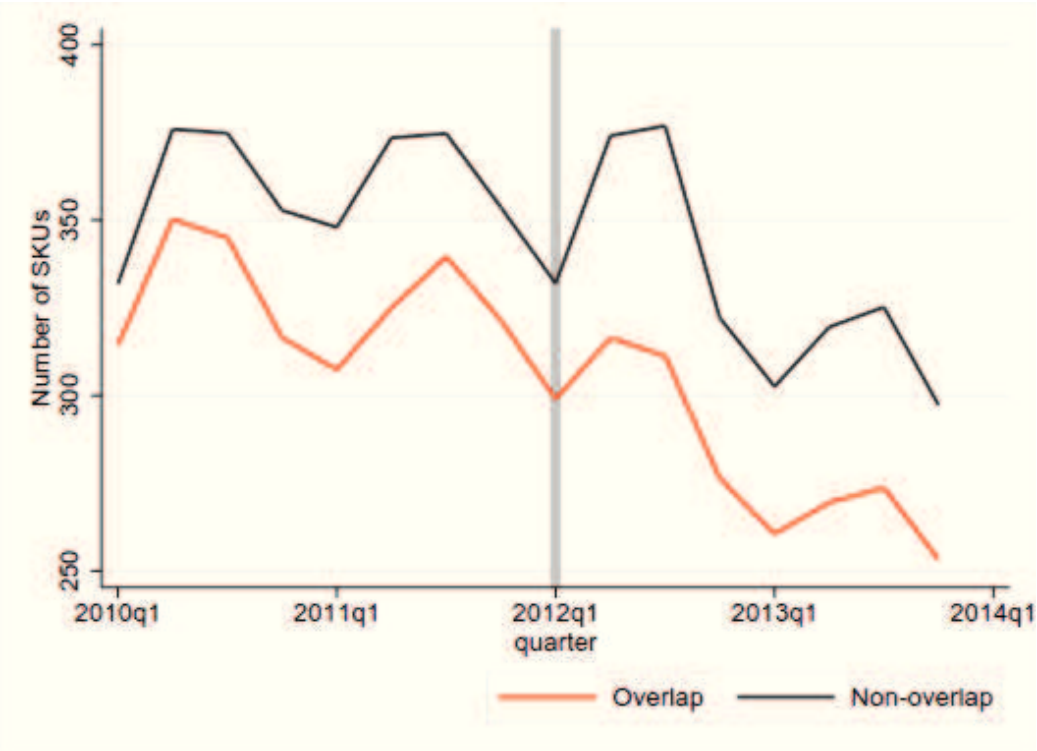
Source: Lear elaboration on IRI data

Figure 12.5: Comparison between average product variety trends in treated and control group: *air refreshers*



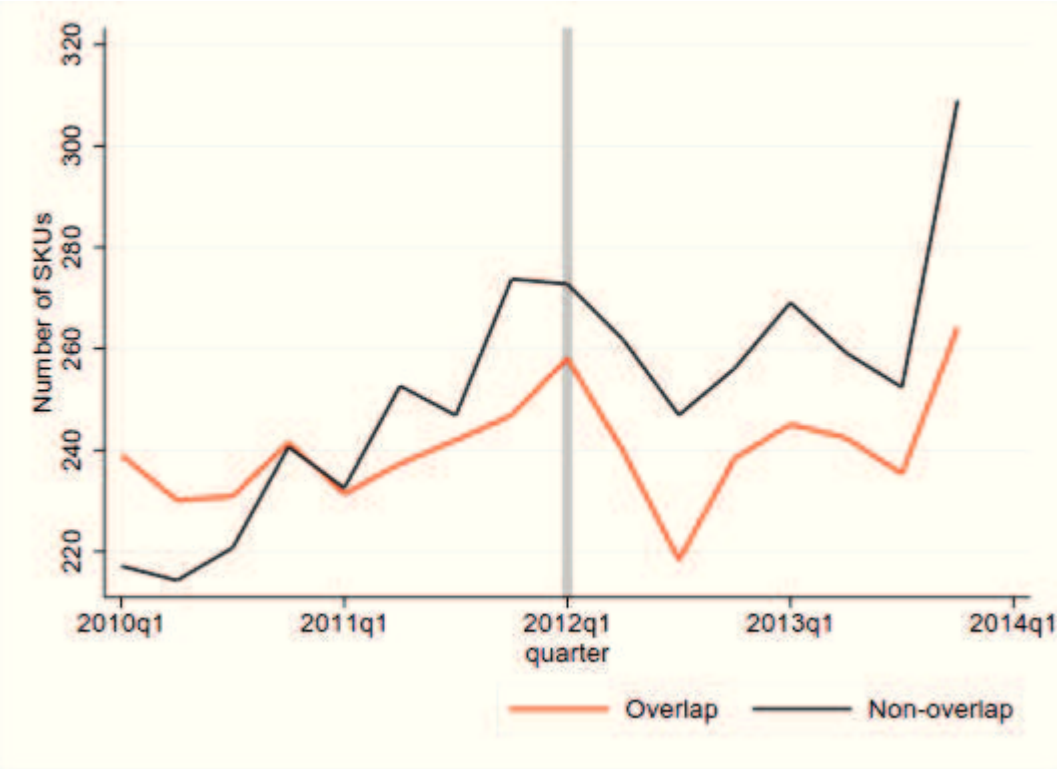
Source: Lear elaboration on IRI data

Figure 12.6: Comparison between average product variety trends in treated and control group: *magazines*



Source: Lear elaboration on IRI data

Figure 12.7: Comparison between average product variety trends in treated and control group: *bakery products*



Source: Lear elaboration on IRI data

Overall, the depth of assortment in the treated stores (i.e. the stores located in the overlapping areas – the orange line) is lower than the level of product variety in the control stores (i.e. the stores located in the non-overlapping areas – the maroon line). For some of the categories analyzed in the figures – it is particularly evident for *shaving products* and *air refreshers*- the level of variety is higher in the treated stores than in the control stores for the first years of the pre-merger period and then gets lower (the two line intersects). However, 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 lines increases after the merger date (indicated by the grey line). This anticipates the results of the econometric analysis: the merger had a negative impact on the level of product variety.

Regarding the trend similarity in the pre-merger period, the figures show that the trend in variety in the treated and control stores might not be comparable. The intersection between the two lines in the pre-merger period might undermine the comparability between the treated and control stores. As it has been pointed out in the previous section, the similarity between the trend in the treated and control group in the pre-treatment period is a requirement for a successful implementation of the DiD methodology. It would indeed ensure that the behavior of the control group could properly represent what would have been the behavior of the treated stores, absent the merger. For this reason, we also did an empirical test and we estimate the following equation:

$$V_{ist} = \alpha + \beta * time\ trend_t + \delta * time\ trend_t * Treated\ Stores + \gamma * X_{jt} + \mu * dummy_{Si} + \varepsilon_{ist}$$

where:

- V_{ist} measures the level of product variety for each stores s, category i and quarter t;

- $time\ trend_t$ is a progressive variable whose coefficient measures the average change in variety each quarter;
- X_{jt} represents a set of control variables measures at city level (supply and demand variables);[86]
- $dummy_{Si}$ captures for the average difference between each combination of category and insignia (for instance, we expect a bigger assortment for beer rather than sun protection products and we expect a bigger assortment for Jumbo than C1000);
- and finally the variable $time\ trend_t * Treated\ Stores$ takes value one if the stores belong to the treated group, zero otherwise. The equation is estimated only in the pre-merger period; hence, the coefficient δ should capture any difference in the time trend in the pre-merger period between the treated and control stores.

The following table shows the regression results of the above equation:

Table 12.1: Comparision between variety trend in the treated and control group in the pre-merger period

VARIABLES	Basic regression Variety
Time trend	1.563
	(0.193)***
Timetrend*TreatedStores	0.0345
	(0.004)***
Population	-0.000252
	(0.000)***
Averageincome	-0.0167
	(0.111)
HHI	-0.00180
	(0.000)***
Net sales floor	0.00470
	(0.001)***
Housevalue	0.0353
	(0.005)***
Constant	-181.9
	(39.846)***
Observations	83,726
R-squared	0.855
cluster	Category
FE	Category*insignia

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

The regression analysis confirms there is a discrepancy between the trend in average depth of assortment in the treated and control stores. However, such discrepancy is negligible. The coefficient of the variable $time\ trend_t * Treated\ Stores$ is statistically significant but it is also very close to zero (0.03). Considering that the average level of variety in the pre-merger period across all the control stores is equal to 90 SKUs per category, the discrepancy would amount to 0.03% in relative terms.

[86] For a more detailed explanation of the control variables, please see section 4.3.4.

Therefore, we can assume that the treated and control stores have a similar trend in variety in the pre-merger period and the stores in the non-overlapping areas are an adequate control group.

The final sample of stores we used to carry on the variety analysis is composed as follows:

Table 12.2 :Selected stores for the variety analysis

Insignia		Treated group	Control group
C1000	*Super de Boer rebranded to C1000*	1	
	C1000	18	12
Jumbo	*Super de Boer rebranded to Jumbo*	12	10
	Jumbo	10	4
	C1000 rebranded to Jumbo	7	8
Total		48	34

Source: Lear elaboration on IRI data.

The sample differs from the one used to analyze the effect on prices for the same merger.

Although we initially requested data on variety, turnover, volume and promotional shares for the same set of stores, data quality issues forced us to drop a number of observations. We then decided to build two different datasets – one for the price analysis and another for the variety analysis – in order to maximize the number of available observations and ensure, at the same time, that:

- all the stores have variety/price data both in the period before and after the merger – we hence dropped all the stores for which we have price/variety observations only before or after the merger;
- the treated and the control group have a comparable number of observations and the products categories are equally represented in both groups.[87]

12.2. Regression equation and regressors

We compare the change in product variety before and after the merger in a selection of stores belonging to the merging parties that were located in overlap areas, with the change in product variety before and after the merger in other stores of the merging parties picked from the best matched non-overlap areas. The period of analysis goes from the first quarter of 2010 to the last quarter of 2013. The date of the merger has been inferred from the date of the ACM merger decision, i.e. February 2012 (having quarterly data, we consider the date of the merger as the first quarter of 2012).

The following general estimating equation illustrates our model:

$$V_{ist} = \alpha + \beta * overlap_s + \gamma * post\ merger_{ist} + \delta\ post\ merger_{ist} * overlap_s + \mu * Z_{st} + \varepsilon_{ist}$$

Where V_{ist} is the quarterly variety level of the store s[88] for the products' category i at quarter t; $overlap_s$ is a dummy variable that takes value one if the store is located in an overlap area; $post\ merger_{ist}$ is a dummy variable that takes value one if the products' variety is observed in the

[87] We separately conducted the process of data cleaning for variety and price data in order to maximize the number of available stores in our sample (for instance, we kept in the variety dataset the stores that have complete variety observations, but not complete price observations, over the period of analysis and vice versa). For further details about the process of data cleaning, please see Appendix E.

[88] Each store is identified by a specific store number (as defined in the "Supermarket Gids" database).

post-merger period (i.e. after the first quarter of 2012); Z_{st} is a set of variables that control for local market features (on the demand and supply side) that change over time.

The equation is estimated through an Ordinary Least Squares (OLS) model. As in the previous sections, the variable of interest is $\boldsymbol{post\ merger_{ist} * overlap_s}$ (or *DiD*), whose coefficient measures the effect of the merger on product variety by identifying the additional variation (if any) in variety experienced by the treated stores (compared to the control stores) moving from the pre-merger to the post-merger period. 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 variety (controlled by the $post\ merger_{ist}$ variable and the control variables); (ii) may be related to the differences between the treated and the control group (controlled by the $overlap_s$ variable).

Finally, we control for the average difference in the product assortment across different product's categories and supermarket chain by including fixed effects for any combination of category and supermarket's insignia. By following this approach, we are able to control for the effect on variety determined by the change in insignia. C1000 and Jumbo have indeed different assortment strategies and the rebranding of C1000 stores to Jumbo stores has definitely caused an increase in the product variety of the rebranded stores.[89] However, the ultimate goal of the analysis is to evaluate if the merger altered the competitive conditions of the local markets and, via the reduction of the number of competitors, affected the average product variety offered by the merging stores. For this reason, we need to disentangle the two effects and control for the average difference across the variety strategies adopted by the merging supermarkets' chains.

In addition, we include clustered standard errors as will be more extensively discussed in the next section.

13. Results

The following table shows the results of our baseline specification. In model (1) the *DiD* coefficient assumes a negative and statistically significant value equal to -3.842 which suggests that the merger had a negative impact on the product variety level.

The impact of the merger on variety has to be evaluated through the coefficients of the variable *Post-merger*, *overlap* and *DiD* altogether.

The coefficient of the variable *Post-merger* indicates that there has been a general increase in the product variety level in the post-merger period (for both treated and control stores). In addition, the product variety level in the treated stores seems to be higher, on average, than the level in the control stores over the entire period of analysis (both before and after the merger) – this is measured by the coefficient of the variable *Overlap*. Finally, the coefficient of the variable *DiD* says that the change in variety in the post-merger period has been lower for the treated stores if compared to the control stores. In other words, the treated stores have increased the level of product variety in the after-merger period but at a lower rate than the control stores did. Considering that the average variety level in the treated stores in the post-merger period is equal to 94 SKUs per category, the merger caused a reduction in variety by 4%.

[89] By simply comparing the number of SKUs per category, it is evident that Jumbo has a much bigger assortment than C1000.

Table 13.1: Regression results: variety analysis – baseline specification

VARIABLES	(1) Basic regression variety	(2) Basic regression variety	(3) Basic regression variety
Post merger	1.881	1.881	1.881
	(0.683)***	(0.413)***	(0.791)**
Overlap	6.717	6.717	6.717
	(0.720)***	(0.736)***	(0.660)***
Did	-3.842	-3.842	-3.842
	(0.441)***	(0.650)***	(0.790)***
Population	-0.000141	-0.000141	-0.000141
	(0.000)***	(0.000)***	(0.000)***
Average income	-0.438	-0.438	-0.438
	(0.131)***	(0.190)**	(0.119)***
Discounters market share	-7.000	-7.000	-7.000
	(1.794)***	(2.445)***	(2.157)***
HHI	-0.00110	-0.00110	-0.00110
	(0.000)***	(0.000)***	(0.000)***
Net sales Floor	0.00541	0.00541	0.00541
	(0.001)***	(0.000)***	(0.001)***
House value	0.0371	0.0371	0.0371
	(0.005)***	(0.006)***	(0.004)***
Constant	139.5	139.5	139.5
	(2.455)***	(6.150)***	(2.266)***
Observations	166,531	166,531	166,531
R-squared	0.867	0.867	0.867
cluster	Category	Storenumber *Category	Category *insignia
FE	Category *insignia	Category *insignia	Category *insignia

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

In model (1), standard errors are clustered at category level. We hence relax the assumption that errors should be independent, at least at category level. In models (2) and (3), standard errors are clustered at a lower level: for each combination of category and store and for each combination of category and insignia respectively. Results are still significant.[90]

[90] In the Appendix F, we will provide further models in which we cluster errors at higher level (storenumber and insignia level). Although results become not significant, we believe the assumptions underlying a higher level of clustering are

The variable that proxies the market share of the discounters (at city level) assumes a negative and significant coefficient thereby indicating that in the cities in which the competitive pressure coming from the discounters is stronger (higher market shares) stores decide to have a lower variety. A plausible explanation might be that stores decide to restrict their assortment only to those products over which they do not suffer competition from discounters (for instance, they may decide to cut down their assortment of first-price products).

In the following tables, we further explore the effect of the merger on variety by enriching the baseline specification.

implausible. In case of an exogenous shock to variety, it is reasonable to assume that the effect on variety will be similar within the same product's category and errors would be hence correlated at that level.

