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

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February 7, 2022

## Abstract

In this paper, we analyze the strategic role of the recent introduction of national brand products by hard discounters in the French food retailing market and its impact both at the retail and manufacturer levels. We use a structural econometric model of vertical relationships and consider the competition between 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 clearly increases hard discounters' profits. Consumers benefit from this strategy. Moreover, we find an increase in the profit of manufacturers of national brands but at the expense of mainstream retailers. We also show that the introduction of national brands by hard discounters does not only act as a means to attract different consumer groups and extend their market share through a variety effect. It also serves to improve their bargaining position with respect to their private label providers.

JEL codes: L11, L25, L81, M31

Key words: Structural Model, Counterfactual Analysis, Hard Discount, Private Labels, National Brands, Variety, Horizontal and Vertical Competition, Bargaining.

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# 1 Introduction

In recent years, there have been a number of fundamental changes in the retail sector around the world. One of these changes has been driven by the increasing importance of discounters, which have transformed the industry in many countries (e.g., US , UK, Australia; see Figure 1 in the Appendix).[1] Hard discounters (HDs) differ from other grocery retailers (hereafter referred to as mainstream retailers or MSRs) because they offer a limited assortment of products at lower prices (Denstadli, Lines, and Grønhaug, 2005). Moreover, a key element in the retailing strategy of HDs is their strong reliance on private label (PL) products, which represent a large share of the products carried in their stores.[2] In contrast to HDs, MSRs generally carry manufacturer brands known as national brand (NB) products. However, given the tremendous success of PL products in HDs, MSRs have fought back by increasing the share of PLs sold on their shelves to limit the effect of increasing competition of HDs in the retail market (e.g., European Commission, 2011, p. 35f).[3] However, this change in MSR strategy has pushed HDs to react, in turn, by introducing NBs as a way of attracting more consumers to their stores.[4]

These facts clearly indicate that HDs must find new strategies to remain competitive in the retail market, fight the competition with MSRs, and continue to grow. These strategies include own branding strategies (that is, PL-based strategies (Gielens et al., 2021)), or a reliance on the procurement of NB products. In this paper, we focus on the HD strategies with respect to NBs and investigate why NB-based strategies are increasingly implemented by some HDs.[5] We analyze whether the introduction of NBs is a profitable strategy for HDs and which are the main channels through which NBs affect their profitability.

While the literature mainly focuses on the analysis of retailers' product strategies with respect to PL introduc-

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[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. This was particularly the case for HDs such as Lidl, Aldi or Netto for which PL products represented more than 90% of stock keeping units in the 2000s (Denstadli, Lines, and Grønhaug, 2005).

[3] There is also a plethora of literature discussing the competition between HDs and MSR in more detail, e.g., Cleeren et al. (2010), Gijsbrechts, Campo, and Vroegrijk (2018). In particular, PLs can attract customers by discouraging them from visiting HDs and then limiting business by stealing from the development of HDs (cf. Vroegrijk, Gijsbrechts, and Campo (2016)).

[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) show that common brands comprise a significant part of the overall listings, in discounters also. Moreover, consultancy reports also show examples: the German HD ALDI, which traditionally provides only few NBs, listed new NBs that are becoming more important for overall revenues (Boston Consulting Group, 2017).

[5] Possible strategies based on PL branding strategies are summarized in the next section.

tion and positioning,[6] our contribution is rather to better investigate the rationale of introducing NBs. The main economic motivations for the introduction of PLs by MSRs are to secure better supply terms when negotiating with NB manufacturers, and to benefit from a potential market expansion effect due to an increase in variety offered in their stores. In this article, we argue that HDs' motivations for introducing NBs in their stores are complex and that their effects are not a simple mirror of the effects of the introduction of PLs by MSRs. On the one hand, PL providers are seen as price takers with no or small bargaining power compared to NB manufacturers, such that the impact on the terms of negotiation should be small. On the other hand, HDs offer mainly PL products, which makes them more dependent of PL procurement and may affect their negotiation with PL providers, in particular for large scale suppliers. Moreover, NBs are historically sold in MSR stores and introducing NBs in HDs may not lead to large business stealing effects. Our objective is thus to empirically assess the prime motive of introducing NBs. We consider three potential market effects. First, introducing NBs may lead to a market expansion effect. This increases the portfolio of products offered to HD customers, contributing to an extension of HD market share whenever HD customers are ready to buy NBs and/or if this strategy attracts more customers to HD stores. Second, by reducing the gap in the product assortments of the two types of retailers, this strategy can also affect market competition between MSRs and HDs, and result in fiercer competition. Third, it may change competition for the procurement of both NBs and PLs, thus affecting the bargaining positions of manufacturers and the HDs. Moreover, whether or not this will benefit consumers depends on the order of magnitude of the variety, quantity and price effects. We disentangle these different effects and draw conclusions regarding manufacturers, retailers and consumer welfare.

Our evaluation strategy relies on a demand and supply model to analyze the decision of HDs to list NBs. We first develop a structural econometric analysis of consumer behaviour using household home-scan panel data of the French dairy dessert category from Kantar Worldpanel. This data enables us to analyze the consumer preferences for differentiated products and thus the substitution patterns between brands and between retailers. We apply the approach proposed by Ackerberg, Rysman et al. (2005), that extends the classical random utility approach by considering how the number of products available to consumers may affect their choices, as the listing of

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[6]See Section 2 for a review of the literature and our detailed contribution to the literature reviewed in the current section.

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NBs in HDs significantly affects consumers' choice sets. We then use demand estimates to, first, assess retail margins using a Bertrand-Nash competition at the downstream level and, second, to assess manufacturer margins using a Nash-in-Nash framework (see, e.g., Draganska, Klapper, and Villas-Boas, 2010; Bonnet and Bouamra-Mechemache, 2016, 2020). Furthermore, we conduct an original counterfactual analysis to simulate the delisting of NBs at HDs. Conditional on the model's assumptions, this counterfactual analysis allows us to derive causal effects. In particular, our structural model allows us to fix wholesale and/or final prices in order to break down the market impacts into a variety effect, a retail competition effect, and a bargaining effect.

We find that the main effect of introducing NBs in HDs is the variety effect that results in market expansion. We also find the existence, even if limited, of a retail competition effect that tends to lower retail prices. Still, the change in horizontal competition between retailers leads to a redistribution of rents among retailers. Our results also show that the NB introduction strategy has a significant effect on the vertical competition and bargaining effect, which leads to a redistribution of rents between retailer and manufacturer, but contrary to Scott Morton and Zettelmeyer (2004), this bargaining effect is not the main motive. Given these effects, HDs benefit from the introduction of NBs; their gains on NB sales more than compensate for the loss in their PL sales. Introducing these also benefits NB manufacturers, however, MSRs are harmed because they suffer from fiercer competition with HDs. Similarly, PL providers are also harmed as competition with NBs becomes more intense. Despite these adverse effects on MSRs and PL providers, the introduction of NBs by HDs is welfare improving from a competition policy perspective. Indeed, we find that consumers benefit from this with an increase of 8.5% in consumer surplus, mainly explained by the increase in the variety of products offered at HDs and reinforced by the competition effect on final prices. These findings confirm NB to be an important strategic device for competition among HDs and MSRs. Furthermore, we can show that it is a strategic device for HDs to ensure their bargaining position when organizing their supply chain, particularly with their PL providers.

Our paper is organized into six sections. Section 2 provides a background discussion on the main arguments and the relevant literature. Section 3 describes the French dairy dessert market and the data used in this study. Section 4 outlines the empirical strategy, while Section 5 discusses the results. Finally, the main conclusions are summarized in Section 6.

# 2 Background Discussion

As highlighted in the Introduction, the aim of this article is to analyze whether it is profitable for HDs to introduce NBs and whether consumers benefit from this strategy. Our analysis is at the leading edge of three streams of research. First, we contribute to the literature (mainly in marketing science) on PL/NB branding strategies. Our analysis also covers horizontal competition issues between HDs and MSRs that have been recently investigated in the literature. Finally, we contribute to the literature in vertical relationships that mainly focuses on PL strategies. Whereas the introduction of NB products by HDs has not been comprehensively investigated in the literature (for exceptions, see e.g., Lourenço and Gijsbrechts, 2013 or Hokelekli, Lamey, and Verboven, 2017), there is an abundance of literature dealing with the introduction of PL products in MSRs. It focuses on the impact of strategic assortment (in particular, market expansion and horizontal competition) and the impact on vertical competition and the bargaining process between retailers and manufacturers (for a survey, see e.g., Berges-Sennou, Bontems, and Réquillart, 2007 or Hyman, Kopf, and Lee, 2010).

**HD brand strategies** The success of HDs has been built on the development of PL products. This PL strategy has evolved over time with an improvement in quality; that is, from PLs of low price and low quality to higher value PLs targeting quality-sensitive consumers. This strategy has been identified in the literature. In particular, Gielens et al. (2021) develop the concept of "smart" PLs. This concept is based on a retail consumer segmentation strategy taking advantage of the existence of data and technology to identify new consumer needs and offer new products to increase profits. This strategy, however, can also be used by MSRs since they can also provide different varieties of PL. Moreover, the average quality of PLs has increased over time and many PL products now reach the level of NB quality (Geyskens et al., 2018).

