

Price Effects of Private Labels Development*

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Abstract

We study the price response of national brands to the development of private labels. Using monthly data from a consumer survey, we show that prices of national brands increase with the development of private labels. However, we also show that the price increase in national brand products is explained by a strategy of product differentiation. Finally, price reaction of national brands differs with the type of private labels they are facing.

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1 Introduction

Private labels are now present in almost all food product categories.¹ Depending of the countries, they represent 10% to 40% of the total sales of the main food retailers in Europe. Private labels are thus a key element of the assortment of retailers and compete with manufacturer brands. In particular they are often direct competitors with national brands. Therefore, it is likely that national brands producers will adapt their pricing strategy to fight these new products.

A recent literature analyzes the economic impact of private labels development. Some theoretical papers conclude that the threat of a private label entry or its actual introduction will cause a decrease in the price of national brands. First, the threat of entry forces the national brand producer to lower its wholesale price in order to deter entry of private labels. Second, when a private label is effectively introduced on the market, the demand for national brand becomes more elastic which explains the reduction in the national brand price.

However recent empirical studies do not support this view. For example, Ward, Shimshack, Perloff and Harris (2002) studied the impact of the development of private labels in the US. They showed that an increase in the private label market share goes with an increase in the price of national brands and a negative impact or no impact on average prices. Gabrielsen, Steen and Sørsgard (2002) studied the impact of private label introduction in the Norwegian food sector. They show that when the impact of the introduction of private labels (on national brand price) is significant, the impact is positive.

The objective of the paper is to estimate the price reaction of national brands to the development of private labels. Our general methodology is similar to the one used by Ward *et al.* (2002). However, we will extend the existing literature in two additional dimensions which are not yet present in empirical studies. First we distinguish different categories among private labels. It is now well established, thanks to marketing studies in particular,

¹According to the Private Label Manufacturers' Association (PLMA), "[Private label] products encompass all merchandise sold under a retailer's brand. That brand can be the retailer's own name or a name created exclusively by that retailer. In some cases, a retailer may belong to a wholesale group that owns the brands that are available only to the members of the group."

that there exists at least three categories of private labels : the ‘low price’, the ‘me-too’ and the ‘high quality’ ones. These three categories do not play the same role and we would like to test if the price reaction of national brands is different across these categories. Second, brand producers can react to private label development not only by changing prices of their products but also by modifying the products themselves. Thus, we would like to distinguish between the price reaction with constant characteristics of the national brands and the change in the characteristics of the product. Product categories used in empirical studies are aggregates of heterogeneous products. Thus, a change in the national brand price in a product category could result in a change in the composition of the aggregate rather than in the change in the price of each item of the aggregate. To address these two issues, using data from a panel of consumers, we built time series of market shares and prices of national brands and private labels for different food products. We then studied how prices of the different national brands react to the development of private labels.

In the next section, we briefly summarize the main findings of the literature. Then, we define the methodology used to estimate the impact of private labels development on national brand prices in France. Section 4 describes the data we use. Section 5 presents our results and finally section 6 concludes.

2 Impact of private labels development on national brand prices: a brief overview of what we know

The development of private labels is likely to have both horizontal and vertical effects. The former is related to competition between retailers. Because, a private label is specific to each retailer, private label development increases the differentiation between retailers and then it could soften the impact of price competition between retailers. The latter is related to the relationship between producers and retailers. With private label, retailers have now a manufacturer role. They design the product they want and they produce it (or they delegate its production). In some extent, they are less dependent from national brand producers for their procurement. This new situation is likely to affect their relationship with upstream producers. The economic

literature has mainly focused on this second impact (for a survey on the economics of private label see Bergès-Sennou, Bontems and Réquillart, 2004).