Table 13.2: Regression results: variety analysis – further specifications

VARIABLES	(4) 3 months window variety	(5) 6 months window variety
Post merger	1.447	1.357
	(0.796)*	(0.892)
overlap	6.900	7.095
	(0.752)***	(0.774)***
Did	-5.603	-5.330
	(0.590)***	(0.604)***
Population	-0.000121	-0.000127
	(0.000)***	(0.000)***
Average income	-0.440	-0.457
	(0.132)***	(0.135)***
HHI	-0.000916	-0.000906
	(0.000)***	(0.000)***
Net sales floor	0.00509	0.00470
	(0.001)***	(0.001)***
Housevalue	0.0363	0.0385
	(0.005)***	(0.005)***
Discounters	-7.062	-7.970
market share	(1.799)***	(1.836)***
Constant	137.7	139.4
	(2.461)***	(2.511)***
Observations	134,752	113,879
R-squared	0.866	0.863
cluster	Category	Category
FE	Category*insignia	Category*insignia

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

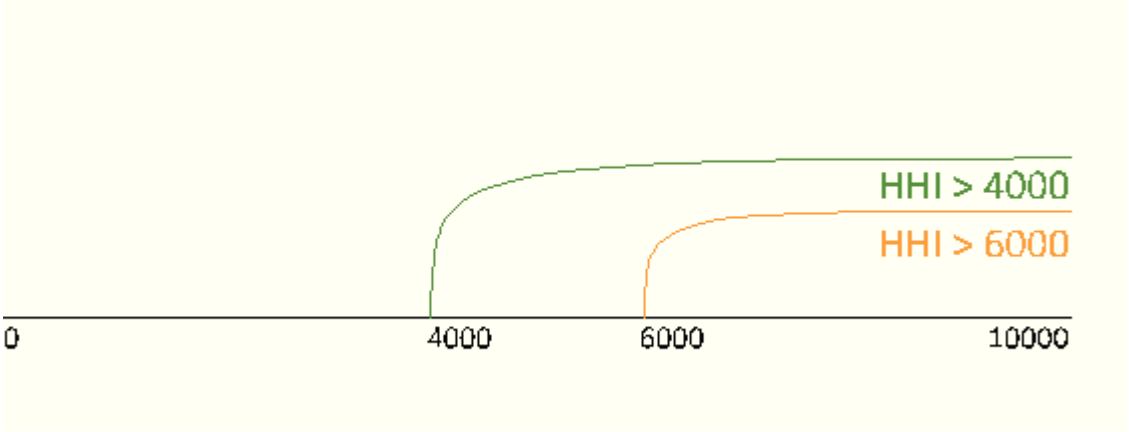
As a robustness check, in model (4) and (5) we respectively drop three and six months around the merger date to explore the possibility that the DiD coefficient was biased by two phenomena: (i) post-merger transitory factors; and/or (ii) the possibility that the merging parties anticipated the ACM decision and that any merger effect started manifesting itself before clearance. Results are still significant and the effect on variety is even stronger.

13.1. Heterogeneous treated effects across local areas

In this section we investigate if the negative effect of merger on variety is different across areas. First, we explore the possibility of a differentiated effect of the merger on variety across areas depending

on the level of post-merger concentration (see model (6) in Table 13.3).[91] To measure the level of concentration we build the HHI index with the net sales floor of each stores (as proxy of market shares). We generate two different thresholds, as it shown in the following graph:

Figure 13.1: HHI thresholds



Hence, the threshold "HHI>4000" is a dummy variable that takes value one for all the cities in the sample whose HHI is higher than 4000 and it takes value zero for all the cities whose HHI is lower than 4000. By the same reasoning, the threshold "HHI>6000" is a dummy variable that takes value one for all the cities whose HHI is higher than 6000 and it takes value zero for all the cities whose HHI is lower than 6000. We then interact the DiD coefficient with each of the three thresholds and we estimate the following equation:

$$V_{ist} = \alpha + \beta * overlap_s + \gamma * post\ merger_{ist} + \delta * DiD + \delta_1 * DiD * HHI > 4000 + \delta_2 * DiD * HHI > 6000 + \varphi_1 * HHI > 4000 + \varphi_2 * HHI > 6000 + \mu * Z_{st} + \varepsilon_{ist}$$

By construction, the $\boldsymbol{\varphi}$ coefficients measure the additional impact on variety moving from less concentrated areas to more concentrated areas, over the entire period of analysis. The $\boldsymbol{\delta}$ coefficients measure, instead, the additional effect of the merger on variety in the treated stores, moving from less to more concentrated areas.

The coefficient δ (that multiplies the DiD variable without any interaction) measures the effect of the merger in all the cities in which the HHI is lower than 4000 (when both thresholds takes value 0).

In the cities in which the HHI is higher than 4000 but lower than 6000, the coefficients $\delta + \delta_1$ measures the effect of the merger on variety. It follows that, in the cities in which the HHI is higher than 6000, the coefficients $\delta + \delta_1 + \delta_2$ measures the effect of the merger.

[91] We estimate the same model in the price analysis too. However, the DiD coefficients are still not significant (even across areas) and we hence decided to not present the results obtained.

Table 13.3: Heterogeneous effects across local areas

VARIABLES	(6) Interaction with HHI (variety)
Post merger	2.073
	(0.752)***
overlap	7.045
	(0.743)***
Did	-2.598
	(0.434)***
Did*HHI>4000	1.087
	(0.920)
Did*HHI>6000	-7.495
	(1.086)***
Population	-0.000118
	(0.000)***
Average income	-0.380
	(0.122)***
Net sales floor	0.00422
	(0.000)***
Housevalue	0.0332
	(0.004)***
Discounters market share	-3.665
	(1.621)**
HHI>4000	-6.814
	(1.096)***
HHI>6000	8.764
	(1.165)***
Constant	135.1
	(2.117)***
Observations	166,531
R-squared	0.867
cluster	Category
FE	Category*insignia

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

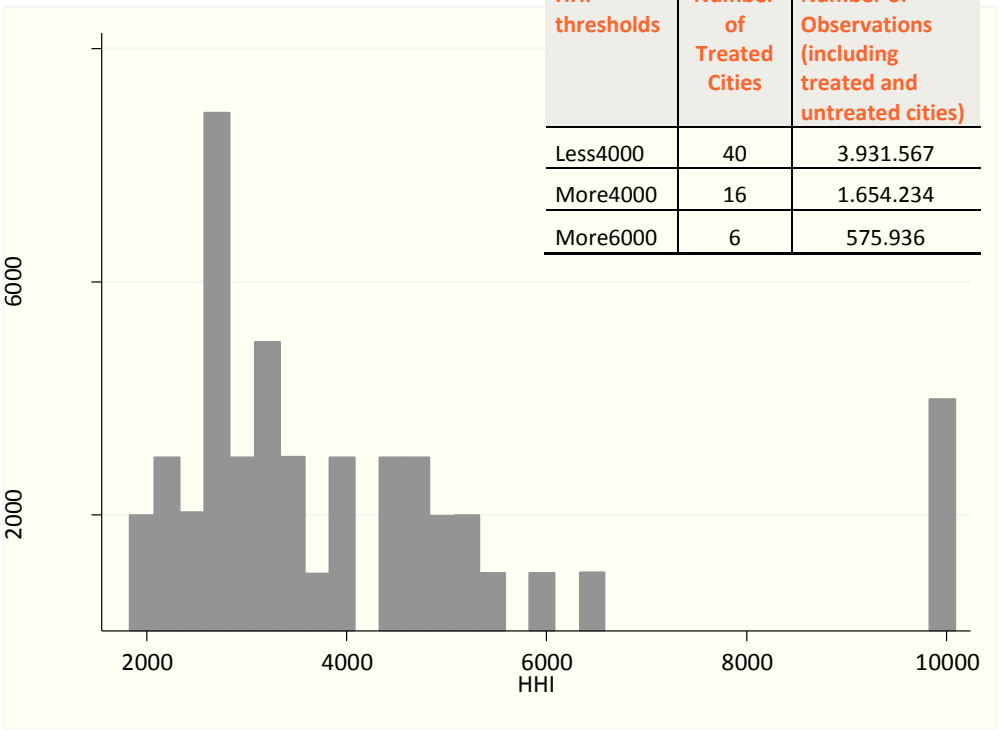
Source: Lear elaboration on IRI data

According to the results of our econometric analysis (column (1)), the effect of the merger on variety is higher in more concentrated cities (where the HHI is higher than 6000)[92]. There is not a significant

[92] The effect of the merger in the cities in which the HHI is higher than 6000, is equal to the sum of the coefficients of the three interacted variables (-2.598 + 1.087 -7.495 = -9.006). On the other hand, the effect of the merger in the cities in which the HHI is higher than 4000 but lower than 6000 is equal to the sum of the first two interacted variables (-2.598 + 1.087 = -1.511). To conclude, the effect of the merger in the cities in which the HHI is lower than 4000 is simply equal to the coefficient of the referred interacted variable (-2.598).

difference between the effect on variety when we move from the cities in which the HHI is lower than 4000 to the cities in which it is higher than 4000 (the coefficient δ_1 in our model is indeed not significant). The coefficient δ_2 is instead significant and it indicates that in the most concentrated areas, the negative effect of the merger on variety has been stronger than in the remaining cities. This result, however, could be driven by the distribution of the HHI in our dataset. As it shown in the following table and graph, we have fewer observations (although still enough to infer valid conclusions) in those cities in which the HHI is higher than 6000.

Figure 13.2: HHI distribution across treated city in the post merger period and number of observations for each HHI thresholds



HHI thresholds	Number of Treated Cities	Number of Observations (including treated and untreated cities)
Less4000	40	3.931.567
More4000	16	1.654.234
More6000	6	575.936

13.2. Effect of the divestitures

We also explore the impact of divestitures on the variety effect of the merger. The coefficient of the variable DiD in model (7) below measures the effect of the merger on variety for the treated stores in areas in which the divestiture has not been issued. The interaction DiD*Divestiture measures, instead, the additional effect of the merger on variety for the treated stores in areas in which a divestiture has been issued.

The coefficient of DiD is still significant and negative, whereas the coefficient of DiD*Divestiture is positive and significant, thereby indicating that the negative effect of the merger on variety is weakened in the areas where a divestiture has been issued. The results we obtain in model (7) suggest that the divestitures have been effective: they modified the competitive conditions in the post-merger period in the areas where they have been issued. However, the coefficient of the variable DiD is still negative and significant. This might signal that in the remaining areas, in which the ACM did not intervene by requesting a divestiture, there has been a reduction in the depth of the product assortment. In other words, even though divestitures were effective, they were nonetheless

insufficient to entirely remove the negative effects of the merger on variety; probably a greater set of divestitures would have been more appropriate.

Table 13.4: Effect of divestiture

	(7) Interaction with divestitures
VARIABLES	(variety)
Post merger	3.030
	(0.702)***
overlap	6.782
	(0.724)***
Did	-3.823
	(0.434)***
Did*Divestiture	1.844
	(0.617)***
Population	-0.000148
	(0.000)***
Average income	-0.590
	(0.136)***
Net sales floor	0.00576
	(0.001)***
Housevalue	0.0402
	(0.005)***
Discounters	-8.796
market share	(1.887)***
Divestiture	-10.38
	(1.004)***
HHI	-0.00121
	(0.000)***
Constant	142.1
	(2.411)***
Observations	166,531
R-squared	0.867
cluster	Category
FE	Category*insignia

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

To further investigate if the divestitures have been effective and reduced the potential anti-competitive effect of the merger, we perform an additional analysis on a subset of our sample. We restrict our sample of stores to all the merging stores located in the treated areas where the combined market share post-merger is higher than 50%. Our sample includes both areas in which the divestiture has been issued and areas in which it has not. We then carry on a DiD analysis to evaluate the effect

of the divestiture. Notice that in this case, the divestiture is the treatment (and no longer the merger).[93] The treated and the control group are composed as follows:

- the treated stores are the stores located in the areas where the merged entity holds a market share above 50% in the post-merger period and a divestiture has been issued;
- the control stores are the stores located in the areas where the merged entity holds a market share above 50% in the post-merger period and a divestiture has not been issued.

We check for the comparability of the trend in variety between treated and control stores through a regression analysis. The results of the analysis show that the trend in variety for the treated stores in the pre-merger period is lower than the trend experienced by the control stores in the same period by 0.14.[94] Although significant, this difference is too negligible to make us discard the hypothesis that the variety level of the control stores represent a valid counterfactual.

The regression equation that we now estimate is the following:

$$V_{ist} = \alpha + \beta * treated_s + \gamma * post\ divestiture_{ist} + \delta\ post\ divestiture_{ist} * treated_s + \mu * Z_{st} + \varepsilon_{ist}$$

Where

- $treated_s$ takes value one if the stores is located in a city in which a divestiture has been issued and value zero otherwise;
- $post\ divestiture_{ist}$ takes value one in the period after the issuance of the divestiture (July 2012)
- $post\ divestiture_{ist} * treated_s$ takes value one in the period after the issuance of the divestiture and if the store is located in a city in which a divestiture has been issued.

The variable of interest is $post\ divestiture_{ist} * treated_s$,whose coefficient measures the difference between the change in variety in the treated stores before and after the divestiture and the change in variety in the control stores over the same period.

The following table shows the result we obtain from this analysis. The coefficient of DiD is positive and significant, thereby indicating that in the areas in which there has been a divestiture variety increases (or decreases less with respect to the areas with no divestiture). Hence, divestitures have been effective.

The variables of interest (i.e. “Post treatment”, “Treated”, “Did”) assume higher coefficients than in the analyses presented before. It is worth noticing that the following model has been estimated on a subsample that include only the merging stores whose combined market shares after the merger is above 50% (15 stores on a total number of 170 stores). It hence follows that the average variation in variety in the post – treatment period (measured by the coefficient of the variable “Post treatment”) is computed on a limited portion of the sample analyzed in the previous analyses. Furthermore, the treatment – whose effect the model is trying to estimate – correspond to the divestiture, and no longer to the merger. Finally, the robustness and consistency of the following analysis is guaranteed by the fact that the three variables of interest have very similar coefficients. The divestitures restore the comparability between the treated and control stores; the coefficient of the variable “Treated” signals, indeed, that the stores located in the most problematic areas (i.e. the treated stores) have, on average, a lower level of variety than the stores located in the remaining and less problematic areas (the control

[93] The sample now includes 12 cities: 6 cities in which the divestiture has been issued and 6 in which has not. The sample is composed by 15 stores equally distributed across the treated and control group.

[94] For further details, please see Appendix F.

stores). The divestiture smooths this discrepancy and reestablish a similarity between the levels of variety offered by the treated and control stores.

Table 13.5: Separate analysis on divestiture

VARIABLES	(8) Analysis of divestitures (Variety)
Post treatment	-20.97
	(2.407)***
Treated	-28.42
	(3.285)***
Did	27.16
	(2.994)***
Population	0.000470
	(0.000)***
Average income	6.738
	(0.697)***
Discounters market share	-13.41
	(5.127)**
HHI	0.00150
	(0.000)***
Net sales floor	0.00338
	(0.000)***
House value	-0.0595
	(0.008)***
Constant	23.75
	(12.529)*
Observations	27,750
R-squared	0.886
Cluster	Category
FE	Category*insignia

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

***

The various econometric analyses presented above confirm the main result we obtain from the analysis on variety: the merger had a negative impact on the average depth of assortment offered by the merging stores located in the overlapping areas. After the merger, the merging stores adjusted their assortment and increased the number of SKU available per category less than they would have done in the absence of the merger. The reduction in product assortment limits consumers' choice and may ultimately harm consumers. 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. [95]

[95] Ashenfelter et al., (2011) derive similar implications from their results. They analyze the effect of the merger Maytag/Whirlpool on variety and they found that the merger resulted in a large reduction in product variety. They estimate

A different conclusion could be drawn only in the case in which the degree of variety offered by the merging stores in the pre-merger period was excessive. In principle, the optimal depth of assortment might not always coincide with the highest number of items per category. Deeper retail assortment give consumers a wider range of items to choose from, increasing the probability they will find the item they want. However, deeper retail assortment also increase the time and effort consumers must exert when selecting an item from a category. The items with broadest appeal are usually the first ones included in an assortment and the benefit of adding additional items diminishes as the number of items in the assortment grows.[96] The assortment size generally reflects consumers' cost of shopping (measured as consumers' opportunity cost of time): consumers with low shopping costs prefer larger assortment, whereas consumers with high shopping costs, prefer instead a smaller assortment. The merging stores might have decided to withdraw duplicates items and invest in innovative and higher quality brands or private label. Jumbo and C1000, indeed, belong to a common buying alliance – Bijeen. After the merger, they might have decided to exploit their bargaining power at the upstream level and renovate their scale at the downstream level, to invest in alternative brands and private labels. Unfortunately, we do not have enough information to assess if the degree of variety was excessive before the merger.[97] The only additional data we have concern prices. The price analysis shows that the merger had no impact on the price charged by the merging stores in the post-merger period. Therefore, even if the assortment adjustment promoted economies of scale and scope, synergies in marketing, IT, overhead and logistics, the related cost-savings have not been passed to consumers (i.e. prices did not decrease in the post-merger period).