An alternative or complementary strategy for HDs could be to include (more) NBs on their shelves. Whether this strategy could be intuitively seen as a rational and profitable choice, it remains an open question given the shortage of studies covering this issue. We are relying on the more extensive literature dealing with the introduction of PLs in MSRs to highlight the main economic mechanisms at stake. We identify three possible economic mechanisms that determine the profitability of this strategy: first, market expansion or variety, second, horizontal

competition and third, vertical and bargaining.[7]

**Market expansion**    First, we take into account the market expansion effect caused by additional varieties, composed of new products introduced in the HDs' retail format. The variety effect in the case of PL introduction has been summarized in Bontems, Monier-Dilhan, and Réquillart (1999), for instance. They highlight the role of PLs in product differentiation, which serves as a means to discriminate between different types of consumers and contribute towards attracting price-sensitive consumers in their stores. Deleersnyder et al. (2007) discusses this effect in the case of NBs introduced by HDs and show evidence of a possible profitable market expansion effect. In addition, Lourenço and Gijsbrechts (2013) also show that introducing NBs may increase variety and enable a differentiation between various consumer groups with diverse preferences.[8] Still, the literature does not provide any rigorous analysis indicating how strong and relevant the market expansion effects are in the current outlets.

**Horizontal competition**    The introduction of new brands also affects competition between firms; that is, between manufacturers (inter-brand competition) and between retailers (intra-brand competition). Cleeren et al. (2010) and Haucap et al. (2021) find intense competition between retail formats, however HDs do not always reduce MSRs' profitability when they do not target the same consumers and when their product assortments do not overlap. This might change if HDs offer (more) NBs. Using a natural experiment, Geyskens, Gielens, and Gijsbrechts (2010) show that, depending on the NB position, the range of high to low tier various PLs affect the NBs differently.

How such results on the impact of PL introduction at MSR can be used to highlight the effect on the market competition outcome when NBs are introduced in HDs is not straightforward, as it depends on the differentiation among brands and among retailers, as well as on consumers' preferences for brand characteristics, prices and retailers. As far as we know, the study carried out by Hokelekli, Lamey, and Verboven (2017) is the only one to analyze the competition between NBs and PLs in HDs. They use the estimates from a demand model that considers the preferences for different brands sold in different retail formats to simulate counterfactual experiments based on

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[7]Our three economic determinants stem from the typical industrial organization literature that largely describes the impact of horizontal competition, vertical competition and variety profitability. These economic mechanisms can be translated from a business perspective in the strategic dimensions scheme described in Gielens et al. (2021) (p.112, Table 1). For instance, their *Positioning* dimension corresponds to our *Market expansion* and *Competition* effects, while their *Supply sources* strategies cover our *Vertical and Bargaining* effect.

[8]They also show that the introduction of NBs contributes to the improvement of the overall perception of the HD outlets. This effect is beyond the scope of our article as we cannot assess the changes in consumers' preferences for retailers following the change in the assortment. However, this effect can only reinforce the profitability of NB introduction.

consumer responses to retailers' different strategies. They focus mainly on the role of PL strategies, however their results suggest that HDs may benefit from offering more NBs.

**Vertical relationships and bargaining**    In addition to horizontal competition, there is an impact on vertical competition; that is, on the bargaining position of manufacturers and retailers and thus on how they share their joint profits for a given brand (Steiner, 2004). Empirical findings show that the introduction of a PL tends to change vertical strategic interactions between manufacturers and retailers in favour of 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; Pauwels and Srinivasan, 2004). As far as we know, while PL strategies by MSR and implication on vertical profit sharing have been analyzed in the literature, the NB/PL strategies of HD have not yet been addressed in the economic literature.

The literature to date investigates how the introduction of PLs in MSRs has changed the bargaining power between NB manufacturers and MSRs and provides insights on possible economic implications on bargaining outcomes and profits. Returning to Mills (1995), we know that PLs contribute to overcoming double marginalization problems and increase the efficiency of the vertical distribution chain. In addition, PLs have been shown to improve the retailers' outside option when dealing with NB manufacturers.[9] Scott Morton and Zettelmeyer (2004) combine the substitution effects caused by assortment positioning choice and a bargaining framework, and find empirical evidence that PLs extended the retailers' bargaining power.[10] They highlight the role of the product differentiation strategy for the size of the retailers' disagreement profit. In particular, a PL designed as a close substitute for NBs has a positive impact on the retailers' disagreement profit. Extending this argument, Ellickson, Kong, and Lovett (2018) show that by introducing PLs, retailers have increased their profits not only through an increase in sales but also from a "substantial" retailers' bargaining leverage, supporting the argumentation of PLs as a means to achieve more favourable bargaining outcomes.

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[9]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 by S. Caprice).

[10]Relatedly, Meza and Sudhir (2010) try to distinguish between substitution effects and bargaining effects, finding support for both. In particular, they highlight that the bargaining power effect should be more important than the substitution effect in "niche markets" compared to large markets. Given that HDs target larger markets, this may indicate that their bargaining power effect may be limited.

**Contribution of this paper**    To fill the gap in the literature regarding the brand strategies of HD, we empirically test whether the Scott Morton and Zettelmeyer (2004) argument of imitating strategies to improve the retailers' disagreements payoff also holds for the case of NBs in HDs. Our empirical methodology based on a structural approach allows us to extend the analysis not only to the bargaining effect, as in Scott Morton and Zettelmeyer (2004),[11] but also to market expansion and competition effects. We argue that HDs value NBs not only because they can be a useful tool to gain market shares from MSR, but also because NBs can improve retailers' outside options in the bargaining situation. In this sense, our article is closer to the analysis of Ellickson, Kong, and Lovett (2018). However, they assume monopolist retailers and thus cannot consider intra-brand competition and its implication on prices and other retailers. Our methodology and data allow for a more general framework. We can thus identify all market effects, including the effect on NBs and PLs sold in other retailers.

The estimation of bargaining effect requires that PL producers have at least some bargaining power. As retailers do not always only rely on competitive manufacturers for the production of their PL, but also on large manufacturers, including NB manufacturers,[12] this issue is worth investigating. In our 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 as well as with French national firms in order to meet consumer preferences. In the specific case of the French dairy dessert market, they deal with large national firms that specialize in the production of PLs (such as Senegral) but with firms that also produce NBs (such as Lactalis-Nestlé). Given the large share of PLs in the food market, such firms may have a significant degree of power in their negotiations with HDs. The concentration of PL providers in this market even led to a cartel formation of the main PL providers in France during the period 2006 to 2012, which had an even greater effect on the wholesale prices of PL manufacturers.

Changing the horizontal competition among NB manufacturers (inter-brand competition) and among retailers (intra-brand competition) following the introduction of NBs by HDs increases the complexity of the analysis compared to those dealing with PLs. NBs are produced by incumbent firms. This will modify their vertical relationships with MSRs as it improves their bargaining position. As a result, it will differently affect retailers and

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[11]It should be noticed that Scott Morton and Zettelmeyer (2004) use a revealed preference empirical approach and test whether the presence of store brands occurs more in categories where the leading NB would have otherwise had a high added value, while our approach allows for the evaluation of the bargaining effect.

[12]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.

manufacturers' profits and change profit sharing for each pair of retailer and manufacturer.

More generally, we also contribute to the literature addressing the above-mentioned three channels (market expansion, horizontal competition and vertical relationships) that have not been subject to an integrated rigorous analysis. We contribute to the empirical economic literature by quantifying the market expansion effect due to increased variety. Furthermore, we add a counterfactual scenario that allows for more detailed insight on the role of NBs at HDs in relation to the horizontal competition dimension by explicitly simulating a potential desisting of NB brands in HDs. Then, we address the vertical competition channel and test whether the introduction of NBs at HDs changes the relative bargaining power in the vertical channel. Finally, we jointly analyze these effects in an integrated setup, allowing us to evaluate their relative importance on HDs' profits, but also for manufacturers, MSRs, and consumers.

Our empirical vertical modelling approach is based on the structural bargaining model approach recently developed in the literature, and more particularly on the empirical analysis used in Bonnet and Bouamra-Mechemache (2020) that focuses on the impact of the French yogurt cartel on upstream and downstream margins. We also use the same dataset. Our approach departs from theirs and introduces new features in order to better tackle the competition both between HDs and MSRs and between HDs, which is necessary to address the economic questions related to HDs' strategies. First, our demand model includes all HD retail chains and models them individually. This allows us to better model the heterogeneity in the preferences for HDs and their different strategies with respect to NB sales. We are then able to better take into account inter-brand competition for each HD, considering the intra-brand competition with MSRs but also between HDs. We can also model the bargaining effect between each HD-manufacturer pair, which is not possible when aggregating all HDs together. Second, our analysis requires a careful evaluation when introducing new products.[13] We have thus enriched our structural demand model based on a random coefficient logit model to take into account a possible "crowding-out" effect, as in Ackerberg, Rysman et al. (2005). We thus mainly contribute to this literature by addressing a new economic question that has not yet been studied but also through our application of the Ackerberg, Rysman et al. (2005) model, which is not widely used in the literature.

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[13]We thank an anonymous referee for this suggestion.

