National brands in hard discounters: Market expansion and bargaining power effects*

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Abstract

In this paper, we analyze the strategic role of the recent introduction of national brand products by hard discounters in the French market and its impact both at the retail and manufacturer levels. We use a structural econometric model of vertical relationships that takes into account the competition between both mainstream retailers and hard discounters, and between national brands and private labels. We apply this model to the French dairy dessert market, which is characterized by a high penetration of private labels and a high concentration at the manufacturer and retail levels. Using a counterfactual analysis, we show that the introduction of national brands by hard discounters does not only act as means to attract different consumer groups and extend their market share. In addition and even maybe more important, we also show that the introduction of national brands by hard discounters serves as a means to improve their bargaining positioning with respect to their private label providers.

JEL codes: L11, L25, L81, M31

Key words: Structural Model, Counterfactual Analysis, Hard Discount, The Role of Private Labels and National Brands.

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1 Introduction

Within recent years there have been fundamental changes in the retail sector across the world. One of those changes has been driven by the increasing importance of discounters which have transformed the business in many countries (e.g., US , UK, Australia; see Figure 1 in Appendix).[1] Discounters differ from mainstream retailing first because they offer a limited assortment of products at lower prices (Denstadli, Lines, and Grønhaug, 2005). Secondly, a key element in the retailing strategy of discounters is their strong reliance on private label (PL) products which represent a large share of the products carried in their stores.[2] This was particularly the case for hard discounters (HDs) such as Lidl, Aldi or Netto for which PL products represented more than 90% of stock keeping units in the 2000 s (Denstadli, Lines, and Grønhaug, 2005). In contrast, other grocery retailers (refered to as mainstream retailers hereafter) generally carry manufacturer brands known as national brand (NB) products. However, given the tremendous success of PL products in discounters, mainstream retailers fought back by increasing the share of PLs sold on their shelves to limit the increasing competition effect of HDs in the retail market. (e.g., European Commission, 2011, p. 35f).[3] PLs can attract customer by discouraging them from visiting HDs and then limiting business by stealing from the development of HDs (cf. Vroegrijk, Gijsbrechts, and Campo (2016)). However, this change in the strategy of mainstream retailers may push HDs to react in turn by introducing NBs in order to attract more consumers to their stores.[4] In this paper, we analyze whether the introduction of NBs was a profitable strategy for hard discounters.

Whereas the introduction of NB products by HDs has hardly been investigated, the literature dealing with the introduction of PL products is abundant. It particularly focused on the impact of strategic assortment effects and the impact on the bargaining process between retailers and manufacturers (see, for a survey, e.g. Berges-Sennou, Bontems, and Réquillart, 2007 or Hyman, Kopf, and Lee, 2010). Mills (1995) shows that PLs help to overcome

[1] https://edition.cnn.com/interactive/2019/05/business/aldi-walmart-low-food-prices/index.html [last download 02.12.2019], https://www.independent.co.uk/news/business/analysis-and-features/aldi-supermarket-latest-how-grow-small-germany-discount-why-uk-us-tesco-sainsbury-rival-a8142066.html [last download 02.12.2019]; http://www.roymorgan.com/findings/6297-aldi-effect-australias-changing-supermarket-scene-201506220132 [last download 02.12.2019]

[2] PLs are store brands that are sold under the retailer's own name or a name created exclusively by the retailer.

[3] There is also a wide literature discussing the competition between HDs and mainstream retailers in more detail, e.g., Cleeren et al. (2010), Gijsbrechts, Campo, and Vroegrijk (2018).

[4] https://www.lsa-conso.fr/comment-le-hard-discount-a-disparu-du-vocabulaire,232578 [last download, 10.4.2019]. Albeit there is limited data availability, Deleersnyder and Koll (2012) shows that common brands comprise an significant part of overall listings also in discounters. Moreover, also consultancy reports show examples such as the German hard discounter ALDI, which traditionally provides only few NBs, listed new NBs that are becoming more important for overall revenues in their particular product categories (Boston Consulting Group, 2017).

double marginalization problems and increase the efficiency of the vertical distribution chain. Similarly, Bontems, Monier-Dilhan, and Réquillart (1999) highlight the role of PLs play in differentiation, which serves as a means to discriminate between different types of consumers. Narasimhan and Wilcox (1998) show that the introduction of PLs can lower wholesale prices for NBs due to substitution effects. In addition, PLs have been shown to improve the retailers' outside option. This means that in the case of disagreement in the bargaining process between retailer and manufacturer, the retailer can gain a reservation profit above zero while this is not the case if no available outside options exist (see Berges-Sennou, Bontems, and Réquillart, 2007, p. 9. citing a french thesis of S. Caprice). Morton and Zettelmeyer (2004) combine the substitution effects due to assortment positioning choice in a bargaining framework and find empirical evidence of an extended bargaining power of the retailer due to PLs. They highlight the role of the strategic product placement in terms of the degree of differentiation for the size of the retailers' disagreement profit. In particular, a PL that is designed as a close substitute has a positive impact on the retailers' disagreement profit. Meza and Sudhir (2010) try to test the relevance of the different motivations for the introduction of PLs that are described above. They use a structural econometric model to test whether PLs increase the bargaining power or whether the retailer uses the general pricing within its assortment to increase the demand for PLs. Their analysis reveals general support for both arguments, which again shows the complexity in the analysis of the role of PLs. In the case of single-serve brew-at-home coffee category, Ellickson, Kong, and Lovett (2018) show that the introduction of PLs by retailers increased their profits not only through an increase in sales but also from a "substantial" retailers' bargaining leverage, and they emphasize the role of PLs in the disagreement payoffs of retailers, that is, on the profits that retailers can earn if negotiation with the manufacturer fail. More generally, empirical findings show that introducing a PL tends to change the price leadership patterns between manufacturers and retailers (Chung and Lee, 2018). It increases unit NB margins for retailers and for some premium-price NB manufacturers (see Chintagunta, Bonfrer, and Song, 2002 and Pauwels and Srinivasan, 2004).