Private label products are considered as a tool for retailers to discriminate demand (by supplying a new product) and to enhance the retailers' share of profits of the vertical structure. Depending of the framework used, the impacts of private labels development on retail prices are different. The usual framework is a vertical structure consisting of a manufacturer and a retailer, both being in a position of monopoly. The upstream monopoly produces a high quality good and the retailer has the possibility to introduce an imperfect substitute (the private label). Depending on the form of the contract between the two monopolies and depending on the specification of the demand, the entry (or the threat of entry) of a private label has different consequences on the price of the national brand. With linear pricing, private label is a tool for the retailer to limit the double marginalization problem. As a consequence, private labels entry causes a decrease in both the wholesale and the retail prices of the national brand (Mills, 1995, Bontems *et al.*, 1999). However, in a context of linear pricing, using a particular form of demand, Gabrielsen and Sørgard (1999) conclude to the possibility of an increase in the retail price of the national brand due to private label entry.² In the context of two part tariff, the entry of a private label has no impact on the wholesale and retail prices of the national brand. This is because, with two-part tariff, the national brand is priced at marginal cost. The introduction of the private does not change this strategy. However, the introduction of a private label changes profits sharing between the upstream producer and the retailer (Caprice, 2000). To sum up, according to this literature, the impact of private label entry on the price of national brands depends on the form of the contract between manufacturers and retailers and also depends on the specification of demand.

The theoretical literature also analyzes the strategic choice of characteristics of the private label by a retailer. As shown by Bontems (2004), in a framework where a manufacturer produces a high quality product (the national brand), the retailer chooses strategically a quality for its private label less differentiated than the one that would be chosen by an other manufacturer (thus competing with the established national brand). Scott Morton

²They distinguished two types of consumers. A first one is addict to national brand and only consumes national brand while the second one chooses between private label and national brand according to their relative price.

and Zettelmeyer (2000) obtained a similar result which is consistent with the marked development of ‘me too’ products that are replicates of national brand products.³

Recent empirical studies investigated the impact on prices of private labels development. Ward *et al.* (2002) studied the impact of the development of private label in the US. They used monthly data on prices, market shares, and advertising expenses for 34 product categories. For each category, they analyzed how national brands react to the development of private labels. They showed that an increase in the private label market share goes with:

- An increase in the price of national brands (or no impact).
- A decrease in the price of private labels (or no impact).
- A negative impact or no impact on average prices.
- A decrease in advertising activity for national brands.

Gabrielsen *et al.* (2002) studied the impact of the introduction of private labels in Norway. They used weekly data on prices and market shares of 83 products. For each product, they studied changes in national brand prices over time and distinguished the period before the entry of private labels from the period after entry. When the impact of private labels introduction is significant (17 cases over 83 products), this impact is positive (15 cases). Thus, the introduction of private label induces an increase in national brand prices. Moreover their results suggest that the increase in national brand prices is larger for leading and nationally distributed brands. Both studies therefore concluded in a positive impact on national brands prices of private label development. However, Chintagunta, Bonfrer and Song (2002), using data on sales from different stores of a large supermarket chain, studied the impact of the introduction of private labels in the breakfast oats market. They showed that private labels introduction goes with a decrease in the price of the leading national brand, a decrease in promotion activities of the national brand and no change in the margin the retailer earns on the national brand. Recently, Bonfrer and Chintagunta (2004) obtained mixed results. In about half of cases, entry of private labels goes with an increase in national brands prices while in the remaining cases it goes with a price decrease.

³In a recent study, Sayman, Hoch and Raju (2002) showed that when private labels are targeted towards national brand products, this concerns primarily the strongest national brand products.

Finally, the literature has drawn only little attention to the strategies (except the change in price explained above) developed by national brands producers in response to the development of private labels. As suggested by Mills (1999), manufacturer can develop different counterstrategies. Some of them refer to short term decisions (price promotions for example) while other are more long term decisions (increase product differentiation). However, we are lacking of analysis on this topic.