# 3 French Dairy Dessert Market and Data

## 3.1 Market and data

We have chosen the French dairy dessert market to analyze competition strategies between MSRs and HDs 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. Second, the coexistence of PLs and NBs in both types of stores (HDs and MSRs) makes the analysis of retailers' brand strategies relevant. The data used consists of individual household purchases in retail stores provided by Kantar Worldpanel, a representative French consumer panel data of 22,508 households and 1,158,245 purchases in 2009. The richness of this database makes it possible to model the competition between differentiated products. We use information on purchase characteristics to distinguish products among brands, dessert categories (yogurt, fresh cheese,[14] and other dairy desserts) and retail chains in which the purchases have been made, and then define a product as a combination of a brand, a category, and a retailer.[15][16] We have selected products purchased at least 700 times throughout the year. Products that do not represent more than 0.05% of our sample have thus been removed. We then obtain 202 differentiated products that compete on the market. The price for each differentiated product is computed as the ratio between the total expenditure and the quantity purchased for a product per month.[17] The analysis of HD strategies requires a differentiation of purchases among the various existing HDs. Our data allows us to distinguish among the five HDs acting in the French retail sector. In addition, we take into account the seven main buying groups that exist in the French retail market and an aggregate of the remaining MSRs. The five main HDs in the French retailing market (the two German HDs, Aldi and Lidl, and Dia, Leader Price, and Netto) represent a total market share of 15.5% of the dairy dessert market, varying from less than 1% to 6% (cf. Table 1).[18] In comparison, the market share for each of the seven main retail chains operating in the French grocery retailing sector varies from 2% to 23%.

The dairy dessert market in France is highly concentrated. Danone, Yoplait, Senagral (a subsidiary company

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[14]Fresh cheese is the translation for "Fromage Frais" and corresponds to a type of dairy desserts and not to a cheese category.

[15]Given a confidentiality agreement, we are not permitted to reveal details of retailers or manufacturers.

[16]We can have different products produced under a same brand (for a given dessert category): different flavours, packaging, etc. We aggregate all the purchases at the brand level.

[17]Choosing the month is a good trade-off to have sufficient purchases of a product within the month to define average prices, but also to observe some variations in price across time periods.

[18]The HDs Netto and Leader Price belong to two buying groups, ITM and Casino respectively. There exist three other HD chains: Mutant, Erteco and Norma. We choose not to include them in the analysis given their low market share and focus only on the main HDs' strategies.

of Senoble), Lactalis (a subsidiary company of Nestlé), and Novandie (a subsidiary company of Andros) are the main players in the NB dairy dessert market with very well-established brands, such as Danone and Yoplait, for instance. The high concentration of dairy firms producing NB brands in this market may lead to manufacturers being in possession of high bargaining power. Retailers then may use PLs as a tool to countervail their bargaining power and get a larger slice of their joint profit.

In our analysis, we are including the 20 major NBs produced by the five main manufacturers in France. We aggregate purchases of other NBs in an outside good because each brand has a very small number of purchases. Globally, this outside good represents 9.3% of the market. Consumers can substitute one of the dairy dessert brands with this alternative option. Moreover, given the wide variety of dairy desserts in France that may differ according to ingredients, flavour, packaging, and other characteristics, we aggregate the sales at the brand level by segment type (yogurt, fresh cheese—quark and cream cheese— and other dairy desserts).

## 3.2 Summary statistics

Each manufacturer supplies a portfolio of brands that cover the three segments and offers between one and nine NBs. With less than 3% of market shares for most brands, market shares at the brand level are low.[19] 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 that retailers deal with to procure their PL products. We can only identify the brand and not the firm that produces it. Thus, we assume that retailers negotiate separate contracts with independent firms for each segment.[20]

PLs account for 46.5% of the total market (34.8% for MSRs and 11.7% for HDs). The share of PLs varies among MSR and HD retailers. While PLs represent between 44% and 56% of MSRs' sales, this share is much higher in HDs (68.8% to 100%). Similarly, MSRs sell most of the NBs (92% of total NB market). Moreover, while

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[19]Statistics at the brand level can be provided upon request.

[20]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 they collude in the sense that prices are set such that they maximize the total PL manufacturers' profits and not individual manufacturers' profits (Bonnet and Bouamra-Mechemache, 2020). (Source: Autorité de la concurrence: Décision 15-D-03 du 11 mars 2015 relative à 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.) The existence of the cartel between PL manufacturers solves the issue of identification of PL providers (that is, whether they are independent, small and medium-sized enterprises or NB manufacturers) due to the lack of information in the data at hand. It should be noted that assuming collusive behaviour of PL providers implies that they have the maximal bargaining power when trading with retailers.

NBs are sold in all MSRs, they are not sold in all HDs. Among the main HDs, two HDs exclusively sell PLs but no NBs while other HDs offer both PLs and NBs in their stores, with a share of NBs varying between 22.2% to 61.7% of HDs' sales (see Table 1).

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

| | Market share (%) | Average price (€/kg) | Average PL price (€/kg) | Average NB price (€/kg) | PL market share (%) |
|---|---|---|---|---|---|
| Retailer 1 | 17.11 | 2.40 | 1.97 | 2.76 | 45.08 |
| Retailer 2 | 10.43 | 2.49 | 2.06 | 2.87 | 47.12 |
| Retailer 3 | 10.84 | 2.49 | 2.07 | 2.85 | 45.84 |
| Retailer 4 | 22.50 | 2.59 | 2.13 | 2.97 | 44.62 |
| Retailer 5 | 5.49 | 2.82 | 2.51 | 3.11 | 47.88 |
| Retailer 6 | 7.21 | 2.46 | 2.03 | 2.85 | 47.27 |
| Retailer 7 | 2.00 | 2.46 | 2.22 | 2.76 | 55.95 |
| Total MS retailers | 75.58 | 2.52 | 2.10 | 2.88 | 34.8 |
| Hard Discounter 1 | 6.04 | 2.02 | 1.72 | 2.67 | 68.31 |
| Hard Discounter 2 | 3.80 | 2.38 | 2.09 | 3.19 | 73.10 |
| Hard Discounter 3 | 2.38 | 1.73 | 1.73 | - | 100.00 |
| Hard Discounter 4 | 2.00 | 1.95 | 1.81 | 2.44 | 77.79 |
| Hard Discounter 5 | 0.93 | 1.84 | 1.84 | - | 100.00 |
| Total Hard Discount | 15.15 | 2.05 | 1.83 | 2.80 | 11.72 |

NB: national brands, PL: private labels.

Average prices over time periods are computed as an average price over brands weighted by market shares.

Outside Option not displayed. Market Shares are thus smaller than 100%.

As expected, given the different MSRs and HDs' supply strategies, the average final price is lower in HDs than in MSRs. As shown in Table 1, they are again lower in HDs that only supply PLs. The comparison of average PL prices between HDs and MSRs (from all HDs and all MSRs on the whole period) show that this average PL price is lower in HDs (€1.83) than in MSRs (€2.10). They are always lower than NB average prices (€2.88 in MSRs and €2.80 in HDs) as expected. Even if NB prices differ across retailer types (MSRs vs. HDs) and retailers of the same type, summary statistics reported in Table 1 indicate that they are in the same order of magnitude. Differences may be explained by price strategies but also by the brands that are offered to consumers. As a result, average NB prices are not always lower in HDs.

# 4 Empirical Strategy

To uncover the role of the introduction 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 rarely observed since this information is kept hidden from all except for the parties involved. The second issue in identifying the role of NBs in HDs is that it may be difficult to disentangle this effect from other listing and delisting moves that occur simultaneously in food stores.[21] Our structural model associated with a simulation method of a counterfactual scenario allows the identification of the causal effect of an event, all things being otherwise equal, by using the identified consumer and firm behaviour patterns.[22] Given that the objective is to analyze the vertical interactions through bargaining, we focus on a single category to better disentangle the effects along the value chain. This allows for a deep analysis of manufacturer-retailer relationships at the expense of the explicit consideration of retailers' choices regarding multi-category strategies.

Our structural econometric approach consists of three steps. First, we identify the consumer substitution patterns of 202 products on the French dairy dessert market and, second, we identify the characteristics of the contractual arrangements; that is, the profit sharing and the relative bargaining power in a structural supply model, where we apply an axiomatic Nash-Framework. This commonly used supply model allows us to overcome the issue of hidden information in vertical contracts to compute margins and profit sharing. 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 in relation to the three strategic dimensions: market expansion, horizontal competition, and vertical relationships and bargaining. The simulation takes into account consumers' and firms' reactions using the demand and supply models developed in the two first stages. Therefore, and we can treat the hypothetical delisting that we disentangle in three scenarios as an exogenous shock. This allows us to derive causal conclusions.

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[21] Furthermore, one can hardly observe listing/delisting cases that would suffice for an analysis in reduced form.

[22] The results of our analysis depend on our structural assumptions that are as flexible as possible to represent the behaviour of consumers and firms.

## 4.1 Demand Model

To model the consumer substitution patterns, we are applying the approach of Ackerberg, Rysman et al. (2005) that extends the flexible random coefficient logit model (Revelt and Train, 1997; Berry, Levinsohn, and Pakes, 1995). This approach relaxes the "symmetric unobserved product differentiation" assumption of logit models and takes into account congestion in the market due to additional products. In our setting, NB products in HD are considered as new products in the market but are not totally novel for consumers as they are also sold in MSR. Thus, they cannot be seen as a combination of totally new characteristics to the unobserved attribute space as NB products in MSRs already take part of it. Ackerberg, Rysman et al. (2005) show that introducing the number of products in the utility allows us to address the issue. In particular, they show that not considering congestion has two major implications: first, it could overestimate the welfare effect of new products in a market; and second, it could bias the estimated consumer substitution patterns. This model is particularly suitable when the consumer substitution patterns are used to evaluate the welfare effect of the entry or exit of products in a market, as this article does.