The role of competition between NBs and PLs when they are sold in a common mainstream retail chain is now well understood, but the particular case of NBs at discounters, relying mostly on PL goods strategies, has hardly been analyzed. Although not explicitly considering the bargaining situation between HD and PL providers,

there are some studies investigating the impact of the introduction of NBs. They show that NBs are used for product differentiation in HDs (similarly to PLs in supermarkets). Lourenço and Gijsbrechts (2013) show that NB introduction may help HDs improve the overall perception of the outlet. This finding parallels, therefore, the role of NBs being similar for HDs in the same way in which PLs are for common retailers: a means of adjusting the assortment and product differentiation, and consumer discrimination. Hokelekli, Lamey, and Verboven (2017) analyze the competition between common retailers and HDs to investigate the role of PLs and NB strategies. For the case of NBs listing in HDs, they find that NBs are an effective means of gaining additional market shares from common retailers. Importantly, none of these studies take into account a specific bargaining situation between PL producers and retailers. This is where our study steps in. We investigate the relevance of NBs for the bargaining situation between PL providers and HDs. That is, we test, whether the Scott-Morton and Zettelmeyer (2004) argument of imitating strategies to improve the retailers' disagreements payoff also holds for the case of PLs with discounters. We argue that HDs value NBs not only because they can be a useful tool to gain market shares. NBs are also listed as being close substitutes to PLs to improve the retailers' outside option in the bargaining situation. This, of course, requires that PL producers have at least some bargaining power. This issue is worth investigating as retailers do not always only rely on competitive manufacturers for the production of their PL but also on large manufacturers including NB manufacturers.[5] In that case, HDs negotiate with private firms for the procurement of their PLs. This is typically the case for German HDs. For instance, German HDs deal with German manufacturers and also French national firms to fit consumer preferences. In the specific case of the French dairy dessert market, they deal with large national firms specialized in the production of PLs (such as Senegral, for instance) but also with firms that also produce NBs (such as Lactalis-Nestlé, for instance). Given the large share of PLs in the food market, such firms may have a significant degree of power in the negotiations with HDs. The concentration of PL providers in this market even led to a cartel formation of the main PL providers during the period 2006 to 2012 in France, which had an even greater effect on the wholesale prices of PL manufacturers.

To test our hypothesis, we use consumer household panel data for the French dairy dessert category from Kantar which makes it possible for us to analyze the preferences of consumers for NBs and PLs and for different

[5]See Ter Braak et al., 2013 and Milberg, Cuneo, and Langlois, 2019 for some examples of NB manufacturers producing PLs and for a literature review on the NB manufacturers' motivations for the production of PLs.

retailers and thus the substitution patterns between brands and between retailers. Given the high level of product differentiation in this category, PL producers are not pure undifferentiated substitutes priced at marginal costs. To uncover results, we apply the a structural econometric analysis of the demand and use demand estimates in a Nash-in-Nash framework to assess manufacturer and retail margins (see, e.g., Draganska et al. 2010, Bonnet and Bouamra-Mechemache 2016). We use the empirical Nash and Nash framework developed by Bonnet and Bouamra (2020) to analyse the listing decision of NB by HDs. [6] We use the same dataset and follow the empirical strategy to derive demand and supply patterns. We then conduct an original counterfactual analysis to simulate the delisting of NBs at HDs. As far as we know, while NB strategies by traditional retailers and implication on vertical profit sharing have been analyzed in this literature, the NB/PL strategies of Hard-Discounters have not been yet adressed in the economic literature while there is a clear trend towards the introduction of NBs in HD stores.

The analysis first replicates the analysis of Bonnet and Bouamra-Mechemache (2020) to derive demand and supply patterns. Then, differently to them, we use a counterfactual analysis and simulate the delisting of NBs at HDs. In addition to business-stealing effect, our analysis shows that better supply terms for the procurement of PLs is one of the key reasons for the introduction of NBs in HDs. Carrying NBs enables HDs to increase the retail margins of PL products and backs the idea of strategic positioning to enhance the disagreement profit in the spirit of Morton and Zettelmeyer (2004). This is important for two reasons. First, it shows that the relevance of bargaining processes and strategic sourcing in retail is of utmost importance to ensure retail profits. Second, it highlights that sourcing from PL producers is also dependent on particular bargaining positions, indicating that bargaining power is also relevant for those producers.

Our paper is organized into five sections. Section 2 describes the French dairy dessert market and the data used. Section 3 outlines the empirical strategy, while section 4 discusses the results. Section 5 concludes.

2 French Dairy Dessert Market and Data

[6] Bonnet and Bouamra analyze the impact of the French yogurt cartel on upstream and downstream margins.

We use a 2009 home-scan data set from a French representative consumer panel data of 22,508 households and 1,348,946 purchases, collected by Kantar Worldpanel as used by Bonnet and Bouamra-Mechemache (2020).[7] It provides information on product characteristics, such as brand, dessert type – yogurt, fresh cheese (quark and cream cheese), and other dairy desserts- the retailer chain in which the purchases have been made, as well as price and quantity. The richness of this database makes it possible to model the competition between retailers as well as between brands. We consider the five main buying groups existing in the French retail market and an aggregate of the remaining main stream retailers. We also compute an aggregate of HD. Given the wide variety of dairy desserts in France that could differ according to ingredients, flavor, packaging, and other characteristics, we aggregate the sales at the brand level by segment type (yogurt, fresh cheese, and other dairy desserts).

We include in the analysis the 20 major NBs produced by the five main manufacturers in France. Each manufacturer supplies a portfolio of brands that cover the three segments and offers between one and nine NBs. Market shares at the brand level are low with less than 3% of market shares for most brands. NB products compete with products sold under PL brands. Each retailer sells its own store brands. Due to the nature of the data available, we cannot clearly identify the exact firm which retailers deal with for the procurement of their PL products. We can only identify the brand and not the firm that produces it. We thus assume that the independent firms negotiate a separate contract with independent firms for each segment.[8] PLs account for almost half of the market (49.6%). We aggregate purchases of other NBs in an outside good that represents 5.5% of the market, implying that consumers can substitute one of the dairy dessert brands with this alternative option. Defining the choice alternative as a combination of a brand, a product category (yogurt, fresh cheese, and other dairy dessert), and a retailer, we obtain 219 differentiated products that compete on the market.

We choose the French dairy dessert market to analyze competition strategies between traditional retailers and HD for two reasons. First, it is a mature market where dairy desserts are present in both retailer formats and purchased on a regular weekly basis. The five independent hard discounters (HDs) in the French retailing market –Aldi, Lidl, Mutant, Erteco and Norma– represent 11% of the dairy dessert market (cf. Table 1).[9] In comparison,

[7]For our estimates, we use a random draw of 100,000 purchasing decisions.

[8]In order to take into account the existence of a cartel formed by most of the PL manufacturers in the French fresh dairy product market during the period 2006 to 2012, we consider that the PL providers colluded such that only one entity negotiated with retailers for PLs. (Source: Autorité de la concurrence: Décision 15-D-03 du 11 mars 2015 relative á des pratiques mises en œuvre dans le secteur des produits laitiers frais. The "yogurt" cartel involved yogurts, fresh cheese, liquid dairy cream, and milk-based dessert sold under store brands.)

[9]There exists two other hard discount chains –Netto and Leader price– which belong to two buying groups, ITM and Casino respectively.

the market share for each of the five main retail chains operating in the French grocery retailing sector varies from 9 to 20%. PLs account for 49.6% of the market with the lowest share for the yogurt category (48.5% of the total market share for this category) and the highest share in the fresh cheese sector (60% of the total market share for this category) as shown in Table 2.

