The Effect of Input Price Discrimination on Retail Prices: Theory and Evidence from France

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Input price discrimination

Input price discrimination* refers to the case where an upstream supplier charges different prices for the same product to different buyers.

Input price discrimination exists because:

- (i) it is always beneficial for a supplier to exploit differences among downstream firms (e.g., demand or production costs). Input price discrimination is commonly practiced in many industries such as Petroleum distribution, pharmaceuticals, steel, tobacco.
- (ii) buyers with high bargaining power may force upstream suppliers to offer advantageous conditions of sales (typically the case in the food retail sector).

*Also called intermediate price discrimination or secondary-line discrimination.

Ambiguous effects

Welfare effect

As in the case of final price discrimination, the welfare effect is likely to be ambiguous.

Retail prices

- Input prices rebates - obtained by large buyer - may translate into lower final prices (competition effect).
- This advantegeous may lead in the long run to the exclusion of some (small) retailers and to higher final prices (exclusion effect).

Legislations (1/2)

Historically, competition authorities adopted various legislation mainly motivated by exclusion concerns.

- **In the U.S.**, the Robinson-Patman Act enacted in 1936, prohibits a seller from applying dissimilar conditions to equivalent transactions where the effect "may be to lessen competition".

- **In the E. U.**, the TFEU Article 102 prohibits a dominant firm from "*applying dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage*".

Legislations (2/2)

- **In France**,
  - the Ordonnance relative à la liberté des prix (1986) prevents any supplier from offering different conditions to similar buyers.
  - the Loi de Modernisation Economique (2008) suppresses this non-discrimination principle.
    - Reform designed to reinforce intra-brand competition (competition effect).

- **In Norway**, current debate on the introduction of a ban on input price discrimination (exclusion effect).

Research question

The LME reform in France provides a (quasi-)natural experiment to evaluate the effect of input price discrimination on final prices, but...
... some difficulties exist to define a valid control group as the reform is introduced at the national level and applied to all retailers and processed products.

Roadmap

1. We first build an original model of vertical relationships featuring imperfect competition in the upstream and downstream markets, multi-product retailers, and secret contracts.
2. Model predictions help us to define a comparison group.
3. We conduct a DiD approach by leveraging a rich set of household scanner data that cover 2006-2010.

The theoretical literature

Public contracts, asymmetric downstream firms

- DeGraba (1990), Katz (1987): higher w for the more efficient buyer (demand elasticity). Discrimination $\rightarrow$ Prices $+$.
- Inderst & Shaffer (2009): two-part, observable tariffs, discrimination *reinforces* the asymmetry (lower w for the more efficient buyer). Discrimination $\rightarrow$ Prices -

Secret contracts

- Hart & Tirole (1990): "opportunism problem"
- O'Brien & Shaffer (1994), O'Brien (2014): uniform pricing solves the "opportunism problem" and restores upstream monopoly power, wholesale unit price is above the marginal cost; Discrimination $\rightarrow$ Prices -
- Caprice (2006): a low-cost supplier competes against a high-cost fringe. Discrimination $\rightarrow$ Prices $+$