We assume that the number of products $J_t$ can vary at each time period $t$ and that the utility that the consumer $i$ buys the product $j$ in period $t$ is represented by the following indirect utility function:

$$U_{ijt} = \beta_{r(j)} + \beta_{c(j)} + \beta_{m(j)} + \alpha_i p_{jt} + \varepsilon_{ijt}. \tag{1}$$

The utility captures the preferences for time-invariant product characteristics through category fixed effects $\beta_{c(j)}$, brand fixed effect $\beta_{b(j)}$ and retailer fixed effects $\beta_{r(j)}$. It also captures the heterogeneous disutility of prices through the term $\alpha_i p_{jt}$ with $p_{jt}$ the price of product $j$ at period $t$, and $\alpha_i = \alpha + \sigma_\alpha v_i$. The term $\alpha$ represents the mean disutility of consumers, $\sigma_\alpha$ represents the deviation from the mean and captures the consumers heterogeneity, and $v_i$ is assumed to be a standard normal distribution. Moreover, there is an unobserved consumer-specific error term $\varepsilon_{ijt}$. We allow for an outside option for consumers for which the utility is normalized to zero, and assume that consumers choose the product that gives them the highest utility.[23] We follow the model proposed by Ackerberg, Rysman et al. (2005), which differs from the classical random coefficient logit model by relaxing the "no crowding out" assumption of standard logit error terms. Hence, the probability that consumer $i$ buys product $j$ at period $t$

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[23]Furthermore, the model assumes that the products are substitutes.

depends on the total number of products available on the market:

$$s_{ijt} = \frac{R_t \exp(\beta_{r(j)} + \beta_{c(j)} + \beta_{m(j)} + \alpha_i p_{jt}}{1 + \sum_{k=1}^{J_t} R_t \exp(\beta_{r(k)} + \beta_{c(k} + \beta_{m(k)} + \alpha_i p_{kt})}, \tag{2}$$

where $R_t$ is the crowding effect that takes the following specification as suggested by Ackerberg, Rysman et al. (2005): $R_t = \gamma/J_t + 1 - \gamma$, and $\gamma$ is a parameter to be estimated. If $\gamma$ is close to 0, the model is equivalent to a standard logit model. Since the literature suggests that store and format choice may be driven by loyalty (e.g., Hokelekli, Lamey, and Verboven, 2017), we test for an alternative specification considering that loyalty to PL products and loyalty to HD stores could affect the price sensitivity of consumers. Table 8 in the Appendix shows that loyalty coefficients are very small. Therefore, there is no significant difference in elasticities between the two models. We then choose not to consider the model with loyalty.[24]

The estimation of this model is conditional on the assumption that product-specific characteristics $X_{jt}$ and the consumer-specific error term $\varepsilon_{ijt}$ 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, advertisements, 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). Using this approach, we first estimate a pricing function with a set of instruments (input prices and the classical instruments in Berry, Levinsohn, and Pakes (1995)) and exogenous demand variables.[25] The residual of this estimation is then introduced in the mean utility to capture all unobserved variables that affect prices, leading to an unbiased estimate of the price coefficient. After estimation, we use the demand estimates to uncover the elasticities according to the commonly used representation:

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

with $s_{jt} = \int s_{ijt} dP_v(v)$ and $P_v$ is the cumulative distribution function of $v$.

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[24]Elasticities are available upon request. We acknowledge that this pattern may be driven by our single category focus.

[25]We use as instruments the plastic price index provided by the French National Institute for Statistics and Economic Studies, the number of products offered by the competing firms by product categories, and the number of other products sold at the same retailer and product category. Furthermore, exogenous demand variables are fixed effects for retailers, brands, and categories.

## 4.2 Supply Model

The supply model follows the general strategy of Draganska, Klapper, and Villas-Boas (2010) and has been applied by Bonnet and Bouamra-Mechemache (2020) to the French dairy dessert market.[26] We conduct an in-depth investigation of the interaction along the vertical value chain through the bargaining procedure. Given this focus, we do not consider further strategic choices of retailers such as the choice of variety in a context of vertical interaction, since this would lead to an increase in complexity, which is beyond the contribution of this paper. As in the above-mentioned paper, we consider two layers; that is, $n_f$ 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. Any retailer-brand-dessert category combination is assigned as a differentiated product $j$.

We thus define the retail profits as the sum of the profits of each product that the retailer sells. The latter is defined as the product of the retail margin, which the corresponding retail price $p_j$ less its wholesale price $w_j$ and the retail marginal costs $c_j$, 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 $p$. Then, the profit of the retailer $r$ is written as:

$$\Pi^r = \sum_{j \in R^r} (p_j - w_j - c_j) M s_j(p).^{27}$$ (4)

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 production marginal cost $\mu_j$. The manufacturer's profit $f$ is represented as:

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

Regarding the vertical interaction between retailer and manufacturer, we assume as in Bonnet and Bouamra-Mechemache (2020) a typical Nash-in-Nash bargaining regarding the wholesale price $w_j$:

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

where $\pi_j^r$ and $\pi_j^f$ denote the agreement profit of retailer $r$ and manufacturer $f$, while $d_j^r$ and $d_j^f$ describe the

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[26]For the sake of simplicity, we use the same notation as in Bonnet and Bouamra-Mechemache (2020).

[27]As in the pattern, we omit the subscript $t$ for readability of the notation.

retailer and the manufacturer's 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 in the retailer or manufacturer's portfolios. The factor $\lambda_j$ represents the exogenous bargaining power parameters to be estimated.

The proposed solution by Draganska, Klapper, and Villas-Boas (2010) assumes 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, whereby the computation of retail margins occurs first and is not changed by the particular bargaining process, such that standard first order conditions of the profit function (4) apply:

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

We define the retailer margins of the product $j$ as $\gamma$. This term is then reformulated using matrix notation and the vector of retail margins for retailer r $\gamma_r$ can be written as:

$$\gamma_r = (I_r S_p I_r)^{-1} I_r s(p).^{28} \tag{8}$$

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 $s(p)$.

In the second step, the Draganska, Klapper, and Villas-Boas (2010) model solves the bargaining problem (6) such that we obtain the following first-order condition for each product $j$ which can be simplified (after assuming compensating derivatives of retail and manufacturer profits) to:

$$\pi_j^f - d_j^f = \frac{1 - \lambda_j}{\lambda_j}(\pi_j^r - d_j^r). \tag{9}$$

The retailer's and a manufacturer's profit for each product $j$ are given by the margins of the retailer $r$ and the manufacturer $f$ weighted by the corresponding quantities $Ms_j(p)$:

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[28] $(.)^{-1}$ corresponds to the unique Moore-Penrose pseudo inverse operator.

$$\pi_j^f = (p_j - w_j - c_j)Ms_j(p) = \gamma_j Ms_j(p) \tag{10}$$

$$\pi_j^r = (w_j - \mu_j)Ms_j(p) = \Gamma_j Ms_j(p).$$

While the derivation of inside profits, is straightforward, it has to be noted that the disagreement profit is equal to the alternative profit that retailer (respectively manufacturer) earns with their portfolio when the negotiation on the product $j$ fails.[29] Indeed, the loss of the delisting product $j$ may thus be compensated by the gains of market shares of other alternatives in the portfolio of both the manufacturer or the retailer. Formally, the definition is:

$$d_j^r = \sum_{k \in R^r - \{j\}} \gamma_k M \Delta s_k^{-j}(p) \tag{11}$$

$$d_j^f = \sum_{k \in G^f - \{j\}} \Gamma_k M \Delta s_k^{-j}(p).$$

Changes in market shares of product $k$ in reaction of such a break up in product $j$, are captured in $\Delta s_k^{-j}(p)$ (see Draganska, Klapper, and Villas-Boas (2010) for a more detailed description).

Taking into account the above definitions, following the bargaining solution in equation (9) and using matrix notations, the vector of manufacturers' margins is as follows:

$$\Gamma = \sum_{f=1}^{n_f} \left(I_f S I_f\right)^{-1} \left[\sum_{r=1}^{n_r} \frac{1-\lambda}{\lambda} * (I_r S I_r) \gamma\right].^{30} \tag{12}$$

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 $\gamma = \sum_{r=1}^{R} \gamma_r$, the matrix $S$ which combines market shares that are placed on the diagonal of the matrix $S[i,i] = s_i$ and cross effects $S[i,j] = \Delta s_i^{-j}$ that are market share changes for all products $i$ that result from the delisting of the alternative $j$ that is subject to the particular bargaining.

Manufacturers' margins can thus be explained by retail prices, substitution patterns, and the exogenous bargaining power. However, manufacturers' margin and exogenous bargaining power are both unknown and cannot

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[29]Note that we only consider substitution patterns within the dairy dessert market, and then firms' strategies and firms' outside options within this market.

[30]The $*$ indicates an element-by-element multiplication.

be identified with the only system of equations (12). Additional assumptions are then required. Draganska, Klapper, and Villas-Boas (2010) propose computing the channel margins, which is the sum of the retailer's and the manufacturer's margin given in equations 8 and 12, as the difference between the retail price and total marginal cost $p - c - \mu = \gamma + \Gamma$ where $c$ represents the vector of the marginal distribution costs and $\mu$ represents the vector of marginal production costs. Thus, we assume that the channel marginal costs $C_j$ is a linear function of a cost shifter vector $\omega_j$ with the corresponding coefficients $\theta$ as well as a common error term $\eta_j$,

$$C_j = \theta \omega_j + \eta_j \tag{13}$$

Then the model uses equations (8), (12) and (13), to obtain the following pricing equation that allows estimating the parameters $(\theta, \lambda)$ with a non-linear least squares method:

$$p = \theta \omega + \left[ \sum_{f=1}^{n_f} \left( I_f S I_f \right)^{-1} \left[ \sum_{r=1}^{n_r} \frac{1-\lambda}{\lambda} * (I_r S_t I_r) \gamma + I \right] \right] (I_r S_p I_r)^{-1} I_r s(p) + \eta. \tag{14}$$

where $\omega = (\omega_1, ..., \omega_J)$ and $\eta = (\eta_1, ..., \eta_J)$. [31]

For cost-shifters, we use the price of cream milk and the price of glass. We also control for category and brand fixed effects. From the estimation of equation (14), we recover the wholesale margins for all products $j$ using the estimates $\lambda_j$ that are allowed to vary by supplier-retailer pair.