Table 1: **Retailers' average price and market share**

	Price in euros par kg	Market share in %	PL Market share in %
R1	2.27	16.19	8.09
R2	2.29	13.76	8.35
R3	2.44	9.58	3.93
R4	2.50	20.33	8.23
R5	2.55	12.24	7.19
HD	1.89	10.74	8.89
Other	2.45	11.77	4.92

HD offer mostly PLs. The share of NBs in the total HD sales of dairy desserts only represents 18% in volume while the share of NBs varies between 39.2% to 59.6% for mainstream retailers. Second, the share of NBs in total HD sales differ from one category of dairy desserts to another as shown in Table 2. The share of NBs in HD sales is the highest for yogurt (21.4%), and the lowest for fresh cheese (9.6%) which means that the highest share of NBs in HD sales does not occur for the most differentiated categories, which exhibit higher NB prices—that is, fresh cheese and other dairy desserts. The share of NBs in HD sales is the highest in the category for which the competition with traditional retailers is tougher, that is, in less differentiated category –yogurt. Interestingly, this category also exhibits the lowest HD total (PL and NB) market share (9.7% of the total market share for yogurt compared to more than 13% of the total market share for fresh cheese and other dairy desserts). Another interesting feature of the dairy dessert market in France is that it is highly concentrated. Danone, Yoplait, Senagral (Senoble), Lactalis (Nestlé), and Novandie (Andros) are the main players in the NB dairy dessert market, with very well-established brands, such as Danone and Yoplait, for instance. These players are active and compete in the three categories of products. The high concentration of dairy firms producing NB brands in this market may lead to higher bargaining power in the hands of manufacturers, such that retailers may use PLs as a tool to countervail the bargaining power of manufacturers and get a larger slice of the trade profit.

We did not include them in the HD retailer as we consider that the negotiations are conducted at the buying group level. They are then included in their respective mainstream retailers.

Table 2: **Descriptive statistics : prices and market shares**

		Market share (%)	**Prices** (euro per liter)
Yogurt			
MSR	NB	26.87	2.33
	PL	22.20	1.56
HD	NB	1.13	2.12
	PL	4.16	1.41
Fresh cheese			
MSR	NB	7.05	3.05
	PL	8.75	2.08
HD	NB	0.24	2.93
	PL	2.25	1.84
Other dairy desserts			
MSR	NB	9.48	3.44
	PL	9.35	2.75
HD	NB	0.48	2.86
	PL	2.57	2.15

MSR: mainstream retailers, HD: Hard Discounters, NB: national brands, PL: private labels

As expected, the average final prices per category are lower for PLs compared to NBs. They are also lower in HDs than at traditional retailers. Average NB prices in HDs are 4% lower for fresh cheese, 9% lower for yogurts, and 16.8% lower for other dairy desserts compared to NB prices at mainstream retailers. However, differences in NB prices at the brand level can be positive or negative depending on the brand. In addition, the product portfolio of each brand in HDs and in mainstream retailers differs, which may also explain the differences in average prices at the category level.

3 Empirical Strategy

To uncover the role of NBs in HDs and their implication on vertical relationships between retailers and manufacturers, we use a structural econometric methodology that allows us to tackle several issues. First, contractual arrangements are hardly observed since this information is hidden from all except for the parties involved. This is the case for all contracts including for PL products. The second issue in identifying the role of NBs in HDs is that it could be difficult to disentangle this effect from other listing and delisting moves that could occur simultaneously in food stores. Our structural model associated with a simulation method of a counterfactual scenario allows the identification of the unique effect of the scenario, all things being otherwise equal.

Our structural econometric approach consists of three steps. First, we identify the substitution patterns of 219 products of the French dairy dessert market, and second, we identify the characteristics of the contractual arrangements, i.e., the profit-sharing and the relative bargaining power in a structural supply model, where we apply an axiomatic Nash-Framework. The supply model allows us to overcome the issue of hidden information in vertical contracts. We show that margins and profit-sharing are estimated using consumer substitution patterns estimated from the first step. The dairy dessert market fits particularly well, since there is a large degree of product differentiation and a high penetration level of PLs. In those, first two steps, we replicate the results by Bonnet and Bouamra-Mechemache (2020). They are briefly summarized below in section 3.1 (demand model) and 3.2 (supply model used to derive upstream and downstream margins). Our third step (counterfactual analysis) differs from latter analysis.

In the third step, we use a simulation method to construct a counterfactual situation of a hypothetical delisting of all NBs at HDs to identify the role of their introduction. The simulation takes into account consumers and firms' reactions using the demand and supply models developed in the first two stages, and we can treat the hypothetical delisting as an exogenous shock that allows us to derive causal conclusions.

3.1 Demand Model

We estimate household demand for dairy dessert products via a discrete choice model, and particularly a random coefficient logit model (Berry, Levinsohn, and Pakes, 1995). This model assumes the demand for a specific product j for a particular household i in period t to be represented by the indirect utility function U_{ijt}:

$$U_{ijt} = \beta_{r(j)} + \beta_{c(j)} + \alpha_{ij} p_{jt} + \gamma_N N_{jt} + \gamma_L L_{jt} + \gamma_H H_{jt} + \varepsilon_{ijt} \tag{1}$$

The utility function is composed of time-invariant product characteristics such as category $\beta_{c(j)}$ and retailer $\beta_{r(j)}$ fixed effects. Moreover, we take into account time-variant product characteristics such as the percentage of plain items (N_{jt}) of the product j in period t, the percentage of diet items L_{jt} of product j in period t, and the percentage of chocolate items H_{jt} of the product j in period t.[10] The related parameters are respectively, γ_N, γ_L and γ_H. Moreover, there is an unobserved consumer-specific error term ε_{ijt}.

[10] Since there are different numbers of each item sold in each period under the brand retail combinations, L_{jt}, N_{jt}, and H_{jt} vary over time.

We assume that distributions of α_{ij} have the following specification:

$$\alpha_{ij} = \alpha_{c(j)} + \sigma_\alpha \nu_i \tag{2}$$

with $\alpha_{c(j)}$ showing the heterogeneous price coefficients for yogurts, fresh cheese, and other dairy desserts and σ_α capturing the individual consumers heterogeneity in a standard normal distribution of ν_i.

This indirect utility can then be summarized in the mean utility δ_{jt} and a deviation from the mean that is given by $\mu_{ijt} = p_{jt}\sigma_\alpha \nu_i$. We allow for an outside option for consumers, which is normalized to zero.