3 Methodology

The objective of the paper is to estimate the price reaction of national brands to the development of private labels. Because, there is not a clear view of the impact of private development on strategies of national brand producers, we will test different models in reduced-form. Following Ward *et al.* (2002), the reduced-form specification of the first model we developed is written as:

$$\ln P_k = \beta_k \cdot \ln MS_k + \sum_s \alpha_s \cdot \delta_s + C \quad (1)$$

with P_k the price of national brands for the product category k , MS_k the private label market share for the product category k , δ_s quarterly dummies, and C a constant.

As explained in the introduction and in line with market analysts, national brands producers can react to the private labels development using a product differentiation strategy or developing new products. In other words, the national brand producers can modify the characteristics of the products they sell. With such strategies, the set of products within a given product category does change with time. Thus, we tested if the price reaction of national brand in a product category is explained by a change in its composition. To do so, we estimated a more complete model than (1) specified as:

$$\ln P_k = \beta_k \cdot \ln MS_k + \gamma_k \cdot \frac{Vol_{k,NB}^{Spe}}{Vol_{k,NB}} + \sum_s \alpha_s \cdot \delta_s + C \quad (2)$$

where $\frac{Vol_{k,NB}^{Spe}}{Vol_{k,NB}}$ is an index of differentiation of the national brand. It is the ratio between the national brands sales within a specific subcategory over

the national brands total sales for product category k .⁴ A high value of this ratio means that national brands producers target their production to the specific subcategory which support higher prices.

As explained in the introduction, market analysts distinguish different types of private labels. In order to analyze the impact of the different private labels on the price of national brands, we tested two additional models more complete than (1) and (2). They are specified as follows:

$$\ln P_k = \sum_j \beta_{k,j} \cdot \ln MS_{k,j} + \sum_s \alpha_s \cdot \delta_s + C \quad (3)$$

$$\ln P_k = \sum_j \beta_{k,j} \cdot \ln MS_{k,j} + \gamma_k \cdot \frac{Vol_{k,NB}^{Spe}}{Vol_{k,NB}} + \sum_s \alpha_s \cdot \delta_s + C \quad (4)$$

where $MS_{k,j}$ are the market shares of the j^{th} private label type for product category k .

For each model, we test for autocorrelation and correct it using the Cochrane-Orcutt method. In order to select the best model among the 4 competing models, we used two main criterions: the Akaike's Information Criterion (AIC) and the Bayesian Information Criterion (BIC).⁵

4 Data

We conducted our tests using data from a panel of French consumers (SEC-ODIP panel). Data refers to a large number of product categories. Among them, we selected 6 product categories, all being dairy products (drinking milk, yoghurt, butter, camembert cheese, cottage cheese, and processed cheese). For each of them, from the database, we built market shares and prices time-series for the different types of brands. For each product category, we designed different subcategories and built the corresponding time-series. The dataset covers three years, 1998, 1999 and 2000 and we defined 39 periods of 4 weeks on the whole period.

⁴A specific subcategory is defined as a set of products which are more 'sophisticated' products (as compared to the category), priced at a higher price and for which national brands have a high market share.

⁵The AIC is defined as $AIC = N \ln(RSS) + 2K$ where K is the number of regressors, N the number of observations, and RSS the residual sum of squares. BIC is $BIC = N \ln(RSS) + \log(N) \cdot K$.

We defined 5 types of brands. The first two are traditionally considered as private labels. The third one corresponds to low-price products while the last two are producers brands. They are defined as:

- Hard discount products (HD) are exclusively sold by hard discounters.
- Private labels (*sensu stricto*) (PL) are exclusively developed by retailers.
- First-prices products (FP) correspond to brands sold at low prices. We defined them as brands which are neither HD nor PL and whose price is lower or equal to the price of hard discount products. They are generally considered as the response of super and hyper markets to the development of hard discounters. In this way, one can consider them as private labels.
- National brand products (NB) are brands which are not private labels (the first three categories) and which are sold in more than 50% of French regions.
- Regional brand products (RB) are the other brands, that is brands which are not private labels and which are sold in less than 50% of French regions.