## 4.3 Impact of eliminating the NB product offer of hard discounters

In order to evaluate the strategic impact of the introduction of NBs in HDs, we perform a counterfactual analysis that consists of removing the presence of NB products on HDs' shelves and compute the impact on prices and profits using our estimated demand and supply models (with the presence of NBs on HDs' shelves) as a benchmark.[33] In accordance with our discussion in Section 2, we define different scenarios in order to not only evaluate the full impact of removing NBs from HD shelves but also to disentangle the market, profit and consumer surplus effects into a market expansion effect (or variety effect; i.e., the effect of having no NBs), a retail market competition

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[31][32]

[33]In our data, NBs have already been introduced in HDs. Our strategy thus consists of removing the products and analysing how the prices and profit-sharing would have been without these products.

effect (i.e., the business stealing effect), and a vertical bargaining effect (i.e., the bargaining impact on the distribution of rents between manufacturers and retailers). Accordingly, we consider three scenarios $S1$ (variety effect only), $S2$ (variety and retail competition effects), and $S3$ (variety, retail competition and bargaining effect). The scenario $S1$ consists in fixing wholesale and retail prices to obtain the pure variety effect. The scenario $S2$ fixes the wholesale price only to allow for variety effect and its retail competition effect, meaning that only retail prices are adjusted by retailers. The scenario $S3$ represents the new equilibrium when the NB products are removed from the HD shelves: that is, both wholesale and retail prices are adjusted. The counterfactual simulation is a commonly used mechanism (e.g., Bonnet and Dubois, 2010; Bonnet and Bouamra-Mechemache, 2020). It first considers the marginal costs per time period $t$ derived in the former analysis, which is the sum of the distribution and production marginal costs defined as: $C_t = (C_{1t}, .., C_{jt}, .., C_{Jt})$. For the simulation exercise, we assume that the exogenous bargaining power $\lambda_j$ is not affected by the presence of NB on HD shelves. On the contrary, our bargaining model allows the consideration of variations in the disagreement payoffs due to NB products removed from HD stores.

Given the cost vector as well as the exogenous bargaining power, we have to find the vector of new equilibrium retail prices consistent with the vector of estimated marginal costs to compute our new set of retail and wholesale prices in scenario $S3$, given that $\Gamma^*$ and $\gamma^*$ 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:

$$\min_{\left\{p^*_{jt}\right\}_{j=1,..,J^*_t}} \left\| p^*_t - \Gamma^*_t\left(p^*_t\right) - \gamma^*_t\left(p^*_t\right) - C_t \right\| \tag{15}$$

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

In scenario $S2$, the program to be solved is less demanding as $\Gamma^* = \Gamma$; that is, wholesale prices and then wholesale margins are not changed. In scenario $S1$, we just recompute market shares and profits, given retail and wholesale prices fixed.

# 5 Results

In this section, we first describe the results of our structural model: demand estimates, supply estimates, retail and wholesale margins, and profit sharing. We then present the results of the counterfactual experiments disentangling the different effects of the listing of NBs on HD shelves.

## 5.1 Demand and supply estimates

We first estimate our demand model without taking into account the "crowding out" effect (model 1).[34] Results are reported in Table 2. As expected, price has a significantly negative effect. However, the deviation from the mean is not significant, meaning that there is no significant unobserved heterogeneity in the price disutility of consumers. All other parameters (retailer, category and brand fixed effects) are significant at 1%. The parameter of the control function approach is positive and significant, meaning that unobserved product characteristics positively affect the demand. The results of the price equation are presented in Table 6 in the Appendix. The F-test for the instrumental variables is very high (58.73), meaning that our instrumental variables are not weak. Taking into account that the utility of consumers can be affected by the number of products available, we then estimate a second demand (model 2) as in Ackerberg, Rysman et al. (2005). We find a significant moderate crowding out effect of 0.3, suggesting that changing the choice set significantly affect the utility. The price sensitivity is not affected by the inclusion of the crowding effect, as only fixed effects seem to be affected by the crowding out effect. We will use this latter demand model to estimate parameters of the supply model. Results of the supply model (i.e., parameters of cost shifters and bargaining weights) are presented in Table 7 in the Appendix and Table 3, respectively.

Table 3 provides average estimates of the demand own-price elasticities, bargaining weights, margins at the retail and manufacturer levels, marginal costs and profit sharing per retailer and per type of brands (NB/PL). Retail and manufacturer margins are computed as a percentage of the price: $\gamma_j/p_j$ where $\gamma_j$ are estimated using equation (8), and $\Gamma_j/p_j$ where $\Gamma_j$ is estimated from the final equation (14). Average own-price elasticities, average retail margins, average bargaining weights, and average marginal costs are weighted (by market share) averages over products. The profit sharing for retailers is the percentage of the total retailer profit over the total joint profit of

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[34]Note that we estimate the demand model using individual purchases.

Table 2: **Demand results**

| | Model 1 Coefficient (standard error) | Model 2 Coefficient (standard error) |
|---|---|---|
| Price | -1.18 (0.00)*** | -1.18 (0.00)*** |
| Std Price | 0.00 (0.00) | 0.00 (0.00) |
| Error term | 1.00 (0.00)*** | 1.00 (0.00)*** |
| Crowding out | | 0.30 (0.00)*** |
| Retailer fixed Effects | | |
| MSR1 | 2.14 (0.00)*** | 2.14 (0.00)*** |
| MSR2 | 1.87 (0.00)*** | 1.87 (0.00)*** |
| MSR3 | 1.84 (0.00)*** | 1.84 (0.00)*** |
| MSR4 | 2.69 (0.00)*** | 2.69 (0.00)*** |
| MSR5 | 1.62 (0.00)*** | 1.62 (0.00)*** |
| MSR6 | 1.52 (0.00)*** | 1.52 (0.00)*** |
| MSR7 | 0.50 (0.00)*** | 0.50 (0.00)*** |
| HD1 | 1.50 (0.00)*** | 1.50 (0.00)*** |
| HD2 | 1.51 (0.00)*** | 1.51 (0.00)*** |
| HD3 | 0.80 (0.00)*** | 0.80 (0.00)*** |
| HD4 | 0.60 (0.00)*** | 0.60 (0.00)*** |
| HD5 | - | - |
| Category fixed Effects | | |
| Yogurt | -1.81 (0.00)*** | -1.28 (0.00)*** |
| Fresh cheese | -2.02 (0.00)*** | -1.49 (0.00)*** |
| Other dairy dessert | 1.06 (0.00)*** | 1.59 (0.00)*** |
| Brand fixed Effects | | |
| NB1 | -1.08 (0.00)*** | -0.16 (0.00)*** |
| NB2 | -0.04 (0.00)*** | -1.25 (0.00)*** |
| NB3 | -1.23 (0.00)*** | -0.25 (0.00)*** |
| NB4 | -2.76 (0.00)*** | -1.40 (0.00)*** |
| NB5 | -0.00 (0.00)*** | -2.92 (0.00)*** |
| NB6 | -1.64 (0.00)*** | -0.17 (0.00)*** |
| NB7 | -0.75 (0.00)*** | -1.81 (0.00)*** |
| NB8 | 0.36 (0.00)*** | -0.91 (0.00)*** |
| NB9 | -2.62 (0.00)*** | 0.19 (0.00)*** |
| NB10 | -0.71 (0.00)*** | -2.79 (0.00)*** |
| NB11 | -3.36 (0.00)*** | -0.88 (0.00)*** |
| NB12 | -1.34 (0.00)*** | -3.53 (0.00)*** |
| NB13 | -1.77 (0.00)*** | -1.51 (0.00)*** |
| NB14 | -2.06 (0.00)*** | -1.93 (0.00)*** |
| NB15 | -0.65 (0.00)*** | -2.23 (0.00)*** |
| NB16 | -0.61 (0.00)*** | -0.82 (0.00)*** |
| NB17 | -1.01 (0.00)*** | -0.78 (0.00)*** |
| NB18 | -0.99 (0.00)*** | -1.17 (0.00)*** |
| NB19 | 0.24 (0.00)*** | -1.15 (0.00)*** |
| NB20 | -1.4 (0.00)***7 | 0.07 (0.00)*** |
| PL1 | 0.44 (0.00)*** | -1.63 (0.00)*** |
| PL2 | 0.16 (0.00)*** | 0.28 (0.00)*** |
| PL3 | - | - |
| LL | 5,336,630 | 5,336,630 |
| Number of observations | 1,158,245 | 1,158,245 |

*** significant at 1%; ** significant at 5%; * significant at 10%. Model 1 is a classical random coefficient logit model.

Model 2 is a random coefficient logit model with crowding effect on the number of products available

both manufacturers and retailers. It is computed from the estimated margins of retailers and manufacturers, market shares and the total size of the market $M$.