The estimation of this model is conditional on the assumption that product-specific characteristics X_{jt} and the consumer-specific error term ε_{ijt} are independent. Given that the error term is composed by product-specific and individual-specific elements, it is unlikely that unobserved factors such as promotions, displays, advertisement or other omitted product characteristics are not related to prices. Given this endogeneity problem, we use a control Function approach as proposed by Petrin and Train (2010). In this approach, we first estimate a pricing function using a set of instruments (input prices) and exogenous demand variables. The residual of this estimation is then introduced in the mean utility δ_{jt} capturing all the unobserved variables that affect prices and leading to an unbiased estimate of the price coefficient. After estimation, we use the demand estimates to uncover the elasticities (with s_{jt}) being the probability of purchases) according to the common representation:

$$\frac{\partial s_{jt}}{\partial p_{kt}} \frac{p_{kt}}{s_{jt}} = \begin{cases} -\frac{p_{jt}}{s_{jt}} \int \alpha_{ij} s_{ijt}(1 - s_{ijt})\, dP_\nu(\nu) & \text{if } j = k \\ \frac{p_{kt}}{s_{jt}} \int \alpha_{ik} s_{ijt} s_{ikt}\, dP_\nu(\nu) & \text{otherwise.} \end{cases} \tag{3}$$

3.2 Supply Model

The industry's supply-side of the dessert category considers two layers, i.e., n_f upstream firms and n_r downstream retailers. An upstream firm f produces a range of products G^f and a retailer r sells R^r products. Importantly, any retailer-brand combination is assigned to be a differentiated product j. The model follows the general strategy as promoted by Draganska, Klapper, and Villas-Boas (2010) and applied, for instance, in Bonnet and Bouamra-Mechemache (2016).

Assuming that all retailers engage in Bertrand-Nash competition, the retailer profit function is thus represented

by the following function:[11]

$$\Pi^r = \sum_{j \in R^r} (p_j - w_j - c_j) M s_j(p). \tag{4}$$

The retailer's profit is the sum of the profits of each product that the retailer sells. The latter is defined as the product of the retail margin, that is, the corresponding retail price p_j less its wholesale price w_j and the retail marginal costs c_j for that specific product, and the quantity sold defined by $Ms_j(p)$, where M denotes the market size and $s_j(p)$ the market share of product j that depends on the vector of retail prices p. The manufacturer profit is represented as:

$$\Pi^f = \sum_{j \in G^f} (w_j - \mu_j) M s_j(p) \tag{5}$$

Each manufacturer earns a margin for the set of products j it sells to the retailers. This margin is equal to the corresponding wholesale price w_j less the wholesale marginal costs μ_j. We assume, following Draganska, Klapper, and Villas-Boas (2010) that the wholesale price w_j is determined in a bargaining procedure between the retailer and manufacturer for each product. This bargaining process is solved using a Nash-in-Nash bargaining model to characterize the interaction between upstream and downstream firms:

$$\left[\pi_j^r(w_j) - d_j^r\right]^{\lambda_j} \left[\pi_j^f(w_j) - d_j^f\right]^{(1-\lambda_j)} \tag{6}$$

where π_j^r and π_j^f denote the agreement profit of retailer r and manufacturer f while d_j^r and d_j^f describe the retailers and the manufacturers' disagreement profit. The disagreement profit is the outcome when the negotiation over product j fails. Due to substitution effects, a loss of one alternative leads to gains in other products of the retailers or manufacturers' portfolios. The factor λ_j represents the exogenous bargaining power of the model to be estimated. As in Draganska, Klapper, and Villas-Boas (2010), we consider individual bargains over the alternatives, assuming rational expectations of the negotiation results and unobserved retail prices during the negotiations. The model is solved by backward induction, the computation of retail margins thus occurs first and is not changed by the particular bargaining process (cf. Draganska, Klapper, and Villas-Boas (2010) for a detailed justification of this assumption).[12] We then estimate manufacturers' margins from the resolution of the bargaining model.

[11] We omit the subscript t for readability of the notation.

[12] Collard-Wexler, Gowrisankaran, and Lee (2019) show that, under mild assumptions such as sufficiently short time between alternating offers, the equilibrium concept in common bargaining situations applies.

Retail margins are deduced from the equilibrium conditions of the Bertrand Nash maximization problem at the retail stage provided in equation (4):

$$s_k(p) + \sum_{j \in R^r} (p_j - w_j - c_j) \frac{\partial s_j(p)}{\partial p_k} = 0, \forall k \in R^r. \tag{7}$$

This term is then reformulated using matrix notation to the retailer margins $\gamma_j = p_j - w_j - c_j$ for retailer r:

$$\gamma_r = (I_r S_p I_r)^{-1} I_r s(p)^{13} \tag{8}$$

This expression uses I_r as a $(J \times J)$ ownership diagonal matrix indicating whether the retailer sells product j. The market share derivatives regarding own and cross prices are indicated in the $(J \times J)$ matrix S_p. Market shares are then summarized in the vector $s(p)$.

The solution of the bargaining problem requires us to solve equation (6) such that we obtain the following first-order condition for each product j:

$$\lambda_j \left(\pi_j^f - d_j^f\right) \frac{\partial \pi_j^r(w_j)}{\partial w_j} + (1 - \lambda_j) \left(\pi_j^r - d_j^r\right) \frac{\partial \pi_j^f(w_j)}{\partial w_j} = 0. \tag{9}$$

Given compensating derivatives of retail and manufacturer profits, this can be simplified to

$$\pi_j^f - d_j^f = \frac{1 - \lambda_j}{\lambda_j} (\pi_j^r - d_j^r). \tag{10}$$

The definition of the retailers' and manufacturers' profits for each product j are given by the margins of the retailer r and the manufacturer f weighted by the corresponding quantities $Ms_j(p)$:

$$\begin{aligned} \pi_j^f(w_j) &= (p_j - w_j - c_j) Ms_j(p) = \gamma_j Ms_j(p) \\ \pi_j^r(w_j) &= (w_j - \mu_j) Ms_j(p) = \Gamma_j Ms_j(p). \end{aligned} \tag{11}$$

The disagreement payoffs take into account the retailer and manufacturer margins for each alternative weighted by the change in market share when there is a disagreement. Importantly, in this setting a full loss of one alternative due to a delisting may thus be compensated by the gains of market shares of other alternatives in the portfolio of

[13] $(.)^{-1}$ corresponds to the unique Moore-Penrose pseudo inverse operator.

both the manufacturer or retailer. Formally, the definition is:

$$\begin{aligned} d_j^r &= \sum_{k \in R^r - \{j\}} \gamma_k M \Delta s_k^{-j}(p) \\ d_j^f &= \sum_{k \in G^f - \{j\}} \Gamma_k M \Delta s_k^{-j}(p) \end{aligned} \tag{12}$$

The change in the market share of product k when there is a delisting of product j is defined as $\Delta s_k^{-j}(p)$.