To build the market shares in volume, we sum the quantities purchased by all panellists for a given period.⁶ Market share of brand j is simply the ratio between the volume of brand j purchased during the period over the volume of all brands purchased during the same period. Price of the brand j is the ratio between the value and the volume of purchases of brand j during the period. In the database, values are in nominal term and were converted into real terms using the consumer price index.

We also define different product categories. One corresponds to "differentiated" products and is used to calculate the index of differentiation defined in equation 2. The others are disaggregations of a product category (e.g. skimmed, semi-skimmed and whole milk in the drinking milk category). They are used to analyze the impact of product definition on the results.

⁶Purchases of each panellist are corrected by a coefficient which represents the weighting of the panellist (given in the dataset).

Table 1: Price and Market Shares of Private Labels (PL), Hard Discount (HD) and National Brands (NB) on 6 dairy products, for the whole category and the national brand specific subcategories. Average 1998-2000.

Product category	subcategory	Size	Average Price	PricePL	PriceHD	PriceNB	MSharePL	MShareHD	MShareNB
Drinking milk	Whole	100.00	3.53	3.83	3.07	4.20	22.41	42.11	31.95
	NB specific	1.80	5.16	4.27	2.86	6.02	8.03	10.53	81.42
Yoghurt	Whole	100.00	10.83	9.08	7.44	12.56	23.48	10.14	65.59
	NB specific	11.69	16.67	15.90	10.95	17.76	4.56	10.13	84.11
Butter	Whole	100.00	30.14	30.38	25.56	34.77	25.65	27.39	34.99
	NB specific	7.82	36.74	32.07	27.42	38.39	16.35	2.10	78.71
Camembert cheese	Whole	100.00	35.44	31.62	26.72	40.86	23.32	14.44	52.29
	NB specific	12.93	47.96	41.19	NA	48.39	9.28	NA	82.53
Cottage cheese	Whole	100.00	14.23	11.63	9.51	16.88	24.93	9.97	60.20
	NB specific	18.44	23.76	17.75	17.09	23.88	1.35	0.59	98.00
Processed cheese	Whole	100.00	42.66	34.80	28.80	52.88	3.00	24.20	64.87
	NB specific	24.17	74.33	NA	NA	74.34	NA	NA	99.92

Notes :

Prices are in French Francs, Market Shares are in percentages of the total volume purchased.
Size: in % of the whole category.

Some brands may not be present on some subcategories, and therefore are not available (NA).
NB specific denotes subcategories dominated by national brands as explained above.

Table 1 displays prices and market shares for the six dairy product categories and their corresponding specific subcategories. Within each category national brands price is greater than private labels price which is greater than hard discount products price. Conversely there is not a clear ranking of the market shares across categories. The market shares of national brands greatly varies across categories (from 31.95% to 65.59%) as well as the market shares of hard discount products (from 9.97% to 42.11%). Private labels market shares are less variable (ranging 22.41% to 25.65% if we except the case of processed cheese for which it is only 3.00%).

The evolution of market shares of two main brand categories ($PL + HD$ and NB), for the six dairy products categories and for different subcategories is analyzed in table 2. For all the product categories (or subcategories), when significant the trend coefficient of private labels ($PL + HD$) market share is positive. For national brands, the coefficient is generally negative at the category level and positive at the specific subcategory level. It means that private labels have increased their market shares during the period while national brands have lost some market shares during the same period, even if they have reinforced their position on the specific subcategory. With respect to market shares equations, ρ represents the per-period (4 weeks) variation of market share in absolute value. The growth of private labels market share is therefore as high as 0.1 to 0.2% on several markets. Conversely, the decrease in market share of national brands is lower (in absolute term). This is because the private labels can also take some market share to regional brands or first prices products. With respect to the evolution of prices it is interesting to note that national brands prices experience significant increases during the period (except for the processed cheese category). In order to facilitate the comparison of the price changes among the different products, we also calculated the ratio ρ/ν which gives an approximation of the per-period (4 weeks) rate of growth of the price evaluated at the first period (α represents the estimated value of the price at time 0). Thus, prices of national brands increased by 0.1 to 0.5% per period of 4 weeks.⁷ Finally, in all the categories, the average prices increased during the period.