The empirical literature

Structural approach

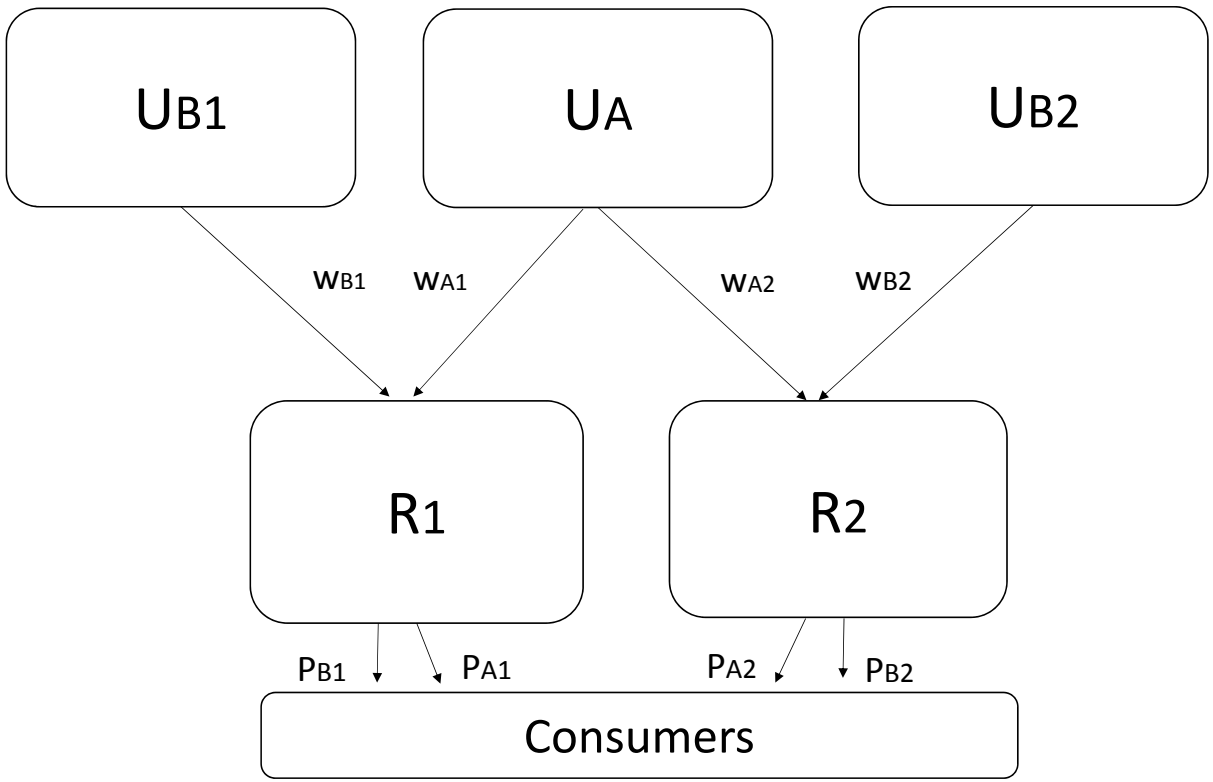
- Villas-Boas (2009) simulates the effect of a ban through a structural model (in the German coffee market), and assuming public wholesale unit contracts. Discrimination $\rightarrow$ Prices $\pm$ & Welfare -
- Hastings (2009)'s study on the gasoline market in the U.S. finds "that average prices would rise five cents per gallon under uniform wholesale pricing". Discrimination $\rightarrow$ Prices -
- Greenan (2013) simulates the effect of a ban through a structural model of secret bargaining and shows that more uniform prices soften competition among hospitals. Discrimination $\rightarrow$ Prices -

Roadmap

A sketch of the model

General framework

- Two imperfectly competing retailers R_1 and R_2.
- U_A produces a national brand A at cost c and sells it to both retailers.
- A differentiated product B (private label) is produced by a dedicated supplier (U_{Bi} for R_i) at the same marginal cost c.



A sketch of the model

General framework

- **Timing of the game**
  - Stage 1: simultaneous secret contract offer (two-part tariff take-it-or-leave-it contract)
  - Stage 2: simultaneous price setting

- **Contract equilibrium**: passive beliefs and "schzyophrenia" (independent representatives).

- **Demand assumptions**: demand symmetric across products and retailers, direct effects larger than cross-effects, ...

Assumptions

A simple example: linear demand

A sketch of the model

Model predictions (1/3)

Price competition stage

- A decrease in the input price of product A drives the retail price of that product down $\left(\frac{dp^{\star}_{Ai}}{dw_A} > 0\right)$ (direct effect)
- The sign of $\left(\frac{dp^{\star}_{Bi}}{dw_A}\right)$ is ambiguous.
  - By strategic complementarity, the price of product B may decrease as well.
  - The retailer i has also an incentive to divert the demand from product B to A ($p_{Bi} \nearrow \Rightarrow p_{Ai} \nearrow$), also coined as the Edgeworth-Salinger effect (indirect effect).