**Demand own-price elasticities** Demand own-price elasticities differ per type of brands (PL/NB) and retailers (MSR/HD). They are higher for NBs than for PLs, whatever the retail chains. Comparing elasticities depending on the retailing type, no clear pattern can be observed. However, average estimated elasticities for PLs are slightly lower in HDs in absolute value (-2.15) compared to MSRs (-2.43). Consumers thus do not appear to react very differently to price changes depending on the retailing type.

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

|  |  | Average own-price elasticities (%) | Average retail margins (%) | Average bargaining weight | Average manufacturer margins (%) | Average marginal costs (€/kg) | Average Profit sharing for retailers (%) |
|---|---|---|---|---|---|---|---|
| Retailer 1 | NB | -3.25 | 40.78 | 0.77 | 14.08 | 1.27 | 68.02 |
|  | PL | -2.26 | 54.96 | 0.88 | 16.92 | 0.61 | 75.01 |
| Retailer 2 | NB | -3.38 | 36.82 | 0.68 | 19.47 | 1.26 | 58.72 |
|  | PL | -2.39 | 48.06 | 0.77 | 23.47 | 0.63 | 66.00 |
| Retailer 3 | NB | -3.36 | 36.95 | 0.69 | 18.96 | 1.26 | 59.83 |
|  | PL | -2.41 | 48.52 | 0.76 | 23.60 | 0.62 | 65.38 |
| Retailer 4 | NB | -3.49 | 40.61 | 0.71 | 17.38 | 1.25 | 63.53 |
|  | PL | -2.44 | 56.18 | 0.84 | 19.21 | 0.58 | 70.34 |
| Retailer 5 | NB | -3.67 | 31.52 | 0.55 | 27.93 | 1.28 | 48.83 |
|  | PL | -2.95 | 38.76 | 0.55 | 39.14 | 0.60 | 46.71 |
| Retailer 6 | NB | -3.37 | 35.26 | 0.65 | 21.40 | 1.25 | 56.82 |
|  | PL | -2.38 | 47.60 | 0.76 | 24.15 | 0.62 | 64.51 |
| Retailer 7 | NB | -3.27 | 34.00 | 0.63 | 22.83 | 1.20 | 55.15 |
|  | PL | -2.62 | 42.18 | 0.64 | 32.92 | 0.60 | 53.16 |
| HD 1 | NB | -3.15 | 35.10 | 0.69 | 20.76 | 1.20 | 61.13 |
|  | PL | -2.01 | 53.92 | 0.99 | 13.31 | 0.60 | 80.29 |
| HD 2 | NB | -3.76 | 29.28 | 0.50 | 31.46 | 1.25 | 45.28 |
|  | PL | -2.45 | 44.58 | 0.70 | 28.83 | 0.60 | 59.04 |
| HD 3 | PL | -2.03 | 52.20 | 0.95 | 15.50 | 0.61 | 76.73 |
| HD 4 | NB | -2.88 | 36.32 | 0.72 | 18.69 | 1.09 | 63.86 |
|  | PL | -2.13 | 49.56 | 0.88 | 18.98 | 0.61 | 71.93 |
| HD 5 | PL | -2.17 | 48.12 | 0.85 | 20.80 | 0.61 | 69.36 |
| MSR | NB | -3.40 | 38.34 | 0.70 | 18.37 | 1.26 | 61.37 |
| MSR | PL | -2.43 | 51.06 | 0.79 | 22.36 | 0.61 | 66.58 |
| HD | NB | -3.30 | 33.51 | 0.63 | 23.74 | 1.20 | 55.61 |
| HD | PL | -2.15 | 50.33 | 0.89 | 18.76 | 0.60 | 71.60 |

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

All columns are computed as weighted averages by market shares over brands.

**Bargaining weights and marginal costs**   Marginal costs are heterogeneous at the brand level depending on their recipe.[35] On average, they are evaluated at around €0.60 for PLs and €1.20 for NBs, which is twice the average marginal costs for PLs. Interestingly, the average marginal costs of PLs are similar for products sold in MSRs and in HDs. For NBs, depending on which NBs are provided in HDs, the average marginal costs can be slightly higher or lower, but on average, are very close (€1.26 and €1.20 respectively).

Table 3 shows that bargaining weights are more in favour of retailers. As expected, bargaining weights for PLs are in the hand of retailers for both HDs and MSRs and are larger than for NBs. On average, HDs' bargaining weights for PLs are equal to 0.89. However, they are not equal to one, meaning that manufacturers are able to extract a (small) share of the total profit for PLs. With respect to NBs, there is no clear ranking between MSRs' and HDs' bargaining weights. Some HDs have higher bargaining weights than many MSRs. This can be explained by the fact that HDs represent one of the main market expansion channels for manufacturers. In an already MSR saturated market, a manufacturer wanting to expand its market share can only increase the presence of her brands in HD stores.

**Margins and profit-sharing**   Given demand estimates and our estimates of retail margins using the assumption of Bertrand-Nash competition between retailers, the average (gross) retail margins are high in percentage. Given our supply estimates, manufacturer margin estimates are much lower on average than those of retailers. They differ between MSRs and HDs for NBs and PLs. At the retail format level (MSR/HD), both retail and manufacturer margins are lower in HDs than in MSRs, as expected, in all cases but one. NB manufacturers are able to achieve a higher margin (in percentage) when trading with HDs than when trading with MSRs.

Average profit-sharing values provided in the last column of Table 3 reflect margin estimates. Both MSR and HD retailers capture a larger share of the profit for PLs and NBs, but HDs can get a higher (lower) share of the profits from PLs (NBs) compared to MSRs. This result holds in average but not for all HDs. This questions the ability for HDs to take advantage of potential bargaining position to extract more of the profit compared to MSRs when negotiating with NB manufacturers. Using counterfactual experiments, we will investigate this outcome deeper.

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[35]Marginal cost results at the brand level are available upon request.

## 5.2 Counterfactual experiment results

To evaluate the impact of the introduction of NBs in HDs, we apply the methodology described in Section 4.3 and simulate three counterfactual scenarios. We first discuss the results of scenario $S3$ that includes all the market effects (variety, competition and bargaining effects) of delisting all the NB products sold at HDs, which represent 12 differentiated products. The removal of NB products represents a market share of 4% of the total market for dairy desserts and 23% of the market share of HDs. It has a different effect on HDs, as they do not have the same strategies with respect to NB sales (see Table 1). When delisting products as simulated in $S3$, we cannot disentangle business stealing and bargaining effects, as final prices and wholesale prices are simultaneously impacted by the delisting of products. To better assess their effects on profits and consumer surplus, we then use results from the two intermediate scenarios $S1$ (that keeps wholesale and retail prices fixed) and $S2$ (that keeps wholesale prices fixed but allows for changes in retail prices) to disentangle the effects. Given scenarios $S1$ and $S2$, it is thus possible to derive the variety, retail competition and bargaining effects of delisting NB products in HDs. The overall impact (i.e., results from $S3$ on retail prices, market shares, and profit sharing) is summarized in Table 4, while impacts on profits are summarized in Table 5. Variation in retail prices and manufacturer and retail margins are computed as the variation of the weighted average of all brands carried by the manufacturer-retailer pair.

**Global price and quantity effect of NB product delisting in HDs**    Removing NBs at HDs (scenario $S3$) directly impacts the sales of PLs at HDs, such that the market share of PLs sold at HDs increases by 3.85% with a corresponding 3.98% increase in the price given inter-brand competition within HD stores. Moreover, consumers can also switch from HDs to MSRs to purchase NB products. Visiting other MSR stores, they can buy the same NB products, other NB products, or other retailers' PLs. Results show that consumers switch mainly to NB products at other retailers but, interestingly, also to other PLs (business-stealing effect from MSR retailers). 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 4.4%, which is higher than the percentage change for PLs sold in HD.[36] Removing NBs in HDs in turn generates a significant change in the average price of NBs (4.2%) and to a lesser extent for PLs (3.0%) at MSRs. Given the positive effect on prices, retail margins become higher for the remaining products and both NB

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[36]This cross-retailer effect is ultimately based on the cross-elasticities summarized in the aggregated elasticities available, upon request.

and PL manufacturers benefit from the competition effect of the removal of NBs from the HD market as shown by

the positive variation of manufacturer margins in Table 4.

Table 4: **Counterfactual results - scenario $S3$: Impact of removing NB products from HD (% change compared to baseline)**

|  |  | Retail price variation | Market share variation | Retail margin variation | Manufacturer margin variation |
|---|---|---|---|---|---|
| Retailer 1 | NB | 4.1 | 4.3 | 5.0 | 2.2 |
|  | PL | 2.9 | 2.0 | 2.7 | 5.2 |
| Retailer 2 | NB | 4.4 | 4.6 | 5.1 | 3.1 |
|  | PL | 3.1 | 2.4 | 2.8 | 4.6 |
| Retailer 3 | NB | 4.3 | 4.6 | 5.1 | 3.0 |
|  | PL | 3.1 | 2.4 | 2.8 | 4.5 |
| Retailer 4 | NB | 3.9 | 3.9 | 4.8 | 2.3 |
|  | PL | 2.7 | 1.7 | 2.6 | 4.0 |
| Retailer 5 | NB | 4.6 | 4.9 | 5.2 | 3.7 |
|  | PL | 3.1 | 2.6 | 2.9 | 3.7 |
| Retailer 6 | NB | 4.5 | 4.8 | 5.1 | 3.3 |
|  | PL | 3.2 | 2.6 | 2.9 | 4.7 |
| Retailer 7 | NB | 4.8 | 5.2 | 5.3 | 3.6 |
|  | PL | 3.3 | 2.8 | 2.9 | 4.2 |
| HD 1 | NB | - | - | - | - |
|  | PL | 4.5 | 4.9 | 3.0 | 9.8 |
| HD 2 | NB | - | - | - | - |
|  | PL | 4.0 | 3.9 | 2.9 | 5.7 |
| HD 3 | PL | 3.5 | 2.8 | 2.9 | 6.9 |
| HD 4 | NB | - | - | - | - |
|  | PL | 3.7 | 3.3 | 2.9 | 6.5 |
| HD 5 | PL | 3.4 | 2.9 | 2.9 | 5.7 |
| MSR | NB | 4.2 | 4.4 | 5.0 | 2.8 |
|  | PL | 3.0 | 2.2 | 2.7 | 4.4 |
| HD | NB | - | - | - | - |
|  | PL | 4.0 | 3.9 | 2.9 | 6.9 |

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

All columns are computed as weighted averages by market shares over brands.