⁷In table 2 results are given in ‰.

Table 2: Price and Market Shares of Private Labels ($PL + HD$) and National Brands (NB) over the period 1998-2000 based on the regressions $Y = \nu + \rho \text{ time} + \sum_{i=1}^3 \delta_i \text{QuarterlyDummies}$ for $Y = \text{price}$ or $Y = \text{market share}$

Product category & subcategories	Endogeneous variable Y							
	MS_{PL+HD}	MS_{NB}	$Price_{All}$	$Price_{PL+HD}$	$Price_{NB}$	ρ/ν		
	ρ	ρ	ρ/ν	ρ	ρ	ρ/ν		
Drinking milk								
Whole	2.52***	-2.68***	4.57***	1.33	0.46	0.13	17.52***	4.61
NB specific	0.82	-0.81	35.10***	8.00	77.21**	55.83	24.01***	4.37
Standard subcategory	1.15***	-2.43***	3.47***	1.11	0.38	0.11	6.05***	1.92
Yoghurt								
Whole	0.81***	-0.39**	10.18***	0.95	-8.25***	-0.91	22.84***	1.88
NB specific	-2.60***	2.65***	19.06**	1.16	-12.32	-0.98	3.65	0.20
Standard subcategory	1.12***	-0.37*	6.04**	0.75	-3.73***	-0.50	15.55***	1.65
Butter								
Whole	0.23	-0.11	32.97	1.13	14.77	0.51	79.76***	2.41
NB specific	0.02	1.03**	82.21***	2.34	7.80	0.25	107.08***	2.96
Camembert cheese								
Whole	1.60***	-0.23	38.98***	1.12	21.68**	0.73	49.03***	1.22
NB specific	-0.75	-0.79	38.36***	0.81	-76.44***	-1.80	53.11***	1.12
Cottage cheese								
Whole	0.66*	0.04	40.48***	2.97	11.98***	1.07	53.77***	3.32
NB specific	0.28	-0.64**	3.74	0.16	-28.66*	-1.55	16.95	0.72
Processed cheese								
Whole	0.91	0.48	19.46	0.44	52.23	1.75	5.56	0.10
NB specific	NA	0.09***	117.88***	1.64	NA	NA	116.35***	1.62

Notes :

***, ** and * indicate the significance of the estimated ρ at the 1%, 5% and 10% levels.

Some brands may not be present on some subcategories (NA).

NB specific denotes the category dominated by national brands as explained above.

5 Results

We report in table 3 the main results which correspond to the four regression models defined in section 3. In model 1 the private label market share is the sum of PL and HD market shares. Model 2 is identical except that we add the differentiation index. In model 3 we consider separately the three types of private labels (HD, PL and FP). Model 4 is identical to model 3 except that we introduce the differentiation index as an additional explanatory variable.

Since the private label market share may be endogeneous, we conduct Hausman test of endogeneity using appropriate instruments.⁸ For each dairy product category, we first test relevance and validity of the instruments.⁹ Then, using a Hausman test, we compare the parameters estimated in the regressions performed with and without instruments. In 4 (over 6) product categories, the parameters estimated with instrumental variables were not significantly different from the original parameters (estimated without instrumental variable). Moreover, in cases where endogeneity was found (yoghurt and camembert cheese), the corresponding coefficients in the regressions performed with and without instruments are very close (and of the same sign). Consequently we report only the regression results obtained without instruments in table 3.