Taking into account the above definitions, the bargaining solution in equation (10) can be rewritten and shown in matrix notation such that for all products j, we obtain the matrix of manufacturer firms' margins:

$$\Gamma = \sum_{f=1}^{n_f} \left(I_f S I_f\right)^{-1} \left[\sum_{r=1}^{n_r} \frac{1-\lambda}{\lambda} * \left(I_r S I_r\right) \gamma\right].^{14} \tag{13}$$

The margins are composed by I_f, which is the $(J \times J)$ ownership diagonal matrix with elements j indicating whether firm f sells the product j. The retail margin $\gamma = \sum_{r=1}^{R} \gamma_r$ is already defined in equation (8). The matrix S combines market shares that are placed on the diagonal of the matrix $S[i,i] = s_i$ and cross effects $S[i,j] = s_i^{-j}$, i.e., market share changes for all $(i, j \in J)$.

Manufacturers' margins can thus be explained by retail prices, substitution patterns, and the exogenous bargaining power. However, the whole system suffers from the fact that while there are two unknowns for one equation, i.e. manufacturer margins Γ and the exogenous bargaining power λ, there is only one equation (equation 13). To identify the two unknowns, we compute the channel margins, which is the sum of retailer (8) and manufacturer (13) margin:

$$p - c - \mu = \gamma + \Gamma \tag{14}$$

The vector c represents the marginal distribution costs and μ represents the marginal production costs that are unknown. Given that we do not observe marginal costs, we specify the channel marginal costs for a product using the typical j as $C_{jt} = \theta \omega_{jt} + \eta_{jt}$, where ω_{jt} is a vector of cost-shifters, θ is the associated vector of parameters, and η_{jt} is an error term. To identify the whole system, we rearrange the above equation to $p = c + \mu + \gamma + \Gamma$. Using the above formulations for retail and manufacturer margins, we can estimate the pricing equaltion to estimate the parameters (θ, λ) using a non-linear least squares method:

[14] The $*$ means an element by element multiplication between the vectors $\frac{1-\lambda}{\lambda}$ and $[(I_r S I_r)\gamma]$.

$$p = \theta\omega + \left[\sum_{f=1}^{n_f}\left(I_f S I_f\right)^{-1}\left[\sum_{r=1}^{n_r}\frac{1-\lambda}{\lambda} * \left(I_r S I_r\right)\gamma + I\right]\right]\left(I_r S_p I_r\right)^{-1} I_r s(p) + \eta. \quad (15)$$

where $\omega = (\omega_1, ..., \omega_J)$ and $\eta = (\eta_1, ..., \eta_J)$.

For cost-shifters, we use the price of raw milk and we take into account the main characteristics of products that affect costs: the content of fat (plain versus non-plain yogurt) and the flavor (chocolate versus other flavors). We also control for manufacturer fixed effects. From the estimation of equation (15), we recover the wholesale margins for all products j using the estimates λ_j.

3.3 Impact of eliminating the NB product offer of hard discounters

In order to evaluate the strategic impact of NBs for HDs, we perform a counterfactual analysis that consists of removing the presence of NB products on HD' shelves and compute the impact on prices and profits.[15] The analysis is based on the demand and supply models estimated in the first two steps.

The vector of total marginal costs in period t, that is, the sum of the distribution and production marginal costs, is defined as: $C_t = (C_{1t}, .., C_{jt}, .., C_{Jt})$. The exogenous bargaining power λ is assumed to be exogenous and, therefore, remains unchanged in the simulation.

To compute our new set of retail and wholesale prices, we have to find the vector of new equilibrium retail prices consistent with the vector of estimated marginal costs given that Γ^* and γ^* now take into account the delisting of NBs in HDs through the new ownership matrices of manufacturers and retailers. We thus solve the resulting program:

$$\min_{\left\{p^*_{jt}\right\}_{j=1,...,J}} \quad \left\| p^*_t - \Gamma^*_t\left(p^*_t\right) - \gamma^*_t\left(p^*_t\right) - C_t \right\| \quad (16)$$

where $\|.\|$ is the Euclidean norm in R^{J^*} where J^* is the number of differentiated products in the market without the NB products sold by the HDs.

4 Results

4.1 Demand and supply estimates

[15] In our data, NBs had already been introduced in HDs. Our strategy thus consists of delisting the products and analyzing what would have been prices and profit-sharing without the NBs.

Using estimates of the control function approach (Table 7), the demand model (Table 8), and the supply equation (Table 9), we compute for each brand the demand own-price elasticities, bargaining weights, margins at the retail and manufacturer levels, and marginal costs. [16] Average estimates per category of dairy products and per type of brands (NB/PL) and retailers (HD, MSR) are provided in Table 3. Demand own-price elasticities are lower in absolute value for yogurts and larger for fresh cheese and other dairy desserts. Comparing elasticities depending on the retailing type, the difference in elasticities are in general larger for PLs compared to NBs. For instance, the demand elasticity at the brand level for a yogurt product sold in MSRs stores is -4.01 for NB products and is lower in absolute value for PL products (-3.26). At the aggregate category level, demand own-price elasticities (in absolute value) for NBs and PLs sold in HDs or MSRs are lower as some substitution occurs within one of those combinations, that is, between NBs or between PLs in a given retailing format (cf. Table 4). However, aggregate elasticities do not differ much for PLs and NBs sold at HDs because not so much substitution is possible within this category as HDs only carry a small number of NBs and PLs while the substitution between NBs sold by mainstream retailers is much higher as they usually carry several NBs. For instance, the demand elasticity at the brand level is respectively -4.08 and -3.07 for NBs and PLs sold at HDs while at the aggregate level, the estimates are -3.96 and -3.07 respectively for NBs and PLs sold at HDs. Interestingly, a percentage change in the price of NBs by HD affects more NBs (and to a lesser extent PLs) sold in MSR than PLs sold in HDs. As a result, a change in the strategy of HDs with respect to NBs will indirectly impact NBs and PLs sold by MSR.

Estimates of bargaining parameters and marginal costs are consistent. Marginal costs are heterogeneous at the brand level[17] depending on their recipe but, on average, they are evaluated at around one euro for NBs and 0.5 for PLs. Supply estimates show that bargaining weights are more in favor of retailers for yogurt brands while they are in favor of manufacturers for fresh cheese and other dairy dessert brands which are more differentiated. Moreover, one may expect bargaining weights for PLs to be in favor of retailers. This is what we indeed found in the yogurt segment for which HDs have all the bargaining power and MSRs a bargaining weight of 0.9 on average when negotiating wholesale prices for their PLs in the yogurt category. However, this result does not hold for the two other categories of dairy products: retailers have less power when negotiating their PL wholesale prices as

[16] The three tables are provided in the Appendix.
[17] Marginal cost results at the brand level are available upon request.