**Global effect of NB product delisting on profits and consumer surplus**   Given all market changes, we can

evaluate the effect on HD revenues from sales. The competition with MSRs is such that most consumers' purchases

will switch to MSRs in both the PL and NB segments. Overall, HDs are thus 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 for the loss

in HD profits on NB products (as shown in Table 5). As a result, the total monetary value of HD sales is lowered

by €31.8 million when NB products are removed from shelves.

On the contrary, MSRs will directly benefit from the increase in NB and PL sales and their total profits increase by €35.2 million. However, the increase in NB sales at MSR cover only a fraction of NB manufacturers' losses from HD sales. The total net loss for NB manufacturers amounts to €20 million. Consumers would be harmed by a removing of NBs from HDs as NBs and PLs' final prices increase. From our estimates, we evaluate that the change in consumer surplus amounts to -8.54%.[37][38]

In other words, the introduction of NBs by HDs would clearly increase HD profits and consumer surplus at the expense of MSRs and PL manufacturers. It would also increase the profits of NB manufacturers, even though they would lose some of the profits from MSR sales. Our results also suggest that such a strategy based on NBs would intensify the competition between HDs and MSRs. However, to better evaluate what drives profits and consumer surplus outcome, disentangling the effects related to variety, retail competition and bargaining effects is required.

**Disentangling variety, retail competition and bargaining effects on profits and consumer surplus**  To evaluate the variety effect on profits (i.e., when wholesale and final prices remain unchanged), we compute the difference in simulated profits between scenario $S1$ and the baseline $B$ provided in Table 5. A direct comparison of results of $S3$ and $S1$ shows that most of the increase in MSRs' profits stems from the variety effect. Similarly, most of the HDs' profits gained on PLs can also be attributed to the variety effect.

Final price changes resulting from the competition between retailers (depicted in $S2$, where only wholesale prices are unchanged) slightly reinforce the positive effect on MSR profits and on HD profits on PL sales. However, this effect remains low compared to the variety effect. It should be noted that manufacturers cannot benefit from this competition effect when wholesale prices remain fixed; that is, if they cannot capture a share of the final price increase. They may even lose as an increase in the final prices reduces the purchases of NBs (everything else being constant).

Comparing results of scenarios $S3$ and $S2$ (see Table 5) provides the effect of NB delisting at HDs net of the variety and competition effect; that is, the effect of a change in the relative bargaining power of manufacturer and retailer following a change in market characteristics. NB manufacturers lose their outside option, which consists of

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[37]The expected consumer surplus, which corresponds to the compensating variation for a change in product attributes, is defined as in Small and Rosen (1981).

[38]The decrease in consumer surplus is a lower bound. Our assumptions imply that the total market (including the outside option) is covered, which means that total sales on the dairy dessert market will not decrease following the removal of NBs from HD shelves.

selling their products to HDs. 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 sales of PLs at HDs reinforces the position of PL manufacturers in the bilateral negotiation with HDs.

Keeping wholesale prices unchanged (scenario $S2$), the variety and competition effects lead to an increase in the HD profits in the PL segment which exceeds the total effect found in $S3$. Indeed, HD profits for PLs increase from €121.9 million in the benchmark to €126.7 million in $S2$ due to the competition and variety effects while decreasing to €125.5 million in $S3$, indicating that there is a substantial loss of bargaining power caused by the delisting of NBs. This effect is higher for HDs that sell more NB products.[39] For PL manufacturers, however, as expected, they unambiguously benefit from the improved outside option that increases their bargaining power and thus their profits (from €48.3 million to €50.6 million in scenario $S2$ and €51.7 million in scenario $S3$).

Comparing the overall profit-sharing between manufacturers and retailers of the scenario $S2$ with the final scenario $S3$ over all product categories, the HD share of the industry profits on PL products drops without NBs. This drop is significant and can achieve 0.6 percentage points. This impact of the NB introduction at HDs is comparable 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.

Removing NBs at HDs also has an indirect impact on the MSRs, thus affecting the profit-sharing between NB manufacturers and MSRs. MSRs capture more on the joint profit with NB manufacturers because the latters become weaker in their negotiation with MSR when removed from HDs (i.e., their disagreement payoff in their negotiation with MSR is reduced). In contrast, MSRs capture a lower share of the joint profit with PL manufacturers, as they need to increase their procurement for PL products to face the increased demand of PLs in their stores.

Consumers are harmed by the competition effect, but the loss in consumer surplus remains marginal compared to the variety effect (-8.56% instead of -8.55%). However, the bargaining effect has almost no incidence on

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[39]This result confirms the conclusion of the literature that finds bargaining power effects for PLs at MSR, as a means to optimize the sourcing and bargaining process (Scott Morton and Zettelmeyer, 2004; Meza and Sudhir, 2010).

| | | Retailers' profit €million | | | | Manufacturers' profit €million | | | | Profit share of retailer % | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **B** | **S1** | **S2** | **S3** | **B** | **S1** | **S2** | **S3** | **B/S1** | **S2** | **S3** |
| Retailer 1 | NB | 113.0 | 117.0 | 117.4 | 118.6 | 53.1 | 55.0 | 54.8 | 54.3 | 68.0 | 68.2 | 68.6 |
| | PL | 92.8 | 96.0 | 96.2 | 95.3 | 30.9 | 32.0 | 31.9 | 32.5 | 75.0 | 75.1 | 74.6 |
| Retailer 2 | NB | 61.4 | 63.6 | 63.8 | 64.5 | 43.2 | 44.7 | 44.7 | 44.5 | 58.7 | 58.5 | 59.2 |
| | PL | 54.7 | 56.6 | 56.8 | 56.2 | 28.2 | 29.1 | 29.1 | 29.5 | 66.0 | 66.1 | 65.6 |
| Retailer 3 | NB | 65.7 | 68.0 | 68.3 | 69.0 | 44.1 | 45.6 | 45.6 | 45.4 | 59.8 | 59.9 | 60.3 |
| | PL | 55.6 | 57.5 | 57.7 | 57.2 | 29.4 | 30.5 | 30.4 | 30.8 | 65.4 | 65.5 | 65.0 |
| Retailer 4 | NB | 160.3 | 165.9 | 166.31 | 68.1 | 92.0 | 95.2 | 94.6 | 94.1 | 63.5 | 63.7 | 64.1 |
| | PL | 129.2 | 133.7 | 133.9 | 132.6 | 54.5 | 56.4 | 56.0 | 56.7 | 70.3 | 70.5 | 70.0 |
| Retailer 5 | NB | 30.2 | 31.3 | 31.4 | 31.8 | 31.6 | 32.7 | 32.8 | 32.8 | 48.8 | 48.9 | 49.2 |
| | PL | 27.7 | 28.7 | 28.8 | 28.5 | 31.6 | 32.8 | 32.8 | 32.8 | 46.7 | 46.8 | 46.5 |
| Retailer 6 | NB | 40.8 | 42.3 | 42.5 | 42.9 | 31.0 | 32.1 | 32.2 | 32.1 | 56.8 | 56.9 | 57.2 |
| | PL | 36.6 | 37.9 | 38.1 | 37.7 | 20.2 | 20.9 | 20.9 | 21.1 | 64.5 | 64.6 | 64.1 |
| Retailer 7 | NB | 8.9 | 9.38 | 9.3 | 9.5 | 7.3 | 7.6 | 7.6 | 7.6 | 55.2 | 55.2 | 55.6 |
| | PL | 11.4 | 11.8 | 11.9 | 11.7 | 10.1 | 10.4 | 10.4 | 10.5 | 53.2 | 53.2 | 52.8 |
| HD 1 | NB | 20.3 | - | - | - | 12.9 | - | - | - | 61.1 | - | - |
| | PL | 43.7 | 45.3 | 45.5 | 45.1 | 10.7 | 11.1 | 11.4 | 11.8 | 80.3 | 80.0 | 79.3 |
| HD 2 | NB | 10.6 | - | - | - | 12.8 | - | - | - | 45.3 | - | - |
| | PL | 28.8 | 29.8 | 29.9 | 29.6 | 20.0 | 20.7 | 20.9 | 21.1 | 59.0 | 58.8 | 58.4 |
| HD 3 | PL | 24.3 | 25.1 | 25.2 | 25.0 | 7.4 | 7.6 | 7.6 | 7.9 | 76.7 | 76.7 | 76.0 |
| HD 4 | NB | 4.5 | - | - | - | 2.6 | - | - | - | 63.9 | - | - |
| | PL | 15.8 | 16.3 | 16.4 | 16.3 | 6.2 | 6.4 | 6.4 | 6.6 | 71.9 | 71.9 | 71.2 |
| HD 5 | PL | 9.3 | 9.6 | 9.7 | 9.6 | 4.1 | 4.3 | 4.3 | 4.4 | 69.4 | 69.4 | 68.8 |
| MSR | NB | 480.4 | 497.3 | 499.0 | 504.4 | 302.4 | 313.0 | 312.3 | 310.8 | 61.4 | 61.5 | 61.9 |
| | PL | 408.0 | 422.3 | 423.3 | 419.2 | 204.9 | 212.0 | 211.5 | 213.8 | 66.6 | 66.7 | 66.2 |
| HD | NB | 35.4 | - | - | - | 28.3 | - | - | - | 55.6 | - | - |
| | PL | 121.9 | 126.2 | 126.7 | 125.5 | 48.3 | 50.0 | 50.6 | 51.7 | 71.6 | 71.4 | 70.8 |

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

B: Benchmark; S1: variety effect only, S2: intermediate scenario (no NB in HD with unchanged final wholesale prices);

S3: scenario with both business stealing and bargaining power effects (no NB in HD with adjustment of final wholesale prices).

consumer surplus. It mostly leads to a redistribution of rents among manufacturers and retailers.