Model 1, which is very close to the one estimated by Ward *et al.* (2002), leads to the conclusion that except for the drinking milk category, private label development does not influence national brands prices. The index of differentiation defined for national brands (model 2) has a very significant and positive impact on the national brands prices. It is highly significant in 5 cases over 6. Moreover, model 2 is considered better than model 1 in most cases. Finally, in model 2, when significant (2 cases over 6) the private label market share has a positive impact on national brands prices.

⁸Available instruments are the lagged PL market shares for each type of private labels for the current product category, if needed the lagged index of differentiation of national brands, as well as the PL market shares for other dairy products.

⁹To test relevance of instruments, we check their significance on the first stage regression. To test validity of instruments, we perform overidentification test (Sargan test).

Table 3: National brand price reaction to the development of private labels for 6 dairy product categories

Product	Model 1		Model 2		Model 3		Model 4		Best	
	β_{PL+HD}	β_{PL+HD}	γ	β_{PL}	β_{FP}	β_{HD}	β_{PL}	β_{FP}		β_{HD}
Drinking milk	0.458***	0.353***	1.370***	0.368**	0.399***	0.126***	0.332***	0.348***	0.122***	0.438
Yoghurt	0.076	0.074	1.528***	0.035	$\beta_{PL} = \beta_{FP}$ 0.001	0.040	0.148**	-0.033**	$\beta_{PL} = \beta_{FP}$ -0.024	1.743***
Butter	-0.031	-0.015	0.114	0.014	0.018	-0.018*	0.020	0.007	-0.016	0.086
Camembert cheese	-0.006	0.236***	0.413***	0.033	0.012	-0.038**	0.040**	0.017**	-0.019	0.323***
Cottage cheese	0.015	0.016	0.692***	0.167**	-0.113***	-0.028	0.048	-0.062**	$\beta_{PL} = \beta_{FP}$ -0.060**	0.662***
Processed cheese	-0.039	0.022	0.565***	-0.031***	-0.293***	-0.051	0.005	0.053	$\beta_{FP} = \beta_{HD}$ -0.027	0.594***

Notes :

***, ** and * indicate the significance of the estimated β at the 1%, 5% and 10% levels.

Not reported are three quarterly dummies and a constant.

Best model is evaluated regarding the AIC and BIC criterions and the significance of the parameters.

When autocorrelation was detected, we performed regression using the Cochrane-Orcutt method to correct auto-correlated residuals.

We report Wald test results only for significant cases and equality verified.

However, distinction between different categories of private labels (models 3 and 4) provides a more balanced analysis. The impacts on national brands prices of the different private labels categories differ. On the one hand, the analysis confirms that an increase in the market share of private labels (considered here in a more restricted way) has a positive impact on national brands prices. On the other hand, an increase in hard discount and first prices products does not systematically lead to an increase in the price of national brands. In one half of the cases (where the impact is significant), an increase in their market share has a negative impact on the price of national brands.

Using the Wald tests of equality between β 's and comparing their values in all significant cases (table 3), we have:

$$\begin{aligned}\beta_{HD} &\leq \beta_{PL} \\ \beta_{FP} &\leq \beta_{PL}\end{aligned}$$

Thus, the impact on national brands prices of an increase in the market share of PL is always larger (or at least equivalent) than the impact of a similar increase in the market share of either HD or FP. On the contrary, it is not possible to rank systematically the respective impact of an increase in the market share of HD and FP. Thus it seems that national brands do not react identically to an increase in the market share of their different competitors. The development of PL products tends to increase more national brands prices than HD and FP products do.

The role of the differentiation strategy in explaining national brands prices is confirmed by the results of model 4. Thus, in 4 cases (over 6), the best model includes the differentiation index.¹⁰ The interest to introduce different private labels categories is also confirmed as models 3 and 4 are considered as best models in 4 cases (over 6).

To investigate the role of product category definition we performed the same analysis on a more disaggregated product definition. Thus for two product categories (drinking milk and yoghurt) we define three subcategories. The whole category is the aggregate of the three subcategories. Results are gathered in table 4.

¹⁰The best model is evaluated according to the AIC and BIC criterions.