A comprehensive assessment of the effect of the merger #7323 on price and non-price dimensions reveals that the merger may have harmed consumers' welfare through a reduction in product variety, although not through an increase 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 in which the divestitures have been issued, the average level of variety decreases less than in similar control areas (where none of the merging stores has been 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 completely remove the adverse effect of the merger on depth of assortment.[98]

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the effect on variety by way of a DiD analysis and comparing the number of SKUs per category offered by the merging parties, before and after the merger, with the number of SKUs offered by the competitors over the same period.

[96] See Fox and Sethuraman (2006).

[97] We have data only on the number of items of the products' categories and we do not have information on their qualitative composition.

[98] See model (8) of Table 6.5.

PART VI – QUALITATIVE ANALYSIS

14. Analysis of the effects on non-price measures of competition: ancillary services

To complement the econometric analysis of the effect of the mergers on prices and variety, we study – by means of exploratory graphical analysis – whether a difference in the pre- and post-merger periods exists in the offering of ancillary services at chain level.

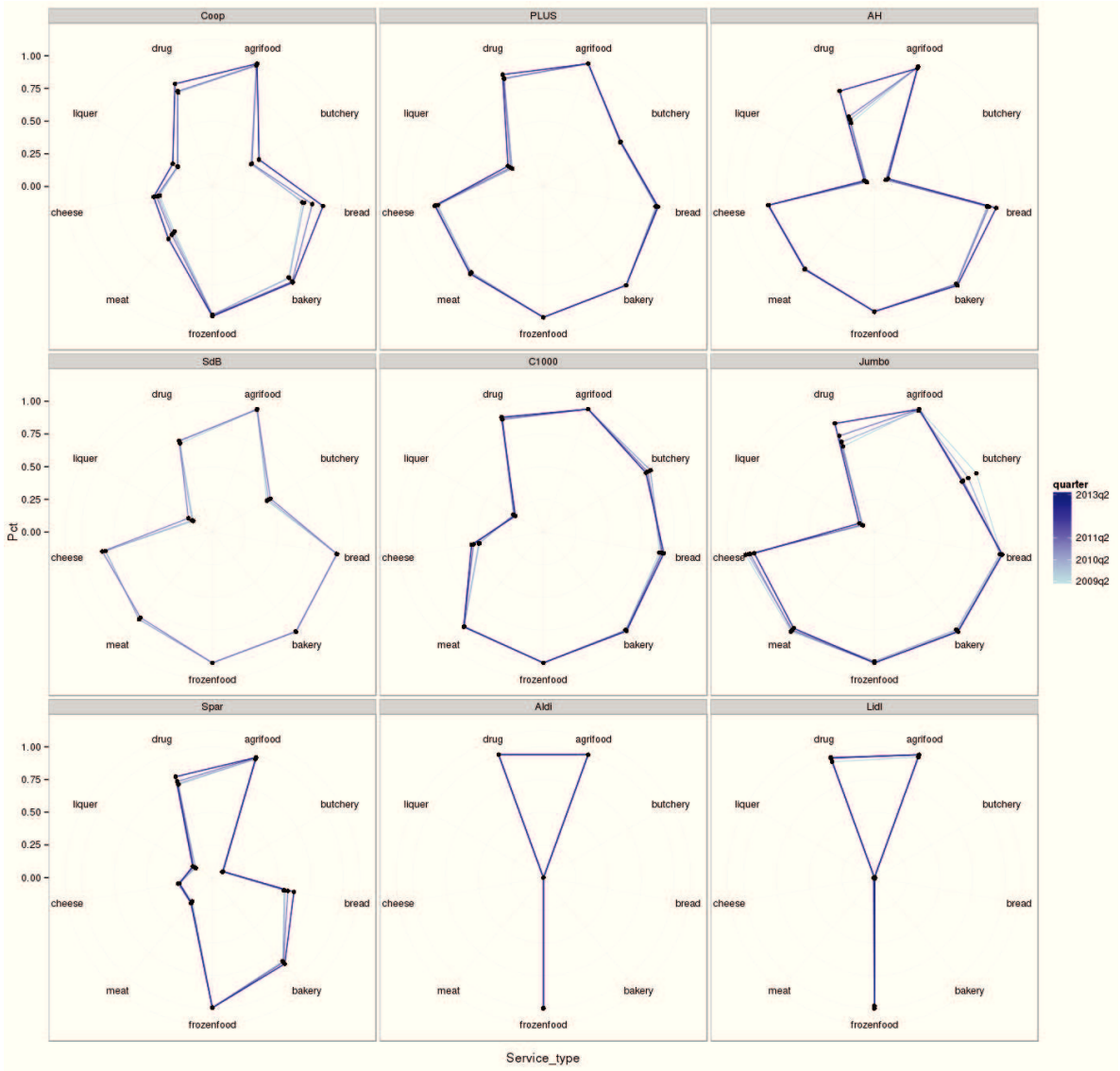
Our dataset – Supermarket Gids – contains store level information on the availability of: agrifood counter, butchery, bakery, frozen food stand, meat counter, cheese counter, liquor counter, drug counter.

We compute, by supermarket chain and period, the percentage of stores offering each specific service over the total number of chains' stores and plot the results in a radar chart (Figure 14.1).

Each panel represents a different chain. For each panel, we plot different lines connecting contemporaneous observations (lighter colored lines refer to older observations). The observations, represented by points in a polar coordinate system (0% the center of the graph, 100% the outer), refer to specific services (the percentage of stores belonging to a chain that offer each specific service). In other words, the further the point is from the center of the graph, the closer to 100% the percentage of stores offering that specific service. Hence, the larger the area delimited by each line, the broader the offer of the chain and the percentage of stores offering a broad variety of services. A number of important market features are apparent from the graphs:

- for most chains, there is limited variation in time (polygons delimited by light-colored lines overlap with polygons represented by dark colored lines);
- Coop, however, increased the availability of ancillary services. This might be due to the acquisition of former Jumbo locations;
- Jumbo and Albert Heijn show perceptible changes over time. Both increased their drug counters. In addition, Jumbo reduced its butcheries (a service not offered by Albert Heijn);
- the two hard discounters, Lidl and Aldi, have distinctive features (very few ancillary services offered) that set them apart from regular supermarkets.

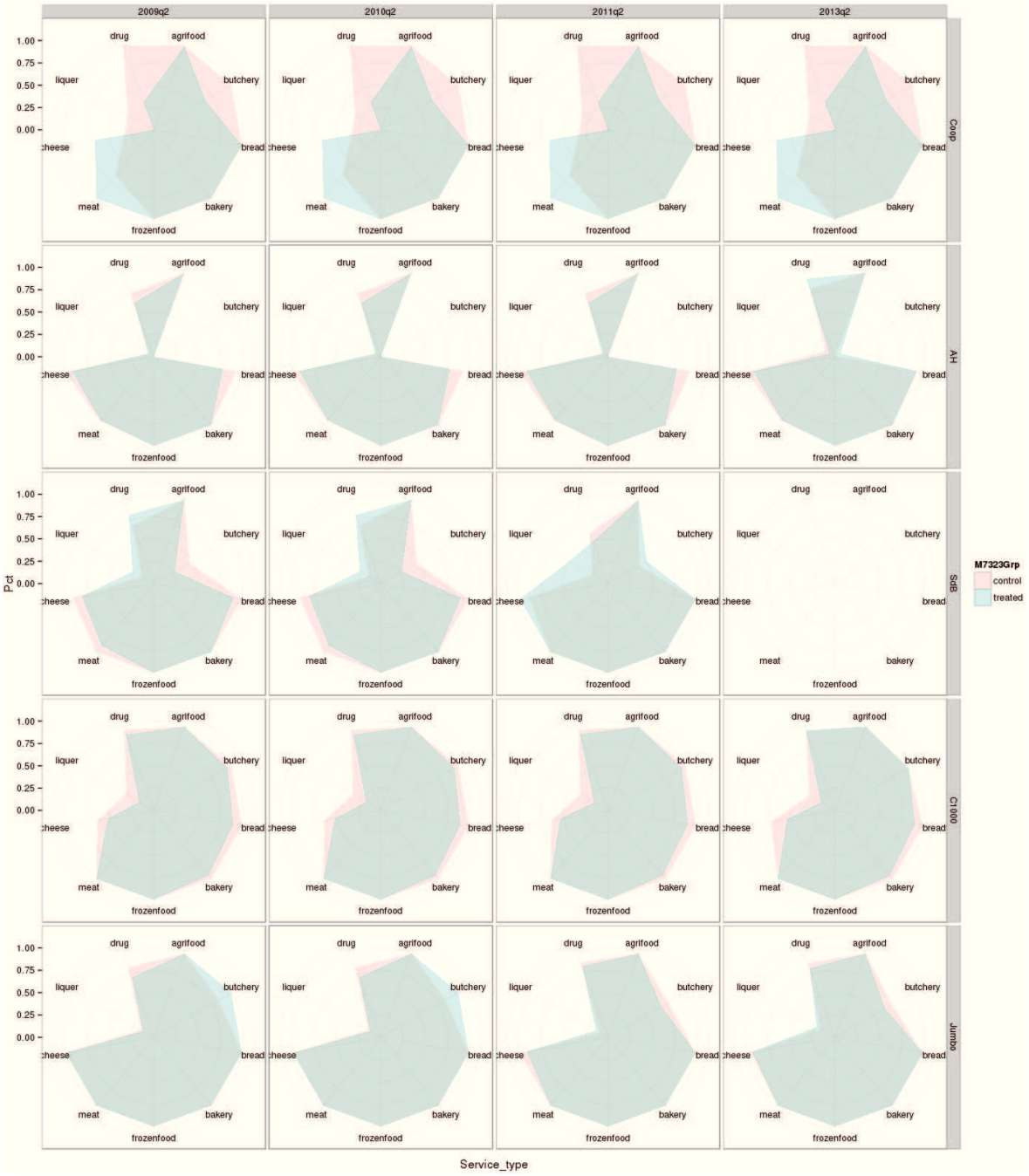
Figure 14.1: Availability and evolution in time of ancillary services by chain



Lear elaboration on Supermarket Gids

One interesting point to note is that C1000 used to have more butcheries than Jumbo. Hence, we can probably exclude that the reduction in the number of butcheries in Jumbo is due to the rebranding of C1000 stores. Instead, it might be part of a strategy. Since Albert Heijn – the main competitor of Jumbo and market leader – does not offer the butchery service, we explore whether the elimination of this service disproportionately affects Jumbo stores in treated areas. We plot the same dataset. This time each line of panels represents one specific chain observed throughout the time. Inside each panel, the two different areas represent the same measurement referred to treated areas (light blue) and the control areas (pink), as defined for the third merger. By looking at Jumbo (the last row of the chart) we notice that changes pre and post-merger #7323 (the last two columns) are only minor and almost identical between treated and control areas. More substantial changes in the "treated" areas happened earlier in time and cannot be attributed to the last merger.

Figure 14.2: Availability and evolution in time of ancillary services by chain



Lear elaboration on Supermarket Gids

Overall, from the analysis described above and from additional explorative analyses performed on the Supermarket Gids dataset at various levels of aggregation, we conclude that there are no apparent signs of a reduction in competition on ancillary services attributable to the mergers.

15. Questionnaire and interviews with market participants

To obtain a more comprehensive understanding of the sector and to both support and complement the quantitative assessment described above, our study includes the analysis of evidence and views of

market participants selected among supermarket chains, purchasing organizations and associations of producers. This information has been collected by means of questionnaires and phone interviews.

Out of nine stakeholders who had declared their willingness to participate in the questionnaire, we received complete responses from five. Other two stakeholders sent us incomplete responses declaring they were not able to provide all the information required. We then contacted them via phone to get a general overview of the industry and the market trends. We also had follow-up calls with three of the stakeholders who sent back completed questionnaires.

Considering both the questionnaire and the telephone interviews, the topics discussed include:

- the market trends, with particular regard to pricing of both branded and private label goods and variety of assortment, from 2009 to 2014;
- the general impact the three mergers had on the market, with particular regard to prices of both branded and private label goods and variety of assortment;
- the general pricing policy;
- the business strategy following the three mergers;
- the role of hard discounters in attracting consumers' demand and the increasing competition with Dutch supermarkets;
- the role of branded/private label goods acceptance over the years;
- the role of buying alliances in the Dutch market over the years;
- the rebranding process of supermarkets' stores, together with the possible difficulties arising from rebranding.

The next sections are structured as follows: Section 15.1 reports the views of market participants on the mode of competition and market breadth of the grocery industry in the Netherlands; Section 15.2 investigates the perceived effects on competition of each merger, as well as the combined effect of the three.

15.1. Mode of competition and market breadth

We exploit questionnaires and interviews to first gather a general overview on Dutch supermarkets' business strategy. We investigate which are the main drivers for consumers' choice of supermarket and hence, which are the main aspects over which supermarkets compete.

As expected, the evidence collected shows that prices of branded goods and the frequency of promotional sales are the characteristics that consumers value the most when choosing a supermarket. However, the interviewees also pointed out that the variety of assortment and the availability (and price) of private label may influence consumers' choices.

Moreover, we also investigate if supermarkets elaborate different pricing strategies across products' categories and across geographic areas. We expect that, for instance, some products are more likely to be promoted with respect to others (for example, because they are predominant in Dutch consumers' shopping habits and hence, are more visible to them). We also expect little geographic price variability (even if the ACM defined geographic markets in the merger decisions as local).

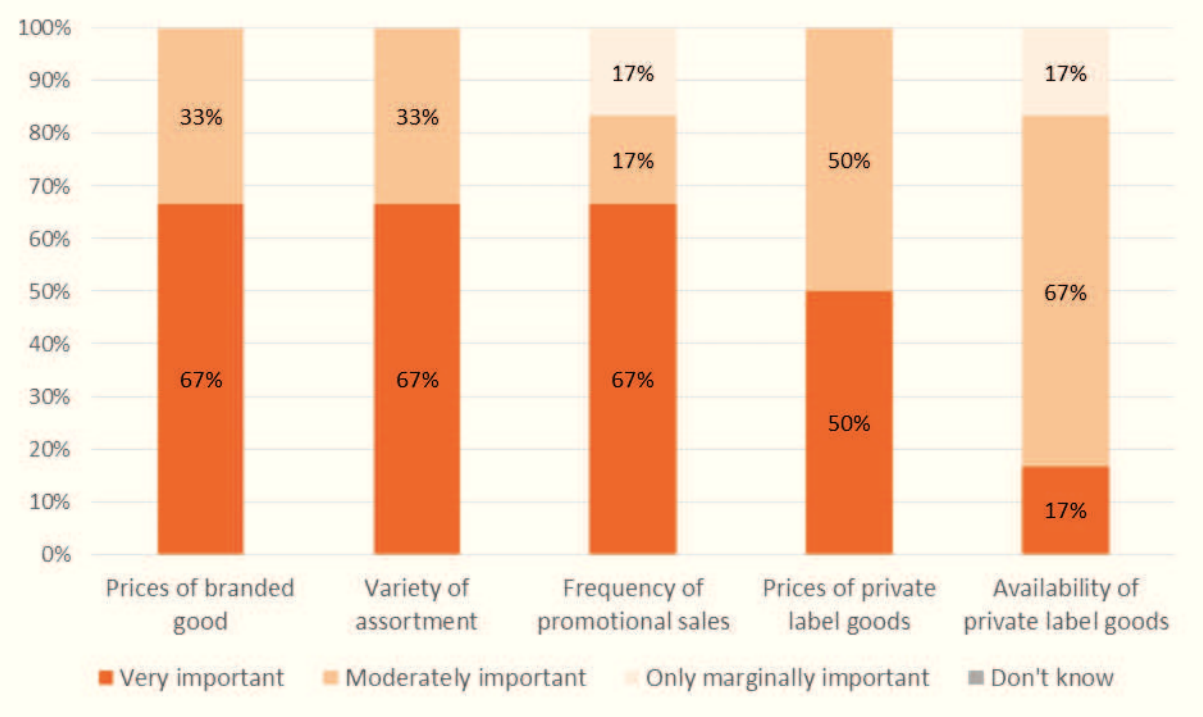
15.1.1. Pricing and non-pricing measures of competition

Supermarkets can compete to acquire customers by tailoring their retail offering along many different dimensions (e.g. prices and availability of goods, variety of assortment, opening hours). Price may not be the most important dimension of competition.