Table 3: **Results of the demand and supply estimates at the brand level**

		Average own-price elasticities (%)	Average retail margins (%)	Average bargaining weight	Average manufacturer margins (%)	average marginal costs (euro/kg)
Yogurt						
MSR	NB	-4.01	28.76	0.68	23.07	1.07
MSR	PL	-3.26	34.87	0.88	30.77	0.53
HD	NB	-4.08	27.06	0.61	26.65	1.06
HD	PL	-3.07	35.52	>0.99	28.50	0.51
Fresh cheese						
MSR	NB	-7.29	17.18	0.26	48.95	0.94
MSR	PL	-6.03	20.62	0.31	56.56	0.47
HD	NB	-7.98	14.28	0.21	54.59	1.06
HD	PL	-5.59	20.69	0.37	52.60	0.49
Other dairy desserts						
MSR	NB	-6.29	18.82	0.33	45.25	1.13
MSR	PL	-6.00	19.46	0.27	58.31	0.61
HD	NB	-6.01	18.58	0.33	44.52	1.04
HD	PL	-5.27	21.09	0.38	50.37	0.62

MSR: Mainstream retailers, HD: Hard discounters; NB: national brands, PL: private labels.

Table 4: **Estimated aggregated own- and cross-price elasticities**

			MSR		HD	
			NB	PL	NB	PL
Yogurt						
	MSR	NB	-2.99	1.16	1.02	1.18
		PL	0.43	-2.78	0.41	0.60
	HD	NB	0.13	0.14	-3.96	0.14
		PL	0.05	0.08	0.05	-3.07
Fresh cheese						
	MSR	NB	-6.56	0.70	0.76	0.68
		PL	0.39	-5.63	0.33	0.50
	HD	NB	0.05	0.04	-7.93	0.04
		PL	0.06	0.08	0.05	-5.58
Other dairy desserts						
	MSR	NB	-5.13	1.00	1.08	0.86
		PL	0.75	-5.30	0.77	0.84
	HD	NB	0.09	0.07	-5.98	0.06
		PL	0.10	0.13	0.12	-5.26

MSR: Mainstream retailers, HD: Hard discounters; NB: national brands, PL: private labels.

the bargaining weights are less than 0.5 in these two categories. The bargaining weights are in the same order of magnitude for HDs and MSRs but HD bargaining weights seem to be slightly higher for both NBs and PLs compared to MSRs. Given the bargaining weight estimates, the splitting of the margin is in favor of manufacturers for fresh cheese and other dairy desserts for both PL and NB brands. The percentage margins for manufacturers are more than twice the margins for retailers for those two categories, while in the yogurt category they are higher for retailers. Moreover, as shown in previous studies, the total margin (in percentage) is higher for PLs than for NBs.

4.2 Counterfactual experiment results

To evaluate the impact of the introduction of NBs in HDs, we simulate a counterfactual scenario ($S1$) which consists of delisting all the NB products sold at HDs. The removal of NB products represent a market share of 1.9% of the total market for dairy desserts and 18% of the market share of HDs. The impact on retail prices, market shares, and profit-sharing are summarized in Table 5. Variation in retail prices is computed as the variation of the weighted average prices of all brands carried by the manufacturer-retailer pair. Removing NBs at HDs directly impacts the sales of PLs at HDs, such that the market share of PLs sold at HDs increases by 6.3% with a corresponding 6.2% increase in the price. It also increases the market shares of NBs at other retailers (business-stealing effect) but interestingly the market share of PLs at MSRs also increases significantly. NB products sold at HDs are thus competing with both NB and PL products sold at MSRs. The total market share of NBs sold in MSR increases by 6%, which corresponds to approximately the same percentage change as for PLs sold in Hard Discount.[18] Removing NBs in HDs generates a significant change in the average price of NBs (6.4%) and in a lesser extend for PLs (3.9%).

Our result confirms the role played by NBs in the negotiation between HDs and their PL suppliers as results in Table (6) show. Table 6 provides results at the product category level for $S1$. Such a scenario leads to two possible effects. The first one is a change in the bargaining power resulting from a change in the disagreement payoff of HDs following the NB delisting. The second effect is a business-stealing effect that occurs from substitution patterns between NBs and PLs sold at HDs but also with PLs and/or NBs sold at MSRs. First, comparing the overall

[18]This cross-retailer effect is ultimately based in the cross-elasticities summarized in the aggregated elasticities provided in Table 4.

profit-sharing between manufacturers and retailers of the baseline scenario (denoted by B) with the final scenario $S1$ over all product categories, the HD share of the industry profits on PL products drops by 2.1% without NBs. Without NBs, HDs become more dependent on PLs, which reduces their bargaining power (lower disagreement payoff when dealing with PL suppliers). The bargaining effect is reinforced by the business-stealing effect. Indeed, the increase in the market share of PLs at HDs reinforces the position of PL manufacturers in the bilateral negotiation with HDs. Removing NBs at HDs also has an indirect impact on the MSRs. Profit-sharings between NB manufacturers and MSRs are also affected. On one hand, the market shares of PLs sold at MSRs increase given the substitution pattern between PLs sold at HDs and PLs sold at MSRs. This favors mainstream retailers in the negotiation with NB manufacturers as their outside option increases with the increase in PL market share. On the other hand, the increase in the market shares of NBs sold in MSRs resulting from the substitution effects implies an increase in the disagreement payoffs of NB manufacturers. The latter effect on NBs may counterbalance the positive impact on PLs for MSRs. Given our results, MSRs get a larger slice of the joint profits with NB manufacturers for the retailer/manufacturer pairs. As a result both NB manufacturers and MSR margins increase but they increase slightly more for MSR than for NB manufacturers. Similarly, compared to the benchmark case, the increase in the market share of PLs sold at MSR in $S1$ favors MSRs. MSRs thus improve their market sharing position in both the PL and the NB markets.

Overall, HDs are harmed by a full delisting of NBs from their shelves as the gain in profit from the increased sales of PLs will be too low to compensate the loss in HD profits on NB products. The competition with MSRs is such that most consumers purchases will switch to MSRs in both the PL and NB segments. The loss for HDs is the biggest in the yogurt and the other dairy dessert categories as the share of NBs in these two segments is more than in the fresh cheese market. To put it another way, the introduction of NBs by HDs would clearly increase HD profits, decrease the profits of NBs sold at MSRs, the profits of PL manufacturers, and MSR profits on both PL and NB products. All dairy dessert categories are impacted.

Consumers are harmed by a removal of NBs in HDs as NBs and PLs' final prices increase. From our estimates, we evaluate that the change in consumer surplus amounts to -1.56% but the loss in consumer surplus remains limited

as consumers can switch from HDs to MSRs to buy NBs.