Table 4: National brand price reaction to the development of private labels for drinking milk and yoghurt, subcategories level.

Product category	Model 1		Model 2		Model 3		Model 4		Best			
	β_{PL+HD}	β_{PL+HD}	β_{PL+HD}	γ	β_{PL}	β_{FP}	β_{HD}	β_{PL}		β_{FP}	β_{HD}	γ
Drinking milk	0.458***	0.353***	1.370***		0.368**	0.399***	0.126***	0.332***	0.348***	0.122***	0.438	3
Whole category						$\beta_{PL} = \beta_{FP}$			$\beta_{PL} = \beta_{FP}$			
Semi-skimmed milk	0.432***	0.306***	1.228***		0.313***	0.430***	0.100***	0.268***	0.342***	0.091***	0.600*	4
Whole milk	-0.127		NA		0.577***	$\beta_{PL} = \beta_{FP}$	-0.016		$\beta_{PL} = \beta_{FP}$	NA		3
Skimmed milk	0.194***		NA		0.110**	0.009	0.078***		NA	NA		1
						$\beta_{PL} = \beta_{HD}$						
Yoghurt												
Whole category	0.076	0.074	1.528***		0.035	0.001	0.040	0.148**	-0.033**	-0.024	1.743***	4
with fruit flavour	0.046	0.370***	1.034***		0.043	0.016	-0.022	0.245***	0.027	0.145***	1.088***	2
without flavour	0.306***	0.368***	-0.334		0.191**	0.007	0.086***	0.241**	$\beta_{PL} = \beta_{HD}$	0.097***	-0.332	1
with flavour and fruits pieces	0.053	0.046	0.328		0.059	$\beta_{PL} = \beta_{HD}$	-0.031	0.052	$\beta_{PL} = \beta_{HD}$	-0.035	0.379*	4

Notes :

***, ** and * indicate the significance of the estimated β at the 1%, 5% and 10% levels.

Not reported are three quarterly dummies and a constant.

Best model is evaluated regarding the AIC and BIC criterions and the significance of the parameters.

When needed, we performed regression using the Cochrane-Orcutt method to correct auto-correlated residuals.

The differentiation index may not be defined on some subcategories, the estimations may not be available (NA).

We report Wald test results only for significant cases and equality verified.

All the main results found at the category level are confirmed in this analysis of subcategories. In particular, the positive impact of PL products development on national brands prices is confirmed. The ranking of the impact is also confirmed as well as the possibility that HD or FP products have a negative impact on national brands prices. Finally, the role of the differentiation strategy to explain national brands prices is also confirmed.

6 Concluding remarks

Results from this empirical analysis give support to both ideas developed in the paper. First, it is important, as pointed out by market analysts, to distinguish the role of the different private labels. Second, the strategy of product differentiation developed by national brands partly explains the increase in national brands prices.

Thus, the overall development of private labels has a positive effect on national brand prices. Nevertheless, the effects by type of private labels may differ. Besides, the national brand price within a product category may be influenced by the development of one type of private labels but not by the development of the others. In all cases, the effect of the development of private labels (*sensu stricto*) on national brands prices is higher (or at least equivalent) than those of hard discount and first prices products. While an increase in private labels *sensu stricto* has in most cases a positive impact on national brands prices, an increase in hard-discount (and first prices) products have a negative one in half of cases. That's why it is useful to separate the different types of private labels in order to estimate the links between national brand prices and private labels market shares.

Moreover, the introduction of an index of differentiation in the model allowed to underline the role of product differentiation in the level of national brand prices. It seems that an increase in private labels market share goes with a strategy of product repositioning by national brands manufacturers. Indeed, the increase of national brand prices is also explained by the changes in the characteristics of the supplied product.

Future studies may focus on other product categories and subcategories paying attention to the impact of the different types of private labels. Moreover, within a product category, it may be interesting to analyze if the different national brands have or not similar price evolution.

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