In this light, we investigated the different dimensions of retail offering that, according to supermarkets, consumers valued most during the merger period (2010-2012) and after the merger period (2012-2014).

As shown in Figure 15.1, according to 67% of the supermarkets interviewed, consumers perceived the prices of branded goods, the variety of assortment and the frequency of promotion sales as very important aspects of the retail offering in 2010-2012; a slightly lower percentage (50%) of consumers considered the prices of private label goods very important as well.

Figure 15.1: Views on consumers' preferences in the merger period (I)

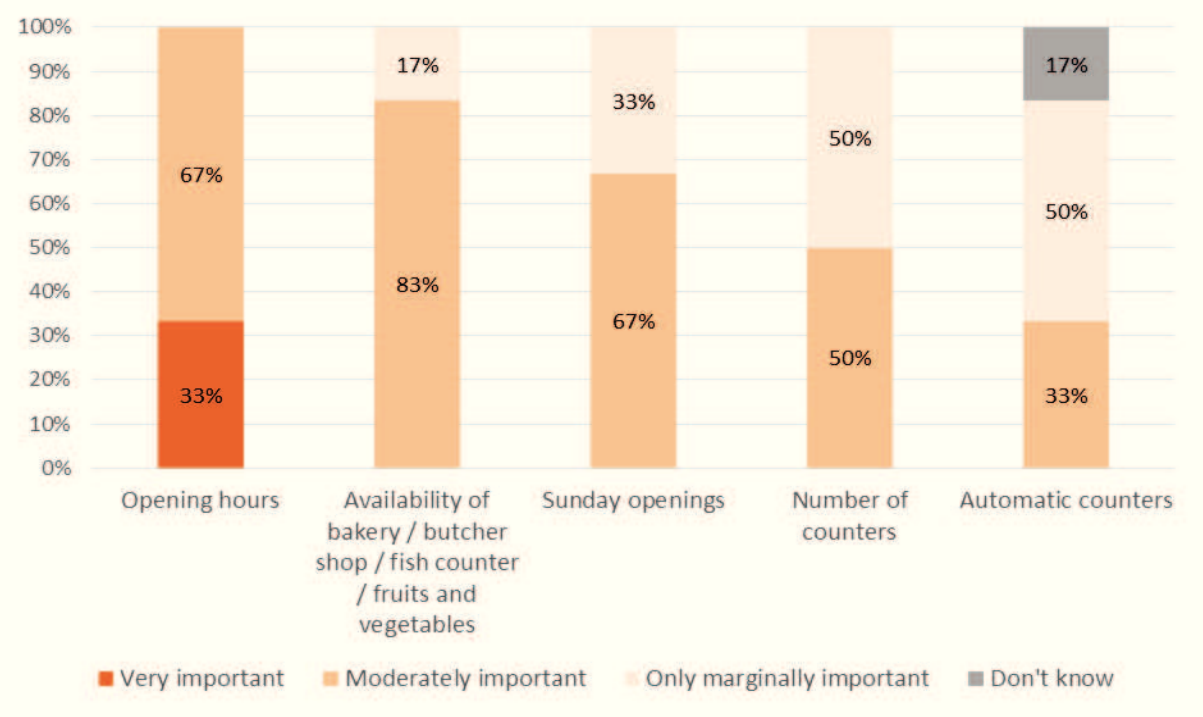


Source: Lear questionnaire

Availability of private label goods, opening hours, Sunday openings and availability of ancillary services (e.g. bakery, butcher shop, etc.) are mostly considered of moderate importance (Figure 15.2).

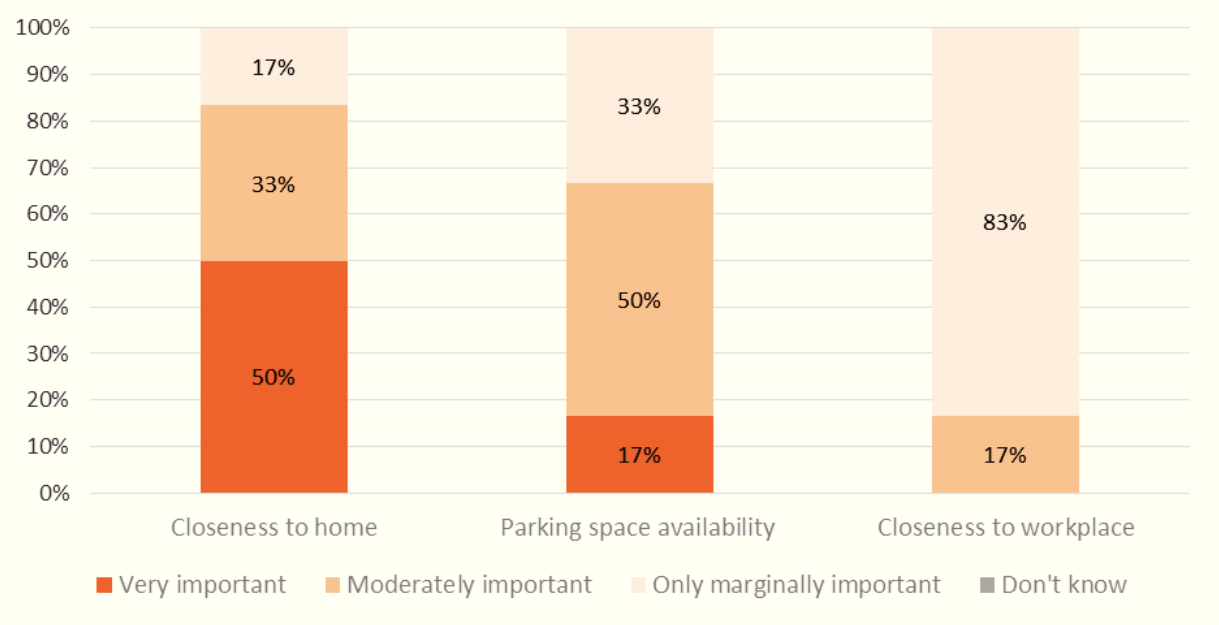
Further, as indicated by Figure 15.3, 50% of the supermarkets interviewed thinks that consumers perceived closeness to home as a very important characteristic of retail offering. According to information collected, consumers usually go shopping from three to five times a week, in supermarkets within 1-2 km from their residences.

Figure 15.2: Views on consumers' preferences in the merger period (II)



Source: Lear questionnaire

Figure 15.3: Views on consumers' preferences in the merger period (III)



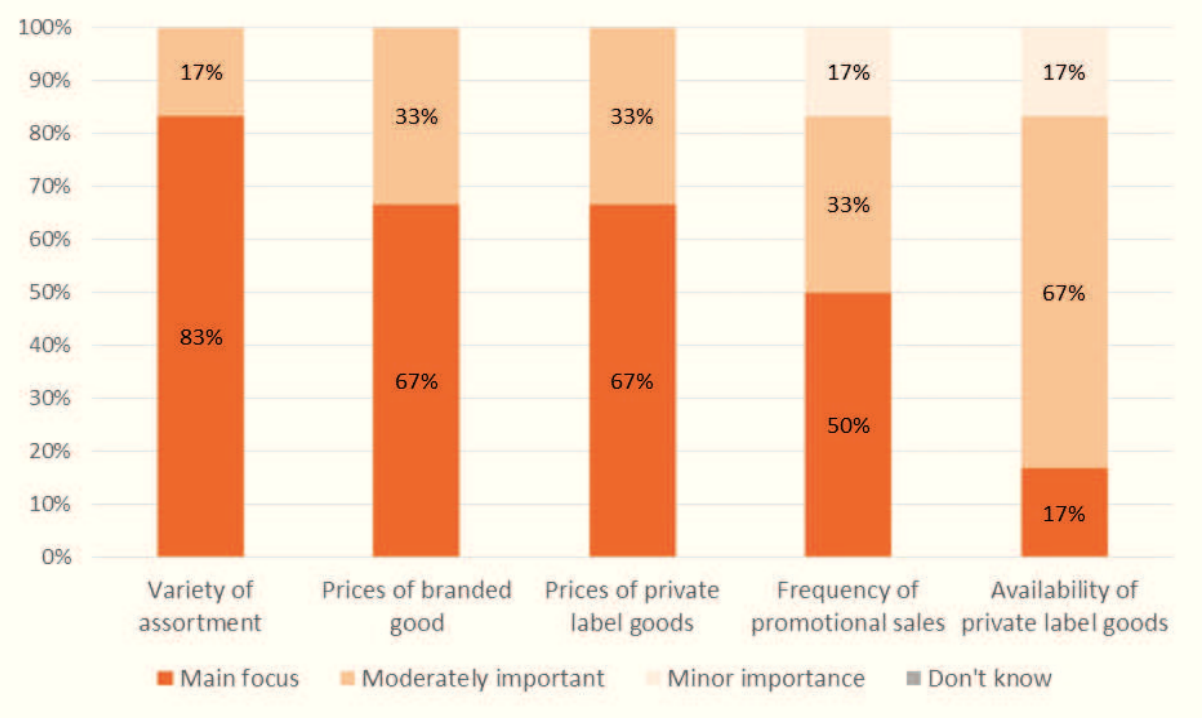
Source: Lear questionnaire

Having collected the views on consumers' preferences, we investigated supermarkets' preferences over the strategic choice of retail offering in 2010-2012, in order to better understand the specific dimensions of competition. In other words, we asked to supermarkets which factors were the main determinant of their business strategy during the merger period.

As described in Figure 15.4, 83% of the supermarkets interviewed indicated variety of assortment as the main focus of their business strategy; according to a lower percentage (67%), the main focus has been on prices of both branded and private label goods.[99]

Availability of private label goods (Figure 15.4), availability of ancillary services (e.g. bakery, butcher shop, etc.) and number of counters were mostly considered of moderate importance (Figure 15.5). An even lower importance is attributed to automatic counters (Figure 15.5), parking space availability, closeness to home and closeness to workplace (Figure 15.6) by large part of the supermarkets.

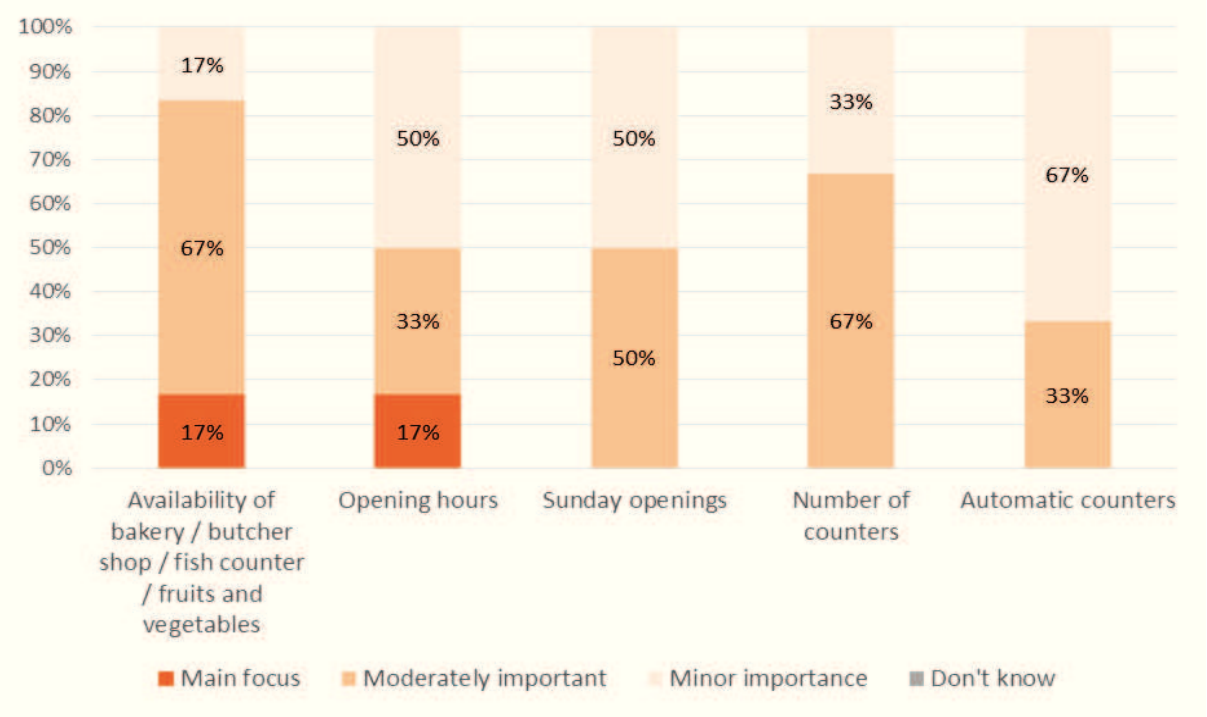
Figure 15.4: Views on the factors that affected supermarkets business strategy in the merger period (I)



Source: Lear questionnaire

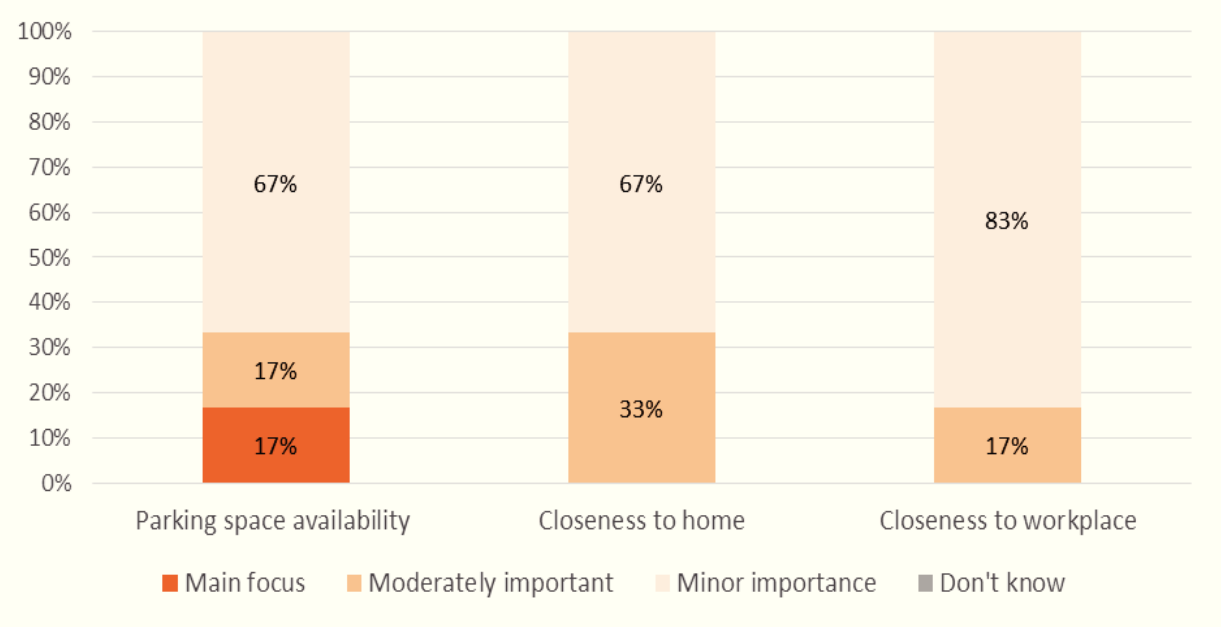
[99] Results should be interpreted carefully as our sample is biased in favour of standard supermarket formulas and, in a market characterized by a level of prices that is commonly referred as low, variety may allow for more flexibility in the development of a business strategy tailored to consumers' needs.