To evaluate the net effect of the bargaining power on profits and profit-sharing, we also include the result of an intermediate counterfactual scenario ($S0$). In the scenario $S0$, we keep the wholesale prices fixed and simulate a new equilibrium. Results from this scenarios are also presented in Table 6. Comparing results from $S1$ and $S0$ provides the effect of NB delisting at HDs net of business-stealing effect, that is, the effect of a change in bargaining power (through a change in the disagreement profits). Keeping wholesale prices unchanged, the p̈ureb̈usiness-stealing effect leads to an increase in the HD profits in the PL segment which exceed the total effect found in $S1$. Indeed, HD profits for PLs increase from 35.4 million euros in the benchmark to 37.6 million euros in $S0$ due to the delisting of NBs only while it decreases to 35.6 million euros in $S1$, indicating that there is a substantial loss of bargaining power due to the delisting of NBs. For PL manufacturers, however, they – as expected – unambiguously benefit from the business-stealing effect and the improved outside option that increases their bargaining power (from 65.4 million euros to 73.6 million euros in scenario $S0$ and 72.1 million euros in scenario $S1$). With respect to profit-sharing, if the business-stealing effect alone explains part of the loss of profit share for HD (profit-sharing decreases from 35% in B to 33.8% in $S1$), there is in addition a bargaining effect as the profit-sharing declines further to 33% in $S0$.

To conclude, we find that the impact of the NB introduction at HDs can be compared to the impact of PL brands for MSRs highlighted in the literature. Indeed, the literature shows that the development of PLs at MSRs generates an increase in MSRs profits through the sales of PLs and indirectly through the strategic role of PLs in their bilateral negotiation with manufacturers. Similarly, we show that the introduction of NBs at an HD is profitable for HDs. NBs are strategic for HD as they attract brand-loving consumers and shift part of the demand of NB products from MSR to HD. The counterfactual results show that they are also a means for stealing some market share to PLs sold at MSRs. This business-stealing effect is reinforced by the indirect effect through an improved bargaining position with PL providers, which leads to an increase in the margins for HDs. Such a strategy favors consumers.

Table 5: **Counterfactual results: Impact of removing NB products in HD (% change)**

		Market shares variation	Price variation	Retail margin variation	Manufacturer margin variation
MSR	NB	6.03	6.38	7.46	6.70
	PL	3.53	3.91	4.97	6.52
HD	NB	-	-	-	-
	PL	6.33	6.17	0.70	10.40

MSR: Mainstream retailers, HD: Hard discounters; NB: national brands, PL: private labels.

Table 6: **Initial and counterfactual annual profits**

		Retailers' profit million €			Manufacturers' profit million €			Profit sharing in %		
		B	**S0**	**S1**	**B**	**S0**	**S1**	**B**	**S0**	**S1**
All categories										
MSR	NB	396.2	421.1	425.6	722.2	760.0	769.6	35.4	35.7	35.6
	PL	225.1	237.8	236.3	471.6	492.7	502.7	32.3	32.6	32.0
HD	NB	39.5	-	-	75.2	-	-	34.4	-	-
	PL	35.4	37.6	35.6	65.4	73.6	72.1	35.1	33.8	33.0
Total		696.2	696.5	697.5	1334.4	1326.3	1344.4	34.2	34.0	34.1
Yogurt										
MSR	NB	211.0	223.5	225.4	188.5	197.4	197.5	52.8	53.1	53.3
	PL	92.6	97.5	97.3	82.6	86.0	90.9	52.8	53.1	51.7
HD	NB	24.9	-	-	27.5	-	-	47.6	-	-
	PL	12.8	13.5	13.0	10.3	11.4	11.7	55.4	54.3	52.6
Fresh Cheese										
MSR	NB	59.9	63.2	64.4	18.3	19.2	19.4	24.6	24.9	24.9
	PL	40.1	42.1	42.0	110.9	115.4	117.5	26.6	26.8	26.3
HD	NB	2.8	-	-	10.9	-	-	20.8	-	-
	PL	6.7	7.1	6.7	17.2	19.5	18.9	28.2	29.6	26.2
Other dairy dessert										
MSR	NB	119.4	126.8	129.5	331.5	350.5	357.9	26.5	26.7	26.6
	PL	92.4	97.3	97.1	278.1	291.2	294.3	24.9	25.2	24.8
HD	NB	9.2	-	-	27.9	-	-	24.9	-	-
	PL	15.8	16.6	15.9	37.8	42.7	41.5	29.5	28.3	27.7

MSR: Mainstream retailers, HD: Hard discounters; NB: national brands, PL: private labels.

B: Benchmark; S0: intermediate scenario (no NB in HD with unchanged final wholesale prices);

S1: scenario with both business stealing and bargaining power effects (no NB in HD with adjustment of final wholesale prices).

5 Conclusion

In this paper, we analyze one of the main HD strategies in recent decades. We focus on the French market for dairy desserts and shed light on the role of NBs in HDs in a market characterized by imperfect competition at both the manufacturing and the retailing levels. Taking into account both intra-brand (between retail chains) and inter-brand (between brands) competition, we are able to show that NBs at HDs have two main impacts on competition.

First, NBs serve as a means of differentiation to increase the consumer attractiveness. We show in a counterfactual experiment that when NBs were not sold at HDs, consumers switched to other retailers not only to buy their NB products, but also the PLs offered by the other retailers. This means that there is a significant business-stealing effect when introducing NBs at HDs. Thus, NBs serve as a strategic instrument for HDs when competing with MSRs. In this regard, our findings are in line with the literature that claims that NBs are used as a differentiation strategy in HDs in order to gain new customers.

Second, we highlight a new additional strategic role for the introduction of NBs at HDs. Hard discounters can benefit from the introduction of NBs because it leads to a shift in the bargaining position of HDs regarding PL manufacturers. Indeed, our counterfactual simulation shows that the delisting of NBs at an HD leads to a clear decrease of profit-sharing of HDs with PL manufacturers due to a decrease in the outside option when NBs are delisted. The listing of NBs thus serves as a clear strategic instrument regarding the management of vertical relationships with the manufacturers. To the best of our knowledge, the vertical relationship effect has not been shown before. It can be compared with the vertical relationship effect of MSRs with their NB suppliers when introducing PLs into their assortment, which has clearly been identified in the literature.

Given the development of NBs in HDs - and of PLs in MSRs-, we can expect a convergence in the strategic decisions of MSRs and HDs with respect to the assortment of both PLs and NBs. From our results, it is likely that these general strategic mechanisms may work similarly across formats. However, the question remains to know how HDs and MSRs will adapt their business strategies in the future. They may keep a certain level of differentiation, indicating a different scope for business strategies. As HDs usually have only “category” leaders of NBs, this may impede the convergence of the two types of retailers. It can also be expected that HDs and MSRs will extend their scope of strategies in order to compete more fiercely with each other. In particular, the European

retailing sector is evolving nowaday towards an increasing number of buying alliances which not only involves common negotiation with NB manufacturers, but which increasingly involve negotiation of PLs. One of the main reasons advocated by MSR for this evolution is the intensity of competition with HDs. They will then be able to better coordinate their relationships with their NB manufacturers including the listing of NBs. In addition, they can make their vertical relationships with PL providers more efficient. The analysis of those strategies and their comparability remains an open field for further research.