To conclude, we find that NBs are strategic for HDs as they attract brand-loving consumers and shift part of the demand of NB products from MSRs to HDs. Our results also show that they are also a means for stealing some market share from PLs sold at MSRs. This 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 and does not affect consumers.

# 6   Conclusion

In this paper, we analyze one of the main HD strategies in recent decades. We start from the hypothesis in the literature that HDs need new strategies to face the intense competition with MSRs. We focus on the French market for dairy desserts and shed light on the role of NBs in HDs. Taking into account the complexity of horizontal and vertical relationships in the supply chain, we show how the introduction of NBs by HDs change inter-brand and intra-brand competition. We identify three economic channels under which this strategy affects market: first, market expansion through an increase in variety; second, final price effects through more fierce horizontal competition; and third, profit-sharing effects through vertical competition and bargaining effect. We test the importance of each of these effects and draw implications for markets and surplus.

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 those 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 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. HDs 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 a HD leads to a clear decrease of profit sharing of HDs with PL manufacturers due to a decrease in the outside option. 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, regarding NBs at HDs, the vertical relationship effect has not been shown before.

Third, our results shed light on retail competition in food industries: an issue that is widely debated and investigated by competition authorities. We provide useful insight on how and to what extent HD strategies can change retail competition. We show that when HDs introduce NBs into their stores, competition intensifies to the benefit of consumers, and may result in welfare improvement and lead to profit redistribution at the retail and manufacturing levels.

Finally, analyzing the introduction of NBs in HDs is more complex than analyzing the introduction of PLs in MSRs. This requires the modelling of both inter-brand and intra-brand competition, not only inter-brand competition. We show that it changes the bargaining position of NB manufacturers with MSRs. Indeed, the introduction of NBs by HDs shifts the profit sharing towards NB manufacturers in their relationships with MSRs.

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 regarding 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 to be able to compete with each other. In particular, the European retailing sector is currently evolving towards an increasing number of buying alliances. These alliances not only involve common negotiation with NB manufacturers but increasingly involve PL negotiation. 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 such strategies and their comparability remains an opportunity 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 may be negatively affected by the introduction of NBs at HDs. Second, in this analysis, we do not consider any other possible HD strategies, such as changes in the quality and assortment of PLs, to fight against MSRs. Indeed, we do not observe in our data any detailed quality characteristics of the PL products. Third, we highlight the market and welfare effects brought about by HDs introducing NBs, but do not directly model the endogenous NB listing choice of HDs. This is outside the scope of this paper.

Several questions remain for future research to better understand the global strategies of retailers. In particular, the single category assumption should be relaxed. A multi-category modelling approach would allow for possible

complementary between the two types of retailers to account for multi-store shopping in the choice of store and thus to better consider the effect of store loyalty as discussed in (Vroegrijk, Gijsbrechts, and Campo, 2013, 2016). This may affect demand estimates and price effect. Another important extension would be to jointly consider retailers' variety and price strategies for both PLs and NBs in addition to the modelling of both horizontal and vertical competition. If empirical demand models that better capture changes of consumers' shopping behaviour have been recently developed, empirical structural methodologies that can handle those changes in demand and supply models are also required. Only a few articles address the joint strategy in variety and price but those articles do not include the vertical relationships dimension , complementarities, or, for most of them, a multi-category setting (see Draganska and Jain, 2005; Federgruen and Hu, 2015; Richards and Hamilton, 2015; Toporowski and Lademann, 2014). As far as we know, there is not yet any existing methodology for the modelling of both variety and price in the context of vertical supply chains. Nonetheless, our results show that vertical relationships and manufacturers' strategies are key for the understanding of branding strategies and their implications for consumers.

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# 7 Appendices

## 7.1 Introduction

Figure 1: Discounter Market Shares
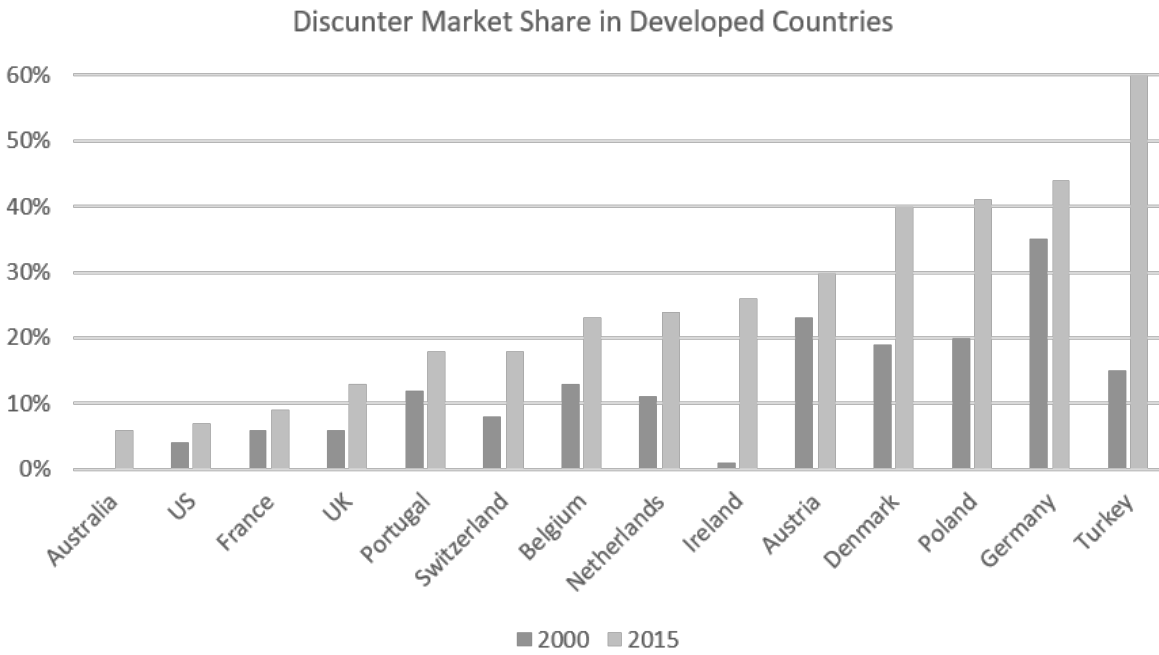


*Source: Boston Consulting Group 2017, using Planet Retail data. Own adaptations.*

## 7.2 Demand: estimation results

Table 6: **Results on price equation**

|  | Coefficient (standard error) |
|---|---|
| Plastic price index | 0.033 (0.014)** |
| Number of products | 0.019 (0.011)* |
|   offered by the competing firms | |
|   by product categories | |
| Number of other products | 0.074 (0.006)*** |
|   by retailers and product categories | |
| Retailer fixed Effects | Yes |
| Brand fixed effects | Yes |
| Category fixed Effects | Yes |
| **F-test of IVs** | **58.73*** (0.00)** |
| R-squared | 0.98 |
| Number of observations | 2,222 |

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

Table 7: **Supply results**

|  | Coefficient (standard error) |
|---|---|
| Cream price index | 0.00 (0.01) |
| Glass price index | 0.32 (0.01)*** |
| Category fixed Effects | Yes |
| Brand fixed Effects | Yes |
| Bargaining weigts ($\lambda_j$) | not shown |
| Number of observations | 2,222 |

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

A summary of the bargaining weights are available in Table 3

Table 8: **Demand with and w/o loyality**

|  | Model 1<br>Coefficient (standard error) | Model 2<br>Coefficient (standard error) |
|---|---|---|
| Price | -1.18 (0.00)*** | -1.18 (0.00)*** |
| Std Price | 0.00 (0.00) | 0.00 (0.00) |
| Error term | 1.00 (0.00)*** | 1.00 (0.00)*** |
| Price x loyalty x PL | | 0.01 (0.00)*** |
| Price x loyalty x HD | | -0.0001(0.00)*** |
| Retailer fixed Effects | x | x |
| Category fixed Effects | x | x |
| Brand fixed Effects | x | x |
| LL | 5,336,630 | 5,336,610 |
| Number of observations | 1,158,245 | 1,158,245 |

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

Model 1 is without loyalty variables Model 2 is with loyalty variables