Figure 15.5: Views on the factors that affected supermarkets business strategy in the merger period (II)



Source: Lear questionnaire

Figure 15.6: Views on the factors that affected supermarkets business strategy in the merger period (III)



Source: Lear survey of market participants

The picture presented does not change substantially after the mergers (i.e. 2012-2014). Price sensitivity and a greater attention to quality by consumers seemed to be increasing together with promotions by supermarkets. Eventually, the greater price sensitivity could have been also driven by

the growth of hard discounters (i.e. Aldi, Lidl, Action), although they could be considered close substitutes to supermarkets even before the 2012-2014 period.[100]

In any case, as reported by half of the supermarkets interviewed, these changes have been mainly the result of market trends for those years, and cannot be attributed to the mergers.[101]

15.1.2. Ability of supermarkets to define market strategy

In defining the various dimensions of its market strategy, a supermarket can either set them at central level or leave some degree of autonomy to its individual stores.

In 2010-2012, the dominant tendency was to set prices of both branded and private label goods at central level; variety of assortment and availability of private label goods were instead centrally decided but with some autonomy granted to individual stores.[102]

According to a party interviewed, prices are adjusted by monitoring close competitors. The monitoring activity focuses on branded products, as they are more easily comparable across stores.

Even though hard discounters have only a limited assortment of branded products, there is some consensus that they increasingly exercise a competitive pressure on regular supermarkets.

Considering the 2012-2014 period, a supermarket reported that its individual stores had more freedom in deciding additional assortment and local promotions, as a result of a strategy to attract customers. The other market participants did not report relevant changes.

15.1.3. Private label and branded goods

Private label and branded goods can be subject to different levels of competition, a circumstance we attempt to exploit in our quantitative analyses as a mean to uncover any effect of the mergers. Following this reasoning, we also investigate any perceived differences between branded and private label goods by market participants.

Private labels are reportedly important for supermarket chains to reach their profitability target, as they generate higher margins compared to branded products. The majority of respondents agrees that, in general, the number, the quality and the innovation of private label products increased in the past six years.[103]

Moreover, private labels are highly considered also by consumers. The majority of the respondents agrees that consumer's acceptance of private label goods has increased over time.[104]

With respect to the existence of a trend in prices, all respondents agreed that branded and private label goods followed the same trend during the period from 2007 to 2014. However, opinions about the direction of these trends (increasing/decreasing) are mixed and a general conclusion cannot be drawn.

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[100] The evidence regarding the effects that hard discounters may have on supermarkets' retail offering is more mixed.

[101] From the other half of the supermarkets interviewed, we received no answer on this specific question except for one who said that the merger had only a limited impact on the factors that affected the supermarkets business strategy in the period of analysis.

[102] For instance, in some cases franchisees can set lower prices (e.g. local promotions) but they cannot set higher prices.

[103] According to the information collected, the development of a strong private label requires a sufficient scale.

[104] According to the views expressed by the respondents, private label goods may have become more important because of the economic crisis.

Overall, evidence collected shows that differences between branded goods and private labels do exist; this validates our initial choice of accounting for both categories in the sample selection strategy.

15.1.4. Price sensitivity of different products' categories

We also questioned market participants about the price sensitivity of different products' categories, in order to check that our product sample met the criteria outlined earlier (see Section 4.3).

We therefore asked to categorize different products according to some definitions used in the economic literature. [105]

According to the information collected, toilet paper, coffee, fresh milk and shampoo are mostly considered as "price sensitive/leadership products". On the other hand, frikandels, olive oil and cleaner represent so-called "invisible products", for which consumers rarely choose a particular supermarket.

15.2. Effects of the mergers

The next paragraphs describe the information we collected through the questionnaire and the interviews with respect to each merger and to the combined effect of the three mergers.

We used the questionnaires and the interviews to gather the views of market participants on the effects of the mergers. We explicitly asked whether, in their opinion, the mergers had an impact on supermarkets' strategies or on consumer behavior.

The evidence collected supports the results obtained in the quantitative and qualitative analyses. Moreover, it provides additional information on the absence of effect for the first and the second merger (in this case, the quantitative analysis estimates only the absence of a cumulative effect; the available observations were not suitable to quantitatively investigate the separate effect of each merger).

At the same time, we check if any other structural change or event might have determined a difference between the pre- and the post- mergers periods. This check is essential to verify the existence of confounding factors that might bias the estimates of our analyses.

15.2.1. The acquisition of Super de Boer by Jumbo

There is a general consensus that the acquisition of Super de Boer by Jumbo did not have any effect on consumers' preferences with respect to the aspects they value most.

Moreover, it seems that the acquisition of Super de Boer stores by Jumbo (#6802) did not have any particular impact on most of the supermarkets' strategic variables. Few respondents reported that the variety of assortment, the frequency of promotional sales and the availability of private label goods increased after the acquisition.

Respondents reported that Jumbo and Super de Boer probably obtained efficiency gains from the mergers in terms of reduction of costs associated to logistic, overhead, ICT and marketing. In addition, they probably enjoyed economies of scale and a stronger buying position.

[105] Price sensitive products are defined as those products which consumers buy often and in large quantities and for which they are likely to choose a retailer based on the price; leadership products are a subset of price sensitive products which are sold at low margins and used by supermarkets to attract consumers ("traffic generators"); non-price sensitive/invisible products are those low priced products less frequently price checked (consumers rarely base their retailers' choice on them).

On the timing needed for rebranding, market participants reported that the full conversion of SdB stores into Jumbo took around 1-2 years to be completed. Available data confirm this circumstance.

15.2.2. *The acquisition of former Super de Boer (Jumbo) locations by Schuitema*

As for the "first merger", according to the information collected, the acquisition of former SdB locations by Schuitema (#6879) did not affect most of the supermarkets' strategic variables. Among the general trends observed, market participants reported that the frequency of promotional sales as well as the variety of assortment have increased, while at the same time, prices of both branded and private label goods seem to have experienced a slight decrease. However, the evidence arisen from the interviews is mixed: clear-cut conclusions cannot be made.

All respondents agree that the acquisition of former Super de Boer locations by Schuitema did not negatively impact competition and consumers.

Once again, respondents reported that the merging parties might have gained some efficiencies from the operation (i.e. logistics, ICT, marketing, overhead, economies of scale and buying efficiencies via lower pricing).

Finally, respondents reported that the rebranding of former SdB stores to C-1000 took place in the 2010-2012 period.

15.2.3. *The acquisition of Schuitema (C1000) by Jumbo*

Considering the "third merger" (#7323), our questionnaires has not led to the identification of detrimental effects on competition and consumer welfare.

Compared to the first two mergers, the changes of supermarkets' strategic variables following the acquisition of Schuitema by Jumbo are less clear. Some respondents reported a slight increase in the variety of assortment, the frequency of promotional sales and the availability of private label goods. The remaining respondents reported "no change" for the variety level after the merger. However, the results of the econometric analyses in section 12 show that the merger negatively affected the depth of assortment (number of different SKUs per category). A plausible explanation for this inconsistency might be related to the interpretation of the term "variety". Some respondents might have interpreted it as the length of the assortment (number of categories) – the regression analysis does not consider this element: the number and the type of categories included in the analyzed sample are constant all over the examined period.

Some respondents emphasized that the rebranding of stores from C1000 to Jumbo is still on-going at the time of the writing, hence the effects of the mergers are not fully observable yet.

On the reasoning for the merger, it is reported that the merging parties gained efficiencies from the operation (this is particularly true for the 1st and 2nd merger).

15.2.4. *Combined effect of the three mergers*

According to the majority of the market participants interviewed, the three mergers allowed Jumbo to compete more fiercely with Albert Heijn in the Netherlands.

Respondents emphasized that Jumbo expanded its presence (i.e. more stores) and that it might have benefited from efficiencies in logistics, overhead, ICT and marketing. An increase in size has been repeatedly described as a prerequisite to increase research in the development of private label brands and additional services.

Overall, according to the views collected, competition in the market has increased after the mergers. This effect, however, is attributed to non-merger specific underlying trends. In particular, hard

discounters have become more attractive to consumers because of the general economic downturn. In addition, in the last 2-3 years, other chains formerly specialized on non-food items (e.g. Action and Hema) started to compete also on food-items.

PART VI – CONCLUSIONS

16. Conclusions

From 2009 to 2012, the ACM cleared three mergers between supermarket chains (conditional on structural remedies) on the basis of the presumption that they would have had no significant negative effect on the market competitive dynamics and, ultimately, on consumer welfare. We studied whether the ACM's conclusions on the forseen market developments in the Dutch grocery sector turned out to be consistent with the actual course of events. We performed both qualitative and quantitative analyses to investigate the effect of the mergers on price and non-price dimensions of competition. We then further enriched our study by examining the influence of the structural remedies required by the ACM.

To perform our analyses, we employed two datasets provided by IRI. The first dataset by IRI included sales data (volume and turnover, hence average prices) for specific products at store level. The dataset covered 170 stores. Both stores belonging to the merging parties and stores belonging to competitors were included. Price data concerned 11 products' categories, including both food and non food items. For each category, we received sales data for two branded goods and one private label. Individual items where chosen in such a way to be comparable within the same category (e.g. same package format). The second datased provided by IRI included store-level data on the depth of product assortment, in particular the total number of different SKUs per category, for each of the 125 products' categories IRI uses to classify items sold. Using these data and other control variables from official sourcers (e.g. the Dutch Bureau of Statistics – Statistics Netherlands) we performed a sequence of analyses.

We first investigated whether the mergers affected firms' pricing decisions in the post-merger period. In order to that, we exploited the established *"Difference in Differences" (or DiD)* methodology. The idea underpinning all the quantitative methodologies used to evaluate the effect of a treatment (in this case, the merger) is to compare the economic outcomes of a treated group (i.e. a group affected by the treatment) to the economic outcomes of a control group (i.e. a group not affected by the treatment) over the same time horizon. The average difference between the outcomes of the treated and control group provides a measure of the effect of the treatment. DiD exploits both the cross sectional and the time series variation: the effect of the treatment is indeed estimated by comparing the difference in the average behavior and outcomes of the treated group, before and after the treatment, with the difference in the average behavior of the control group, over the same time horizon. A fundamental step to implement the DiD method correctly consists in the identifycation of a proper control group, i.e. a benchmark that may proxy the price trend that would have occurred absent the merger. We pursued different approaches to identify our benchmark in order to obtain a valid quantitative estimate of the mergers' effect both under the assumption of local and national pricing. We first compared the price charged by the merging stores in the overlapping local markets with the price charged by the merging stores in the non-overlapping local markets (*across areas analysis*). The underlying assumption is that the merging stores located in the non-overlapping areas are not directly involved into the merger and might not be affected. However, if the pricing policy is set at national level, we would expect no price variability across the two groups of stores, regardless of the actual effects of the merger. We analysed the geographic extent of the pricing policy by looking at the price dispersion for each single SKU/chain at a given point in time. Our analyses suggested that some degree of price variability exists, even if limited. We hence corroborated the results of the *across areas analysis* by comparing the price charged by all the merging stores with the price charged by the competitors (*across chains analysis*). This analysis, although less precise – it would only capture a second order effect of the merger – can be considered a valid alternative under the assumption of

national pricing. According to the results obtained from both our analyses, the mergers had no effect on prices. Results hold both if we individually estimate the effect of each merger on prices and if we directly estimate the cumulative effect of the three mergers.

We then investigated the effect of the mergers on non-price dimension of competition. We focused on product variety, measured as the number of SKUs per products' category. Due to data availability issues, we implemented this analysis only for the last of the three mergers cleared by the ACM, i.e. the merger between C1000 and Jumbo (#7323, February 2012). As before, we adopted the DiD approach. However, we only implemented the *across areas analysis*. This approach is consistent with available evidence (including the results of one-to-one interviews with representatives of supermarket chains), which showed that stores enjoy a wider degree of autonomy when it comes to decisions concerning the depth of their assortment. In addition, it seems reasonable to assume that variety decisions are set at local level to take into account specific local demand and supply conditions (such as consumer preferences or presence of hard discounters). Our econometric estimates confirmed this intuition: the depth of assortment varies across stores located in different cities. In particular, our analyses suggested that, differently from the estimated effect on prices, the merger negatively affected product variety. According to the various econometric analyses we performed, after the merger, the merging stores increased the product variety level less than they would have done in the *but-for scenario* (i.e. in the absence of the merger). In particular, the merger caused an average reduction in the number of SKUs per category ranging from approximately 4 to 5 SKUs.[106] Considering that the average number of SKUs per category offered by the merging stores in the post-merger period amounts to 94, the merger caused a reduction in variety between 4 to 5%.

We finally assessed the effect of the merger #7323 on the provision of ancillary and qualitative services, such as availability of agrifood counters, butchery, bakery, frozen food stands, meat counters, cheese counters, liquor counters, drug counters. Given the nature of available data, we only implemented a qualitative analysis. The graphical analysis we carry on allowed us to conclude that the merging stores did not decrease their provisions of ancillary services after the merger.

In addition to the quantitative and qualitative analysis, we also investigated the effect of the mergers through questionnaires and phone interviews to the main Dutch supermarket chains and producers' associations. The evidence collected helped us to understand the dynamic of the markets under scrutiny and better design the econometric models. In particular, we could explore whether any counfounding factors contemporaneous to the mergers that may have biased our estimates exists (for instance, an hypothetic and external price shock might have been counfounded with the effect of the merger if not properly controlled in the model). We couldn't identify anyone. The interviews to the main market participants also helped us understand which are the main determinants of the retail offering of supermarkets stores and, hence, the dimensions of competition most likely to be affected by the merger (prices of branded goods or private label goods, variety of assortment, availability of private label goods, opening hours, etc.). Finally, the interviewees reported their opinion on the effects of the mergers. The evidence collected is mixed. Opinions are contrasting and we could not identify a common answer.

To conclude, this study evaluated the effect of the merger #7323 by focusing on both price and non-price dimensions. Mergers may indeed affect more than firms' pricing incentive and a comprehensive assessment of the ultimate effect on consumers' welfare should hence take into account a multiplicity of factors. In the case under examination, we observed indeed no effect on prices but a reduction in the number of SKUs per category. The ultimate effect on consumers' welfare may be negative:

[106] The effect raises to 8 SKUs if we consider the stores located in the most concentrated local markets (with higher level of HHI).

following the merger, consumers have less choice. We do not know, however, if the level of variety pre-merger was excessive or if the reduced assortment adopted by the merging stores after the merger is centered on the most appealing products. In addition, the separate analysis on the effects of divestiture showed that the structural remedies required by the ACM partially outweigh the negative effects on variety: the merging stores located in the cities where the divestitures have been required experience a lower reduction in variety than the merging stores located in cities where no divestitures have been issued. A precise estimate of the overall effect of the merger on consumers' welfare would hence require more information about the merging parties and consumers' preferences. Nonetheless, the results obtained in this report suggest to pay serious attention to the mergers effects on variety and other non-price dimensions. A better understanding of the overall effect of the mergers may indeed help identifying the correct decisions to take or the remedies to require.

APPENDICES

A. Bibliography

Aguzzoni, L., Argentesi, E., Buccirossi, P., Ciari, L., Tognoni, M., Vitale, C., 2011. The Ex Post Evaluation of Two Merger Decisions (Report prepared for the UK Competition Commission).

Aguzzoni, L., Argentesi, E., Ciari, L., Duso, T., Tognoni, M., 2013. Ex-post merger evaluation in the UK retail market for books (No. 98). DICE Discussion Paper.

Aktas, N., Bodt, E. de, Roll, R., 2007. Is European M&A Regulation Protectionist?*. Econ. J. 117, 1096–1121. doi:10.1111/j.1468-0297.2007.02068.x

Allain, M.-L., Chambolle, C., Turolla, S., Villas-Boas, S., 2013. The Impact of Retail Mergers on Food Prices: Evidence from France (Working Paper No. hal-00920460). HAL.

Ashenfelter, O., Ashmore, D., Baker, J.B., Gleason, S., Hosken, D.S., 2004. Econometric methods in staples. Princet. Law Public Aff. Pap.