Even if our qualitative results are general, it should be noted that our analysis has some limits. First, the data at our disposal do not allow us to identify the manufacturer from which the retailer buys its PLs and thus to evaluate the characteristics of the PL manufacturers that might be hurt by the introduction of NBs at HDs. Second, we do not consider in this analysis other possible HD strategies, such as changes in the quality and assortment of PLs, that a fight against MSRs. Indeed, we do not observe in our data detailed quality characteristics of the PL products. This is out of the scope of our paper, though it deserves a specific investigation to better understand the global strategies of retailers.

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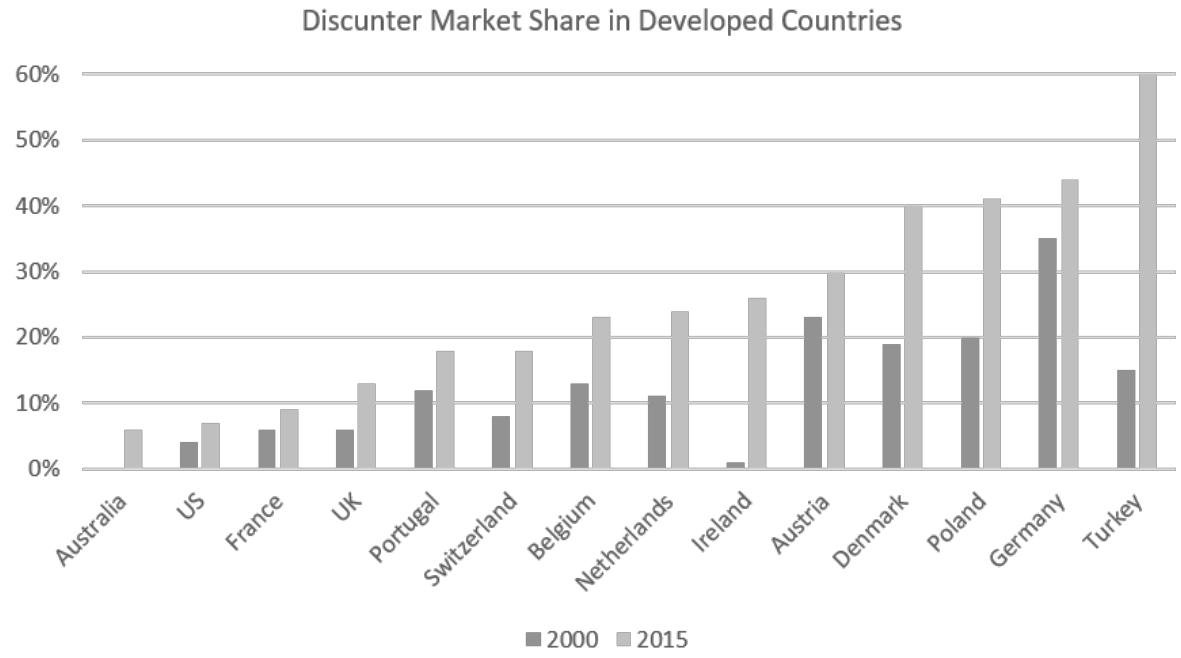
6 Appendices

6.1 Introduction

Figure 1: Discounter Market Shares



Source: Boston Consulting Group 2017, using Planet Retail data. Own adaptations.

6.2 Demand: estimation method and results

The control function uses price indexes for the main inputs used in the production of dairy desserts, that is, raw milk and packaging (plastic). Those are presumably not related to the unobserved factors of demand.[19] The resulting first step, i.e., the estimation of the price are shown in Table 7. Given the F-tests results instruments are not weak. Demand estimates are shown in Table 8.

[19]These indexes are provided by the French National Institute for Statistics and Economic Studies.

Table 7: **Results on price equation**

	Coefficient (standard error)
Cow milk	-0.91 (0.42)**
Cow milk × M2	0.94 (0.16)***
Cow milk × M3	-0.93 (0.15)***
Cow milk × M4	2.49 (0.20)***
Cow milk × M5	5.36 (0.20)***
Cow milk × M6	-2.73 (0.19)***
Plastic	0.018 (0.00)***
Retailer fixed Effects	
R1	-0.11 (0.05)**
R2	0.07 (0.05)
R3	0.00 (0.05)
R4	0.09 (0.05)*
R5	0.37 (0.05)***
R6	-0.31 (0.06)***
Category fixed Effects	
Yogurt	0.84 (0.75)
Fresh cheese	2.05 (0.75)***
Other dairy dessert	1.75 (0.75)**
Plain (N_{jt})	-0.85 (0.06)***
Diet (L_{jt})	-0.17 (0.05)***
Chocolate (C_{jt})	0.41 (0.09)***
F-test of IVs	**205.75***** **(0.00)**
R-squared	0.94
Number of observations	2,628

Source: Bonnet and Bouamra-Mechemache (2020)

***significant at 1%; **significant at 5%;*significant at 10%

Table 8: **Demand results**

	Coefficient (standard error)
Price × Yogurt	-1.81 (0.00)***
Price × Fresh cheese	-2.88 (0.00)***
Price × Other dairy dessert	-2.46 (0.00)***
Std Price	0.84 (0.00)***
Error term	1.86 (0.00)***
Retailer fixed Effects	
R1	0.24 (0.00)***
R2	0.22 (0.00)***
R3	0.37 (0.00)***
R4	0.92 (0.00)***
R5	0.66 (0.00)***
R6	-0.43 (0.00)***
Category fixed Effects	
Yogurt	2.66 (0.00)***
Fresh cheese	6.54 (0.00)***
Other dairy dessert	5.93 (0.00)***
Plain (N_{jt})	-1.35 (0.00)***
Diet (L_{jt})	-0.33 (0.00)***
Chocolate (C_{jt})	1.68 (0.00)***
LL	331,663
Number of observations	100,000

Source: Bonnet and Bouamra-Mechemache (2020)

***significant at 1%; **significant at 5%;*significant at 10%

Table 9: **Supply results**

	Coefficient (standard error)
Constant	0.35 (0.01)***
Raw milk price	0.02 (0.00)***
Other dairy dessert	0.06 (0.00)***
Non plain	0.20 (0.00)***
Chocolate	0.01 (0.00)***
Error term	1.86 (0.00)***
Manufacturer fixed Effects	
M1	0.49 (0.01)***
M2	0.71 (0.01)***
M3	0.50 (0.01)***
M4	0.18 (0.01)***
M5	0.27 (0.01)***
Bargaining weigts (λ_j)	not shown
R^2	0.97
Number of observations	2,629

***significant at 1%; **significant at 5%;*significant at 10%

A summary of the bargaining weights are available in Table 3