Ashenfelter, O.C., Hosken, D.S., Weinberg, M.C., 2011. The Price Effects of a Large Merger of Manufacturers: A Case Study of Maytag-Whirlpool (Working Paper No. 17476). National Bureau of Economic Research.

Ashenfelter, O., Hosken, D., 2010. The effect of mergers on consumer prices: Evidence from five mergers on the enforcement margin. J. Law Econ. 53, 417–466.

Bergman, M.A., Jakobsson, M., Razo, C., 2005. An econometric analysis of the European Commission's merger decisions. Int. J. Ind. Organ., Merger Control in International Markets 23, 717–737. doi:10.1016/j.ijindorg.2005.08.006

Berry, S.T., Waldfogel, J., 2001. Do mergers increase product variety? Evidence from radio broadcasting. Q. J. Econ. 1009–1025.

Bjornerstedt, J., Verboven, F., 2012. Does Merger Simulation Work? A "Natural Experiment" in the Swedish Analgesics Market. SSRN Electron. J. doi:10.2139/ssrn.2109318

Buccirossi, P., Ciari, L., Duso, T., Fridolfsson, S., Spagnolo, G., Vitale, C., 2007. Ex Post Evaluation of Mergers (report prepared for Directorate General for Competition of the European Commission).

Cameron, A.C., Trivedi, P.K., 2005. Microeconometrics: methods and applications. Cambridge university press.

Clougherty, J.A., Seldeslachts, J., 2012. Deterrence of Horizontal Mergers: Empirical Evidence from U.S. Industries. J. Law Econ. Organ. forthcoming.

Davies, S., Olczak, M., Coles, H., 2011. Tacit collusion, firm asymmetries and numbers: evidence from EC merger cases. Int. J. Ind. Organ. 29, 221–231.

Deloitte, 2009. Review of merger decisions under the Enterprise Act 2002 (report prepared for Competition Commission).

Deneckere, R., Davidson, C., 1985. Incentives to Form Coalitions with Bertrand Competition. RAND J. Econ. 16, 473–486.

Directorate General Competition (DG Comp) - European Commission, 2005. Merger Remedies Study.

Draganska, M., Mazzeo, M., Seim, K., 2009. Beyond plain vanilla: Modeling joint product assortment and pricing decisions. QME 7, 105–146.

Duso, T., Gugler, K., Szücs, F., 2013. An Empirical Assessment of the 2004 EU Merger Policy Reform. Econ. J. 123.

Duso, T., Gugler, K., Yurtoglu, B., 2011. How Effective is European Merger Control? Eur. Econ. Rev. 55, 980–1006. doi:10.1016/j.euroecorev.2011.04.003

Duso, T., Neven, D.J., Roller, L.-H., 2007. The Political Economy of European Merger Control: Evidence using Stock Market Data. J. Law Econ. 50, 455–489.

Einav, L., Leibtag, E., Nevo, A., others, 2008. On the accuracy of Nielsen Homescan data. USDA, Economic Research Service.

European Economic Community, Cambridge Econometrics (Firm), Arcadia International (Firm), European Commission, Directorate-General for Competition, 2014. The economic impact of modern retail on choice and innovation in the EU food sector: final report. Publications Office of the European Union, Luxembourg.

Farrell, J., Pautler, P.A., Vita, M.G., 2009. Economics at the FTC: retrospective merger analysis with a focus on hospitals. Rev. Ind. Organ. 35, 369–385.

Focarelli, D., Panetta, F., 2003. Are Mergers Beneficial to Consumers? Evidence from the Market for Bank Deposits. Am. Econ. Rev. 93, 1152–1172.

Fox, E.J., Sethuraman, R., 2006. Retail competition, in: Retailing in the 21st Century. Springer, pp. 193–208.

Friberg, R., Romahn, A., 2012. Ex-Post Merger Review and Divestitures. mimeo, Stockholm School of Economics.

Gujarati, D.N., Madsen, J.B., 1998. Basic econometrics. J. Appl. Econom. 13, 209–212.

Haucap, J., Heimeshoff, U., Thorwarth, Susanne, Wey, Christian, 2015. Die Sektoruntersuchung des Bundeskartellamts zur Nachfragemacht im Lebensmitteleinzelhandel: Ein Kommentar aus ökonomischer Perspektive. DICE Ordnungspolitische Perspekt. 71.

Hosken, D.S., Olson, L., Smith, L., 2012. Do Retail Mergers Affect Competition? Evidence from Grocery Retailing. Fed. Trade Comm. Bur. Econ. Work. Pap.

Inderst, R., Shaffer, G., 2007. Retail mergers, buyer power and product variety*. Econ. J. 117, 45–67.

Jiménez, J.L., Perdiguero, J., 2014. Mergers and difference-in-difference estimator: Why firms do not increase prices? Eur. J. Law Econ. 1–27. doi:10.1007/s10657-014-9437-0

Kemp, R.G., Kersten, N., Severijnen, A.M., 2012. Price effects of dutch hospital mergers: an ex-post assessment of hip surgery. Econ. 160, 237–255.

Kovacic, W.E., 2009. Assessing the Quality of Competition Policy: The Case of Horizontal Merger Enforcement. Compet. Policy Int. 5, 129–150.

Mazzeo, M., Seim, K., Varela, M., 2014. The Welfare Consequences of Mergers with Endogenous Product Choice.

Motta, M., 2004. Competition Policy Theory And Practice. Cambridge University Press.

Office of Fair Trading (OFT), 2005. Ex Post Evaluation of Mergers.

Pofahl, G.M., Carlson, J., others, 2010. Evaluating the Unilateral Price and Variety Effects of Horizontal Mergers, in: 2010 Annual Meeting, July 25-27, 2010, Denver, Colorado. Agricultural and Applied Economics Association.

Pricewaterhouse Coopers (PWC), 2005. Ex Post Evaluation of Mergers (report prepared for the Office of Fair Trading, Department of Trade and Industry and the Competition Commission).

Rosenbaum, P.R., Rubin, D.B., 1983. The central role of the propensity score in observational studies for causal effects. Biometrika 70, 41–55.

Schmalensee, R., 1978. Entry deterrence in the ready-to-eat breakfast cereal industry. Bell J. Econ. 305–327.

Seldeslachts, J., Clougherty, J.A., Barros, P.P., 2009. Settle for Now but Block for Tomorrow: The Deterrence Effects of Merger Policy Tools. J. Law Econ. 52, 607–634. doi:10.1086/596038

Sweeting, A., 2010. The effects of mergers on product positioning: evidence from the music radio industry. RAND J. Econ. 41, 372–397.

B. Empirical techniques and literature review

During the last decade, the assessment of merger policy has been the focus of discussion both in the academic discourse as well as in the policy arena. Ex-post or retrospective evaluation exercises are increasingly regarded as a way of informing and improving future policy enforcement through a learning process as well as a tool that competition authorities might use to increase transparency and accountability (Kovacic, 2009). Most of the major antitrust jurisdictions have attempted to conduct in-house studies (e.g. DG Comp - European Commission (2005); OFT (2005); UK Competition Commission, 2011) or have commissioned such studies to external consultants and academic advisors (e.g., Davies and Lyons, 2005; Pricewaterhouse Coopers (2005); Buccirossi et al. (2007); Aguzzoni et al. (2011)).

Academics have contributed to the debate on merger policy evaluation by exploring the topic from different angles: from case-by-case specific analysis (e.g., Focarelli and Panetta (2003); Ashenfelter and Hosken (2010); Ashenfelter et al. (2011); Friberg and Romahn (2012); Aguzzoni et al. (2013); Bjornerstedt and Verboven (2012); (Kemp et al., (2012)), to broader analysis of merger control enforcement in a jurisdiction over a long time period (e.g., Bergman et al. (2005); Aktas et al. (2007); Duso et al. (2007); Duso et al. (2011); Duso et al. (2013); Davies et al. (2011)), to long-term effects of the policy in terms of the deterrence of particular merger behaviors (Seldeslachts et al. (2009); Clougherty and Seldeslachts (2012); Duso et al. (2013)).

When it comes to evaluating a specific merger decision, the objective of researchers is to establish if the decision adopted was correct, i.e. whether a particular decision achieved the goals set up by the existing legal framework (in most jurisdictions, the protection of consumer surplus).[107] The ex-post evaluation exercise tries to assess whether the decision under examination succeeded in protecting consumer welfare, or whether this would have been better achieved had the competent Competition Authority adopted a different decision (the counterfactual).[108]

One of the main differences between the various empirical evaluation methodologies lies in the choice of the counterfactual. Several empirical approaches and econometric techniques have been employed for the ex-post evaluation of merger policy, such as:

- the estimation of structural econometric models coupled with simulations;
- program-evaluation methods (in particular difference-in-differences analysis);
- event studies; and
- surveys.

The first method requires the construction of a theoretical structure as counterfactual. The second and the third, instead necessitate the identification of an appropriate empirical counterfactual. Below, we briefly discuss each method.

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[107] As it is pointed out in Buccirossi et al. (2007): "[t]he aims of an ex-post assessment of a merger decision [..] are 1) to establish whether the market structure arising from the decision is apt to pursue the economic goal of the EU merger control regulation better than the market structures that could have arisen from alternative decisions available to the Commission within its legal powers; and 2) to assess whether the analysis adopted to reach the decision is correct and complete. The first aim is obvious because it is essential to verify if a decision has reached the goal that justifies the existence of the merger control policy. However, we believe that this is not sufficient because to improve the Commission's decision-making process and to minimize the number of inappropriate decisions it is also necessary to understand why a decision was appropriate or not". The vast majority of the literature focuses on the first issue, while the second one still seems to be largely under-discussed and is an area where some important contributions can potentially still be done.

[108] Buccirossi, P., Ciari, L., Duso, T., Fridolfsson, S. O., Spagnolo, G., & Vitale, C. (2008). A short overview of a methodology for the ex-post review of merger control decisions. De Economist, 156(4), 453-475.

Merger simulations

Merger simulations based on structural econometric models give the researcher the most flexible tool to create different counterfactual scenarios to analyze the effects of one particular merger decision. This approach entails two steps. First, some fundamental parameters of specific economic models are estimated. In a second step, these values are used to simulate alternative scenarios. The flexibility arises from the fact that the researcher can use these estimates and simulate alternative situations, which are well-identified within the theoretical model used for the estimation. Thus, for instance, similar models have been used to estimate demand elasticities and marginal cost parameters using pre-merger data and subsequently used to simulate alternative scenarios. Studies such as Hausman, Leonard and Zona (1994), Nevo (2000), Pinske and Slade (2004), Slade (2004), Ivaldi and Verboven (2005) exemplify this methodology.

In all these studies, merger simulation has been employed for simulating the potential effects of a merger. Indeed, it is still unclear how exactly one could use this methodology in a retrospective assessment of merger control decision. A possible use could be the study of the impact of alternative decisions made by the antitrust authority. For example, on could: (i) simulate what would have happened if some brands (assets) acquired by the merging party had been divested to rivals or potential entrants; (ii) if specific divestures were issued, simulate alternative ones. Moreover, simulations might be a particularly useful instrument to analyze the effect of a prohibition. However differently than in an ex-ante analysis, this exercise should be conducted using ex-post data to capture the fact that the market conditions might have changed after the merger. Yet, it might be quite difficult to credibly identify which changes are due to the merger and which are due to other factors. It is probably due to these difficulties that very few published studies have followed this path.[109]

Event studies

Event studies use the stock market data coupled with finance models to determine a theoretically appropriate, estimated rate of return of an asset and, hence, create counterfactual indicators to assess the effects of mergers and merger decisions on market outcomes. One additional assumption behind the use of event studies to perform ex-post evaluations is the theoretical prediction that consumers' surplus after the merger would be reduced if competitors to the merging firms increase their profits. By conducting event studies around the merger's announcement date, the change in rivals' profits due to the merger can be measured and, hence, a proxy for the competitive nature of the deal can be obtained.

This methodology may best be put to use for a large cross-section of mergers because it allows researchers to consistently identify relevant tendencies. Indeed, even though dependent variables which are mainly based on the firms' cumulative average abnormal returns (CAARs) are prone to measurement error, one might still be able to consistently estimate how the characteristics of the

[109] Interestingly, what most researchers have focused on in the last couple of years has been to verify how accurately merger simulations can predict actual outcomes. This can also be seen as an ex-post assessment, especially if the merger simulations have been used to support decisive arguments to settle the case. Peters (2006) is one of the first papers to perform such an analysis and he has been followed by several other contributions such as Weinberg and Hosken (2008) and Weinberg (2011) with US data and Björnerstedt and Verboven (2012) and Friberg and Romahn, (2012) with European (specifically, Swedish!) data. All these studies encompass two main steps. First, the merger effect is estimated ex-ante by means of merger simulations using pre-merger data. Second, ex-post data on prices are collected some years after the merger and a difference-in-differences analysis is used to estimate the 'true' effect of the merger on prices. Finally, the ex-ante predictions are compared to the ex-post assessments. The results of these studies cannot be easily generalized and are quite mixed. Sometimes merger simulations seem to underestimate the 'true' price effect of the merger, sometimes they seem to over-estimate it and yet sometimes they seem to appropriately measure it.

merging parties, their rivals, the mergers, and the past policy enforcement are correlated with stock market reactions. In turn, inferences on how these observable characteristics affect the way markets evaluate mergers and merger decisions can be made. For this reason, this methodology will be discussed more in depth in the next section, where a description of the literature review on the ex-post evaluation of merger control is presented.

Program evaluation methods

Program evaluation methods look at markets that are similar to those affected by the merger but which have themselves not been affected by the concentration; the objective is to infer what would have happened had the merger not occurred. Since it seems very natural to compare the pre-merger and post-merger situations to verify whether something has changed, this methodology, and in particular difference-in-difference analysis, is probably the one that is commonly considered to be the most appropriate for ex-post evaluations among scholars. Clearly comparing the pre- and post-merger situations is not sufficient to identify the causal effect of the merger and merger decisions. To make this causal inference, the researcher has to control for confounding factors, i.e. other possible forces that might have affected the outcome of interest and are correlated with the merger decision. Hence, the use of more sophisticated identification strategies based on the methodologies developed in the so-called program evaluation literature (see, e.g., Angrist and Pinske, 2010 for an overview) – where 'natural' or 'quasi-natural experiments' are used to estimate so-called 'treatment effects' – have been applied in the field of merger evaluation as well. The main idea is to compare how two very similar groups of firms/markets behave before and after the merger. Of these two groups, one has been treated by the merger, while the other is used as a control group. The difference in the outcome variable between the two identifies the causal effect of the treatment (therefore difference-in-differences).

This methodology is surely very appealing and has been increasingly used in the last decade to perform retrospective merger evaluations: as Ashenfelter, Hosken, and Weinberg (2011) mentione "*[e]xamples include Borenstein (1990) and Kim and Singal (1993) studies of airline mergers, Focarelli and Panetta (2003), Sapienza (2002), and Prager and Hannan (1998) studies of banking mergers, and Hastings (2004) Taylor and Hosken (2007), and Simpson and Taylor (2008) studies of gasoline mergers. Chandra and Collard-Wexler (2009) estimate the price effects of Canadian newspaper mergers."* Hunter et al. (2008) also provide an overview of ex-post studies based on the difference-in-differences methodology.

The ex-post studies employing such methodology differ in the choice of the control group. It might actually be very difficult to define a reasonable counterfactual (i.e., control groups) necessary to causally identify the merger effect. To account for this difficulty, this report considers a bundle of studies that differ in their respective choice of control groups.

Some recent contributions (e.g., Ashenfelter and Hosken, 2011) have simply used the competitors to the merging firms as a benchmark. While this can be justified, it is eventually problematic, since direct competitors are affected by the merger as well.[110] Some cleaner identifications strategies have also

[110] In Aguzzoni et al., (2011) we discuss this issue: "[...], using the competitors as a control group has the disadvantage that these prices may be affected by the merger and, hence, represents an imperfect counterfactual. Indeed if the merger allowed the merging parties to raise their prices, their rivals may have reacted by increasing their own prices as well in the post-merger equilibrium (this effect is thoroughly discussed in Ashenfelter et al, 2011). This effect takes place under a variety of market conditions and, in particular, in the differentiated product Bertrand model commonly used to simulate mergers (introduced in Deneckere and Davidson, 1985). However, for a large class of demand systems Deneckere and Davidson (1985) show that the merging firms increase their prices by a greater amount than their rivals. Therefore, our analysis identifies a first-order effect of the merger, in terms of the change in the prices of the merging parties, and a second-order effect, in

been recently proposed. For instance, researchers have used products in a market different from the one affected by the merger but similar in terms of characteristics and life cycle (e.g., Ashenfelter, Hosken, and Weinberg, 2011). Other researchers made use of the existence of local markets, some of which have been affected by the merger while others have not (e.g., Hastings, 2004; Aguzzoni et al. 2014).

This methodology is not free from weaknesses. First of all, program evaluation approaches might be undermined by the failure of some of their crucial assumptions, such as the fact that in most cases mergers cannot be considered as exogenous events. In addition, this methodology is generally quite data intensive. To increase the number of observations to a level which allows a serious econometric analysis, the researcher needs the price (or other outcome variables) of several goods and possibly several markets affected by the merger. In addition, he might also need more information to control for the goods' characteristics as well as to define suitable control groups. Since good quality data is usually expensive to obtain, budget considerations may seriously limit the scope for applying this methodology to a large range of merger cases.

Other approaches

Alternative approaches to evaluate merger effects are based on the use of surveys and balance sheet data.

Surveys generally use the opinion of market participants to elicit possible counterfactual scenarios. Being based on expectations rather than on 'hard data', this methodology is to a large extent less 'objective' than other methods based on statistical end econometrics analyses (e.g., Farrell et al., 2009). PricewaterhouseCooper (2005) carried out a study for the UK Department of Industry and the UK Office of Fair Trading. The authors investigated the market development that followed ten mergers referred to the Competition Commission by the OFT, all cleared without remedies. For each merger they conducted a series of in-depth interviews with different market participants to understand what had happened to the market both immediately after the merger and in the longer-run in terms of price, market structure, and changes in buyers' behavior.

The literature that uses balance sheet data is very limited. Gugler et al. (2003) makes use of balance sheet data on sales, assets and profits to identify the effects of a merger, and categorizes mergers as anticompetitive when they increase the profit of merging firms while simultaneously decreasing their sales.

Preliminary considerations on the relative performances of each methodology

The results obtained with each evaluation method crucially depend on the chosen counterfactual, and, without doubt, none of these counterfactuals is perfect. Merger simulations make strong structural assumptions on the underlying theoretical model of oligopolistic competition and consumer preferences. Event studies rely on the assumption of the semi-strong efficiency of financial markets, i.e., the assumption that prices reflect all publicly available information about the involved firms. Finally, program evaluation methods require the identification of a suitable control group, that is, a set of firms or markets, which are similar enough to the firms/markets that have been affected by the merger but have not been affected themselves and can therefore be used as a comparison. Each of these methods and their specific counterfactuals might provide insightful information, if carefully applied. On the other hand, if not properly applied, these approaches can lead to misleading conclusions, which might even be deleterious (e.g., Neven and Zenger, 2008). Hence, the focus of a good empirical ex-post evaluation should be on the carefulness, precision, transparency, and

terms of the change in the prices of their rivals." Hence, in some cases it might be at least possible to identify whether the merger had anti-competitive effects by using the competitors as a control group.

robustness of all aspects of the chosen methodology. We will further develop these arguments and identify sensible conclusions.

C. Area selection and propensity score matching

This appendix describes the methodology used to select our units of observation: stores.

The ACM provided us historical location data on all supermarkets in the Netherlands: "Supermarkt gids" database. "Supermarket gids" lists geographic data (including addresses, zipcode, city, and province) and qualitative data (e.g. availability of parking or automatic counters). In 2013, the guide counts approximately 6641 stores.

Project budget allowed to select a total of 170 stores. The final selection of stores had to be consistent with all our identification strategies, either in the analysis across areas or the analysis across chains. As a consequence we selected a mix of merging stores and stores belonging to competing chains.

As described in the report, in the analysis across areas we compare the merging stores in the overlapping areas (treated stores) and the merging stores in the non-overlapping areas (control stores). To select the appropriate stores for our analysis, we started by identifying the overlapping and not overlapping areas. Notice that the definition of "overlapping areas" varies if we consider the analysis of the effect of the merger #7323 or the analysis of the cumulative effect of all the three mergers. Therefore, we separately conducted the selection process for the analysis of the merger #7323 and the cumulative analysis of the three mergers.

The following table shows the total number of overlapping and non-overlapping areas we identified.

Table C.1: Overlapping and non-overlapping areas

	Overlapping Areas	Non-overlapping Areas[111]	Total
Analysis of 7323	253	892	1145
Analysis of all the mergers	12	892	904

Source: Lear elaboration on Supermatk gids data

In order to identify the areas for the selection of 170 stores, we follow an approach based on the *Propensity score matching* (PSM).

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.[112]

The propensity score matching allows to group treated and control units according to their probability of receiving the treatment. The propensity score is defined as the conditional probability of receiving the treatment given the pre-treatment variables:

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

[111] Notice that the definition of non-overlapping area for merger #7323 and for the cumulative analysis is the same: those areas that have not been directly involved in any merger occurred in the Dutch grocery market during the period 2009-2013.

[112] See Rosenbaum and Rubin, (1983).

The PSM technique allows to collapse 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.

Table C.2: Explanatory variables for PSM

Variables	Description	Source
Local market features: demand side		
population	number of inhabitants per City	CBS
population density	average number of inhabitants per square kilometer per City	CBS
income	weighted average of income per capita per City (weights equal to number of income recipients per city)	CBS
Local market features: supply side		
rental price	average value of residential real estate	VU University Amsterdam
HHI	HHI per city (stores' market shares are proxied by the net sales floor)	Supermarkt gids
number of stores	number of stores per City	Supermarkt gids
average store size	average net sales floor of all the stores in the City	Supermarkt gids
Hard discounters	dummy that takes value one if there is at least one Aldi or Lidl store in the City	Supermarkt gids
HHI discounters	Interaction between Hard discounters and HHI	Supermarkt gids

Source: Lear elaboration on CBS, Supermarkt gids and VU University of Amsterdam data

The following table shows the results of the logistic regression for both the analysis of the merger #7323 and the cumulative analysis.[113]

[113] Notice that the analysis is a cross section but not a time series. We indeed estimate the propensity score for each city in a single year (2009) and we intentionally picked a year not influenced by the occurrence of the mergers.

Table C.3: Propensity score matching, estimation results

VARIABLES	PSM - 7323 analysis *overlap*	PSM - Cumulative analysis *overlap*
Population		4.73e-06
		(0.000)
Average store size (squared)		-8.70e-08
		(0.000)
Average income	4.20e-05	0.00307***
	(0.000)	(0.001)
Number of stores	0.000422	0.00643**
	(0.003)	(0.003)
HHI	-0.000251***	-0.000221
	(0.000)	(0.000)
Average land price	-0.000236	-0.00725
	(0.001)	(0.005)
Hard discounters		1.391
		(1.259)
Average population density	-3.25e-06	
	(0.000)	
Average store size	0.00164***	
	(0.000)	
HHI Discounters	5.77e-05	
	(0.000)	
Constant	-1.062	-11.17***
	(0.787)	(3.206)
Observations	1,142	901
Regression	LOGIT	LOGIT
Replacement	YES	NO

Source: Lear elaboration on CBS, Supermarkt gids and VU University of Amsterdam data

In order to improve the goodness of the fit of the econometric models, we use slightly different explanatory variables for the two analyses.

We then group treated and control cities according their estimated scores. Treated and control units with exactly the same propensity score can rarely be found. Instead, each treated unit is usually matched with its closest control, as indicated by the propensity score value. In the cumulative analysis, the matching was performed with no replacement, i.e. each control city has been used only once as a match. In the #7323 analysis, instead, 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").[114] .

[114] In a matching with no replacement, some of the treated cities that were relevant to our analysis ended up being excluded because they could not be matched with the remaining control cities (they were "off support"). In addition our selection of areas is necessarily intertwined with the final selection of stores. While performing the matching for the #7323 analysis, we notice that, in some of the control matched cities, there were no merging stores located. 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.

The following tables present the list of areas obtained from the matching process. Matched cities are color coded. Table below also indicates those areas that, among the treated ones for the merger #7323, were deemed problematic (i.e. where the merged entity had a market share above 50%) and, among the latters, those that required a divestiture.

Table C.4: List of matched areas (analysis 7323)

City	Province	Treated	Overlapping (combined mkt sh>50%)	Overlapping (combined mkt sh<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

For this reason, we could not limit the match to the "nearest neighbor", but had to extend the match to the third nearest neighbor.

City	Province	Treated	Overlapping (combined mkt sh>50%)	Overlapping (combined mkt sh<50%)
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

City	Province	Treated	Overlapping (combined mkt sh>50%)	Overlapping (combined mkt sh<50%)
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

Source: Lear elaboration on IRI data

Table C.5:List of matched areas (cumulative analysis)

City	Province	Treated
'S-HERTOGENBOSCH	Noord-Brabant	Treated
BILTHOVEN	Utrecht	Untreated
AMERSFOORT	Utrecht	Treated
PUTTEN	Gelderland	Untreated
BERGEN OP ZOOM	Noord-Brabant	Treated
ALPHEN AAN DEN RIJN	Zuid-Holland	Untreated
LEEUWARDEN	Friesland	Treated
HAARLEM	Noord-Holland	Untreated
ROSMALEN	Noord-Brabant	Treated
CASTRICUM	Noord-Holland	Untreated
ZWIJNDRECHT	Zuid-Holland	Treated
GELDERMALSEN	Gelderland	Untreated

Source: Lear elaboration on IRI data

To conclude, the propensity score matching technique allowed us to identify the areas from which we finally selected our sample of stores. Post selection, it is possible to check if treated and control areas are indeed similar 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. The following tables show the obtained results.

Table C.6:Test on equality of means for explanatory variables (#7323 analysis)

Variables	Mean			t-test	
	Treated	Control	%bias	t-test	p>t
pscore	.39056	.3712	10.8	1.18	0.237
Average density population	13580	11830	8.4	0.78	0.434
Average store size	922.67	927.57	-1.6	-0.18	0.855
Average income	2407.7	2416.4	-2.8	-0.31	0.757
Number of stores (squared)	37.226	31.381	8.0	0.74	0.459
HHI	4731.1	5088.7	-11.7	-1.27	0.204
Average land price	142.34	147.41	-5.2	-0.52	0.604
HHI Discounters	1757.2	1776.9	-1.0	-0.11	0.916

Source: Lear elaboration

Table C.7: Test on equality of means for explanatory variables (cumulative analysis)

Variables	Mean			t-test	
	Treated	Control	%bias	t-test	p>t
pscore	.25425	.20902	16.3	0.36	0.725
Average population	1.1e+05	1.2e+05	-10.1	-0.22	0.830
Average store size (squared)	8.3e+05	7.9e+05	8.4	0.21	0.837
Average income	2612	2624.2	-3.3	-0.06	0.956
Number of stores (squared)	270.1	197	14.9	0.54	0.598
HHI	2980.3	2530.3	13.8	0.30	0.765
Average land price	221.95	209.64	16.2	0.20	0.841
HHI Discounters	.8	.8	0.0	0.00	1000

Source: Lear elaboration

D. List of selected SKUs

The following table presents a list of the selected SKUs per products' category.

Table D.1: List of the selected SKUs (brands and private labels)

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

PRODUCTS			CHAINS				
Category		A Brand/Private label	*C1000*	*Jumbo*	*SdB*	*Coop*	*Albert Heijn*
		SUPER DE BOER			■		
Fresh Milk	*A-brand*	Arla biologisch					■
		BIO PLUS				■	
		CAMPINA	■	■	■		■
		FRIESCHE VLAG	■	■	■	■	
		VECOZUIVEL					
	Private label	Albert heijn					■
		JUMBO		■			
		MELKAN		■		■	
		SUPER			■		
		ZUIVEL	■				
Frikandels	*A-brand*	Beckers	■	■	■	■	■
		MORA	■		■	■	■
		VAN RIJSINGEN		■			
	Private label	Albert heijn					■
		C1000	■				
		EUROSHOPPER					■
		JUMBO		■			
		MARKANT				■	
		O'LACY		■			
		PERFEKT					
		SUPER			■		
Mayonaise	*A-brand*	Calve			■		
		REMIA	■	■	■	■	■
		ZAANSE MAYONAISE	■	■		■	■
	Private label	Albert heijn					■
		C1000	■				
		JUMBO		■			
		MARKANT				■	
		O'LACY		■			
		PERFEKT					
		SUPER DE BOER			■		
Olive Oil	*A-brand*	Bertolli	■	■	■	■	■
		BIO PLUS		■	■	■	
		BIORGANIC					
		MONINI	■				■
	Private label	C1000	■				
		EUROSHOPPER					■
		JUMBO		■			
		MARKANT				■	
		O'LACY'S		■			

PRODUCTS			CHAINS				
Category		A Brand/Private label	*C1000*	*Jumbo*	*SdB*	*Coop*	*Albert Heijn*
		PERFEKT					
		SUPER DE BOER					
Sanitary Napkins	*A-brand*	Always ultra					
		ALWAYS ULTRA NORMAAL					
		KOTEX MAXI SUPER					
		LIBRESSE INVISIBLE NORMAL					
	Private label	Albert heijn					
		C1000					
		JUMBO					
		NEWWAY					
		SUPER					
Shampoo	*A-brand*	Guhl					
		NEUTRAL					
		SYOSS SHINE BOOST					
Toiletpaper	*A-brand*	Edet soft					
		PAGE KUSSENZACHT					
		PAGE ZACHT EN STERK					
	Private label	Albert heijn					
		C1000					
		JUMBO					
		MARKANT					
		PERFEKT					
		SUPER DE BOER					

Source: Lear elaboration on IRI data

E. Data and data cleaning

This appendix describes the data cleaning process we implemented on the dataset provided by IRI.

IRI provided us turnover and volume data for 170 stores and 15 product categories. It also provided promotional shares and variety data for the same sample of stores and 125 product categories.

In order to properly evaluate the effect of the merger (or the sequence of the merger) on price and variety, we performed some checks on the dataset to avoid that the product sample composition across time (pre-merger versus post-merger period) and across stores (treated versus control stores) could bias the estimate of the treatment.

The first test on data concerned the time length. For each individual store, we dropped from our dataset the products (or categories) whose sales were concentrated either at the beginning or at the end of the period of analysis. Without this dropping, we would have ended up with different products (or categories) in the pre-merger and the post-merger period. Hence, the variation in price, or variety, between the pre-merger and the post-merger period, could have been driven by such differences rather than the merger effect. So, this procedure avoided a sample selection bias and allowed building a sample of products constant over time.[115]

We then checked that the products sample composition across the treatment and control group (in both the *across areas* and *across chains* analysis) was balanced. With respect to the price dataset, we identified 15 products categories and IRI selected, for each category and store, two branded products and one private label. Clearly, different insignia may decide to sell different brands for a given product category. To ensure sufficient similarity across different brands of the same product category, we asked IRI to select comparable products, i.e. brands belonging to the same price/quality rank sold in similar formats (e.g. 1 liter bottles).

The variety dataset, instead, contains data at category level and we ascertained that all the stores were selling the 125 categories included in the dataset.

The data cleaning process related to the temporal horizon of price and variety observations had an impact on the final composition of our sample. Hence, we performed a further check at city level: for each pair of matched cities (overlapping and not-overlapping), we dropped all the redundant brands and categories and we ensured that the number of observation per brands and categories sold by the selected stores across treated and control areas was equal. In this way, we avoided the risk of some categories being overrepresented in the treated areas compared to the control areas (i.e. we had price observations for coffee in a treated area but not in its matched control area).

[115] In principle, we could have kept all the observations and avoid the effect of the sample selection bias by following an hedonic price approach (i.e. controlled for all the products' characteristics). However, given the level of detail of information needed and the high number of products involved, pursuing a similar approach appeared unfeasible.

F. Estimates

This Appendix presents some further results on the price and product variety. In particular, for all the analyses performed, this appendix contains the results of the baseline specification with different cluster standard errors, with newey standard errors and different lags and it finally shows the results of the baseline specification at category level. Moreover, for the variety analysis, this appendix provides the results of the formal test on the comparability between the treated and the control stores in the separate divestiture analysis.

#7323: ACROSS AREAS ANALYSIS

Table F.1: Regression results with different standard errors

VARIABLES	(1) Baseline Price	(2) Baseline Price	(3) Baseline Price	(4) Baseline Price	(5) Newey lag1 Price	(6) Newey lag2 Price
Post merger	0.199***	0.199	0.199*	0.199***	0.182***	0.182***
	(0.025)	(0.125)	(0.061)	(0.019)	(0.040)	(0.047)
overlap	-0.0133	-0.0133**	-0.0133	-0.0133	-0.0578*	-0.0578
	(0.014)	(0.006)	(0.011)	(0.012)	(0.032)	(0.039)
Did	0.00358	0.00358	0.00358	0.00358	0.0290	0.0290
	(0.035)	(0.009)	(0.013)	(0.025)	(0.055)	(0.066)
Population	-2.59e-07***	-2.59e-07***	-2.59e-07	-2.59e-07**	6.81e-08	6.81e-08
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Average income	0.00831***	0.00831*	0.00831***	0.00831***	0.0469***	0.0469***
	(0.002)	(0.004)	(0.001)	(0.002)	(0.008)	(0.009)
Discounters market share	0.0835***	0.0835**	0.0835	0.0835**	0.301***	0.301**
	(0.024)	(0.033)	(0.030)	(0.038)	(0.111)	(0.135)
HHI	3.68e-06*	3.68e-06*	3.68e-06	3.68e-06**	2.28e-05***	2.28e-05**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.589***	1.589***	1.589***	1.589***	1.240***	1.240***
	(0.042)	(0.140)	(0.011)	(0.042)	(0.173)	(0.210)
Observations	83,736	83,736	83,736	83,736	83,736	83,736
R-squared	0.947	0.947	0.947	0.947		
cluster	Storenumber *SKU	SKU	Store name	Store number	NO	NO
FE	Chain *SKU	Chain *SKU	Chain *SKU	Chain *SKU		
newey					lag(1)	lag(2)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

Table F.2: Regression results per product category

	(7) Cleaners	(8) Coffee	(9) Cola	(10) Diapers	(11) Fresh Milk
VARIABLES	Price	Price	Price	Price	Price
Post merger	-0.0347***	1.074***	0.0568***	0.0137***	0.0508***
	(0.011)	(0.092)	(0.006)	(0.002)	(0.006)
overlap	-0.00237	-0.882***	-0.0134	0.00395	-0.0457
	(0.069)	(0.323)	(0.026)	(0.007)	(0.037)
Did	-0.00560	-0.107	0.00221	0.00236	-0.00121
	(0.010)	(0.069)	(0.009)	(0.003)	(0.007)
Population	1.87e-07	-1.03e-05	-2.38e-07	-1.05e-07	6.63e-08
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Average income	0.00611	0.967***	0.00981***	-0.00265	0.0356***
	(0.014)	(0.089)	(0.003)	(0.002)	(0.004)
Discounters market share	-0.0954	1.292	-0.0116	0.0224	-0.0772
	(0.141)	(1.029)	(0.074)	(0.030)	(0.080)
HHI	4.60e-06	0.000154	1.37e-06	-2.53e-06	1.07e-06
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.366***	-14.48***	0.604***	0.242***	0.0399
	(0.318)	(1.998)	(0.074)	(0.034)	(0.093)
Observations	8,480	10,375	12,197	5,320	6,243
cluster	Storenumber*SKU	Storenumber*SKU	Storenumber*SKU	Storenumber*SKU	Storenumber*SKU
FE	Chain*SKU	Chain*SKU	Chain*SKU	Chain*SKU	Chain*SKU
Number of id	162	164	198	120	112

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

Table F.3: Regression results per product category

	(12) Frikandels	(13) Mayonaise	(14) Olive Oil	(15) Sanitary Napkins
VARIABLES	Price	Price	Price	Price
Post merger	0.0518	0.0647***	-0.185***	0.00997***
	(0.037)	(0.023)	(0.057)	(0.002)
overlap	0.0218	-0.0705**	-0.0515	0.00156
	(0.098)	(0.031)	(0.459)	(0.003)
Did	-0.0260	-0.00204	0.0504	0.00234
	(0.051)	(0.031)	(0.070)	(0.003)
Population	-7.89e-07	-1.53e-06**	-2.32e-06	-7.56e-08
	(0.000)	(0.000)	(0.000)	(0.000)
Average income	-0.0458**	0.0714***	-0.322***	-0.00312***
	(0.018)	(0.011)	(0.055)	(0.001)
Discounters market share	-0.531	0.131	-0.698	-0.00236
	(0.412)	(0.131)	(0.642)	(0.014)
HHI	5.17e-07	1.25e-05*	-4.87e-05	1.30e-07
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	3.347***	0.632***	14.79***	0.178***
	(0.405)	(0.235)	(1.190)	(0.024)
Observations	8,325	9,840	8,077	6,464
R-squared				
cluster	Storenumber *SKU	Storenumber *SKU	Storenumber *SKU	Storenumber *SKU
FE	Chain*SKU	Chain*SKU	Chain*SKU	Chain*SKU
Number of id	163	166	144	128

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

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Table F.4: Regression results with different clusters

VARIABLES	(1) Baseline Price	(2) Baseline Price	(3) Newey lag2 Price
Post merger	0.248*	0.248***	0.248***
	(0.135)	(0.027)	(0.011)
merged	5.712***	5.712***	5.712***
	(0.045)	(0.027)	(0.401)
Did	-0.0447	-0.0447	-0.0447***[116]
	(0.135)	(0.032)	(0.013)
Population	-1.01e-07	-1.01e-07	-1.01e-07
	(0.000)	(0.000)	(0.000)
Average income	0.0123**	0.0123***	0.0123***
	(0.006)	(0.004)	(0.002)
Discounters	0.119**	0.119**	0.119***
market share	(0.057)	(0.050)	(0.028)
HHI	2.03e-06	2.03e-06	2.03e-06
	(0.000)	(0.000)	(0.000)
RebrandingCandJ	-0.0113*	-0.0113*	-0.0113
	(0.006)	(0.006)	(0.009)
RebrandingSandJ	-0.0919	-0.0919***	-0.0919***
	(0.075)	(0.034)	(0.019)
RebrandingSandC	0.00620	0.00620	0.00620
	(0.037)	(0.032)	(0.028)
Constant	1.451***	1.451***	1.451***
	(0.156)	(0.088)	(0.040)
Observations	131,869	131,869	131,869
R-squared	0.935	0.935	
cluster	SKU	Storenumber *SKU	NO
FE	Chain*SKU	Chain*SKU	Chain*SKU
newey			lag(2)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

[116] The coefficient of the variable DiD in model (3) assume a negative and significative value. However, this model is not robust: in all the other specifications, the coefficient of DiD is still negative but not significant. Moreover, by excluding the fixed effects, the coefficient of the variable DiD assume the opposite sign: it becomes positive and still significant. We hence concluded that the results obtained thorugh model (3) are not reliable.

Table F.5: Regression results per product category

	(5)	(6)	(7)	(8)	(9)
VARIABLES	Cleaners Price	Coffee Price	Cola Price	Diapers Price	Fresh Milk Price
Post merger	-0.0263	1.162***	0.0761***	0.0113**	0.0759**
	(0.081)	(0.080)	(0.025)	(0.005)	(0.030)
merged	0.118	-0.207	0.0609	-0.0421**	-0.0848
	(0.218)	(0.596)	(0.103)	(0.017)	(0.099)
Did	-0.0253	-0.166	-0.0174	0.00342	-0.0169
	(0.017)	(0.145)	(0.021)	(0.009)	(0.036)
Population	4.00e-08	-1.30e-05***	-2.05e-07	-2.98e-08	-7.66e-07
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Average income	0.0270	1.010***	0.00889	-0.00244	0.0241***
	(0.097)	(0.048)	(0.014)	(0.003)	(0.007)
Discounters	-0.188***	0.742	-0.0168	0.00856	-0.0323
market share	(0.037)	(0.649)	(0.024)	(0.017)	(0.063)
HHI	1.18e-06	9.83e-05***	3.36e-07	-3.25e-06**	1.49e-06
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.831	-15.28***	0.559*	0.284***	0.357***
	(2.121)	(0.985)	(0.295)	(0.071)	(0.125)
Observations	14,099	16,810	18,484	8,658	11,275
R-squared					
cluster	SKU	SKU	SKU	SKU	SKU
FE	Chain*SKU	Chain*SKU	Chain*SKU	Chain*SKU	Chain*SKU
Number of id	261	263	297	201	203

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

Table F.6: Regression results per product category

VARIABLES	(10) Frikandels Price	(11) Mayonaise Price	(12) Olive Oil Price	(13) Sanitary Napkins Price
Post merger	0.0971**	0.0684	0.118	0.0119
	(0.042)	(0.091)	(0.147)	(0.008)
merged	0.425	0.0221	0.683	0.0141
	(0.413)	(0.058)	(1.525)	(0.012)
Did	-0.0488	-0.000966	-0.307	8.53e-05
	(0.152)	(0.067)	(0.202)	(0.009)
Population	-4.15e-07	-1.55e-06***	-3.87e-06	3.21e-08
	(0.000)	(0.000)	(0.000)	(0.000)
Average income	-0.0572***	0.0684**	-0.281**	-0.00408
	(0.018)	(0.027)	(0.115)	(0.003)
Discounters	-0.502*	0.0188	-0.438**	-0.00355
market share	(0.274)	(0.077)	(0.215)	(0.004)
HHI	-5.45e-06	-1.10e-06	-3.68e-05*	-8.29e-07
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	3.185***	0.703	13.16***	0.187***
	(0.583)	(0.524)	(2.767)	(0.060)
Observations	10,708	15,603	13,061	10,562
R-squared				
cluster	SKU	SKU	SKU	SKU
FE	Chain*SKU	Chain*SKU	Chain*SKU	Chain*SKU
Number of id	221	265	227	198

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

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Table F.7: Regression results with different cluster

	(1)	(2)	(3)
	Baseline	Baseline	Baseline
VARIABLES	variety	variety	variety
Post merger	1.881***	1.881	1.881
	(0.683)	(3.167)	(4.785)
overlap	6.717***	6.717	6.717
	(0.720)	(4.875)	(3.215)
Did	-3.842***	-3.842	-3.842
	(0.441)	(4.875)	(6.946)
Population	-0.000141***	-0.000141*	-0.000141
	(0.000)	(0.000)	(0.000)
Average income	-0.438***	-0.438	-0.438
	(0.131)	(1.250)	(0.258)
Net sales floor	0.00541***	0.00541**	0.00541
	(0.001)	(0.002)	(0.003)
Housevalue	0.0371***	0.0371	0.0371***
	(0.005)	(0.040)	(0.003)
Discounters market share	-7.000***	-7.000	-7.000
	(1.794)	(15.211)	(12.752)
HHI	-0.00110***	-0.00110	-0.00110
	(0.000)	(0.001)	(0.001)
Constant	139.5***	139.5***	139.5***
	(2.455)	(24.209)	(8.821)
Observations	166,531	166,531	166,531
R-squared	0.867	0.867	0.867
cluster	Category	Storenumber	Insignia
FE	Category*insignia	Category*insignia	Category*insignia

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

Table F.8: Regression results per product category

	(4) BEER	(5) CHEWING GUM	(6) WINE AND CHAMPAGNE	(7) CEREALS	(8) DEODORANT
VARIABLES	variety	variety	variety	variety	variety
Post merger	21.57***	0.315	8.673	5.983***	25.00***
	(5.324)	(1.813)	(6.882)	(2.193)	(3.184)
overlap	14.59***	5.869***	10.66*	7.975***	14.69***
	(4.903)	(1.670)	(6.337)	(2.021)	(2.935)
Did	-12.46*	0.219	-12.51	-4.254	-10.62***
	(6.809)	(2.319)	(8.801)	(2.831)	(4.112)
Population	-9.94e-05	-9.29e-05***	-0.000377***	-6.00e-05*	-7.08e-05
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Average income	2.869***	-0.492	2.081	-0.647	0.488
	(1.092)	(0.372)	(1.412)	(0.461)	(0.669)
Net sales floor	0.0110***	0.00228**	0.0139***	0.00500***	0.00737***
	(0.003)	(0.001)	(0.004)	(0.001)	(0.002)
Housevalue	0.0188	0.0278***	0.176***	0.0583***	0.00793
	(0.030)	(0.010)	(0.038)	(0.012)	(0.018)
Discounters	-13.41	-4.022	-53.80***	2.219	-5.574
market share	(15.307)	(5.213)	(19.786)	(6.505)	(9.446)
HHI	-0.00105	-5.49e-05	-0.00357***	-0.00109**	-0.000918
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Constant	139.6***	80.43***	199.8***	83.41***	105.4***
	(21.250)	(7.237)	(27.468)	(9.030)	(13.113)
Observations	1,311	1,311	1,311	1,379	1,379
R-squared	0.143	0.108	0.119	0.087	0.229
FE	insignia	insignia	insignia	insignia	insignia

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

Table F.9: Regression results per product category

	(9) CLEANERS	(10) COFFEE	(11) COLA	(12) DIAPERS	(13) FRESH MILK
VARIABLES	variety	variety	variety	variety	variety
Post merger	15.54***	20.79***	2.541	2.843***	-0.316
	(5.021)	(3.875)	(1.759)	(1.068)	(0.919)
overlap	15.94***	10.53***	9.383***	1.728*	1.495*
	(4.623)	(3.569)	(1.621)	(0.984)	(0.846)
Did	-6.920	-3.212	-2.881	-2.303*	0.172
	(6.421)	(4.956)	(2.271)	(1.366)	(1.175)
Population	-0.000192**	-0.000222***	-9.09e-05***	-6.63e-05***	-5.07e-05***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Average income	-5.067***	-1.060	-0.589	-0.0600	0.131
	(1.030)	(0.795)	(0.369)	(0.219)	(0.189)
Net sales florr	0.0130***	0.00795***	0.00263**	0.00217***	0.00162***
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)
Housevalue	0.110***	0.0321	0.0128	0.00281	0.0158***
	(0.028)	(0.022)	(0.010)	(0.006)	(0.005)
Discounters market share	-62.02***	-22.80**	-12.30**	1.297	0.141
	(14.436)	(11.142)	(5.217)	(3.071)	(2.642)
HHI	-0.00379***	0.00189**	-0.00120***	-0.000223	-0.000103
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Constant	281.3***	163.9***	89.10***	38.67***	24.21***
	(20.040)	(15.468)	(7.242)	(4.263)	(3.668)
Observations	1,311	1,311	1,379	1,311	1,311
R-squared	0.072	0.135	0.112	0.190	0.220
FE	insignia	insignia	insignia	insignia	insignia

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

Table F.10: Regression analysis – baseline specification – excluding seasonal products from the sample

VARIABLES	(14) Excluding seasonal products variety
Post merger	1.881
	(0.683)***
overlap	6.717
	(0.720)***
Did	-3.842
	(0.441)***
Population	-0.000141
	(0.000)***
Average income	-0.438
	(0.131)***
HHI	-0.00110
	(0.000)***
Net sales floor	0.00541
	(0.001)***
Housevalue	0.0371
	(0.005)***
Discounters	-7.000
market share	(1.794)***
Constant	139.5
	(2.455)***
Observations	166,531
R-squared	0.867
cluster	Category
FE	Category*insignia

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data

Note: we exclude from the dataset the products that show a seasonality in their variety trend (namely sun protection products, insecticides and greeting cards). Results do not change: the effect of the merger on variety is still significant and negative.

Table F.11: Comparability across treated and control stores in the divestiture analysis

VARIABLES	(1) variety
quarter	-0.0720
	(-0.532)
Time*Treated	-0.143***
	(-8.926)
population	0.000909***
	(8.232)
Average income	11.49***
	(9.492)
HHI	0.00310***
	(7.459)
Net sales floor	-0.00365***
	(-6.231)
Housevalue	-0.0712***
	(-7.234)
Constant	-60.28*
	(-1.930)
Observations	17,469
R-squared	0.877
cluster	Category
FE	Category*insegna

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Lear elaboration on IRI data