Final prices

Ambiguous effect of input price discrimination on final prices (new result wrt. O'Brien & Shaffer, 1994; O'Brien, 2014).

A sketch of the model

Model predictions (2/3)

Contract stage

- Discrimination allowed: prices are set at marginal cost (opportunism problem).
- Discrimination forbidden:
  - A ban solves the opportunism problem and an increase in w_A benefits the supplier.
  - For some very specific conditions, the supplier may have an incentive to reduce w_A in order to reduce the status-quo profit of $\overline{\pi}_B^i(w_A)$ (bargaining leverage effect).

Additional details

Input prices

Ambiguous effect of input price discrimination on input prices (new result wrt. O'Brien & Shaffer, 1994).

A sketch of the model

Model predictions (3/3)

4 scenarios are posssible

Table 1: Potential effects of the lift of the ban

	$w_A \nearrow$	$w_A \searrow$
$\frac{dp^*_{Bi}}{dw_A} = 0$	–	(i) $p_A \searrow$ $p_B \rightarrow$
$\frac{dp^*_{Bi}}{dw_A} < 0$ (comp<Edg)	–	(ii) $p_A \searrow$ $p_B \searrow$ (iii) $p_A \searrow$ $p_B \nearrow$
$\frac{dp^*_{Bi}}{dw_A} > 0$ (comp>Edg)	(iv) $p_A \nearrow$ $p_B \nearrow$	(ii) $p_A \searrow$ $p_B \searrow$

Key results

Overall, the model predicts a differentiated impact of the reform on the final prices of national brand and private label products. National brands are assumed to experience a larger change in prices relative to private labels.

A (quasi-)natural experiment

The LME Act

- France experienced a long period of inflation (1996-2008) that is mainly explained by (see Figure):
  - A highly concentrated market structure: $CR_5 = 79.3\%$ at the national level but even more concentrated locally;
  - Unequal balance of power between retailers and producers and a change in below-cost pricing regulations (Galland Act, 1996) that has substantially limited intra-brand competition.

- The Loi de Modernisation de l'Economie (LME) was introduced, in August 2008, to intensify competition among retailers.
  - Products negotiated on spot markets are not concerned (e.g., fresh fruits & vegetables, fresh meat, fish).

A (quasi-)natural experiment

Household scanner data

- The data come from the Kantar Worldpanel survey and span the period 2006–2010.
- Daily purchases of food products over a panel of more than 10,000 households per year.
- Information on the quantity and the expenditure for each product purchased, product characteristics (including brand name), store type and retail chain name.
- We restrict the sample to food purchases made in food retail chains and their associated online food delivery platforms (e.g. Chronodrive, Ooshop, or Télémarket).

Empirical strategy

We use a difference-in-differences (DiD) approach to assess the price effect of authorizing input price discrimination.

- We compare the mean change in prices for a group of products affected by the LME to that of a comparison group.
- Identification assumption: Parallel trend assumption $\Rightarrow$ Prices would have evolved identically between the affected and comparison groups, absent the law.

Following our model predictions, the definition of the affected and comparison groups can rest on the brand type of products.

- **The affected group**: national brand products (NB) sold at least in 2 retailers.
- **The comparison group**: private label products (PL).

Empirical strategy

Sample selection

- Parallel trend assumption verified at the the category and aggregate levels. Category trends
- Variable of interest: monthly average price of a chain-product pair.
- Large-scale study: 1,921,070 chain-product-month triplets that correspond to 26,660 products (belonging to 76 categories), 9,969,687 purchase transactions and more than € 31 millions of food expenditures.

  Summary stat.

Empirical results

Average price effect

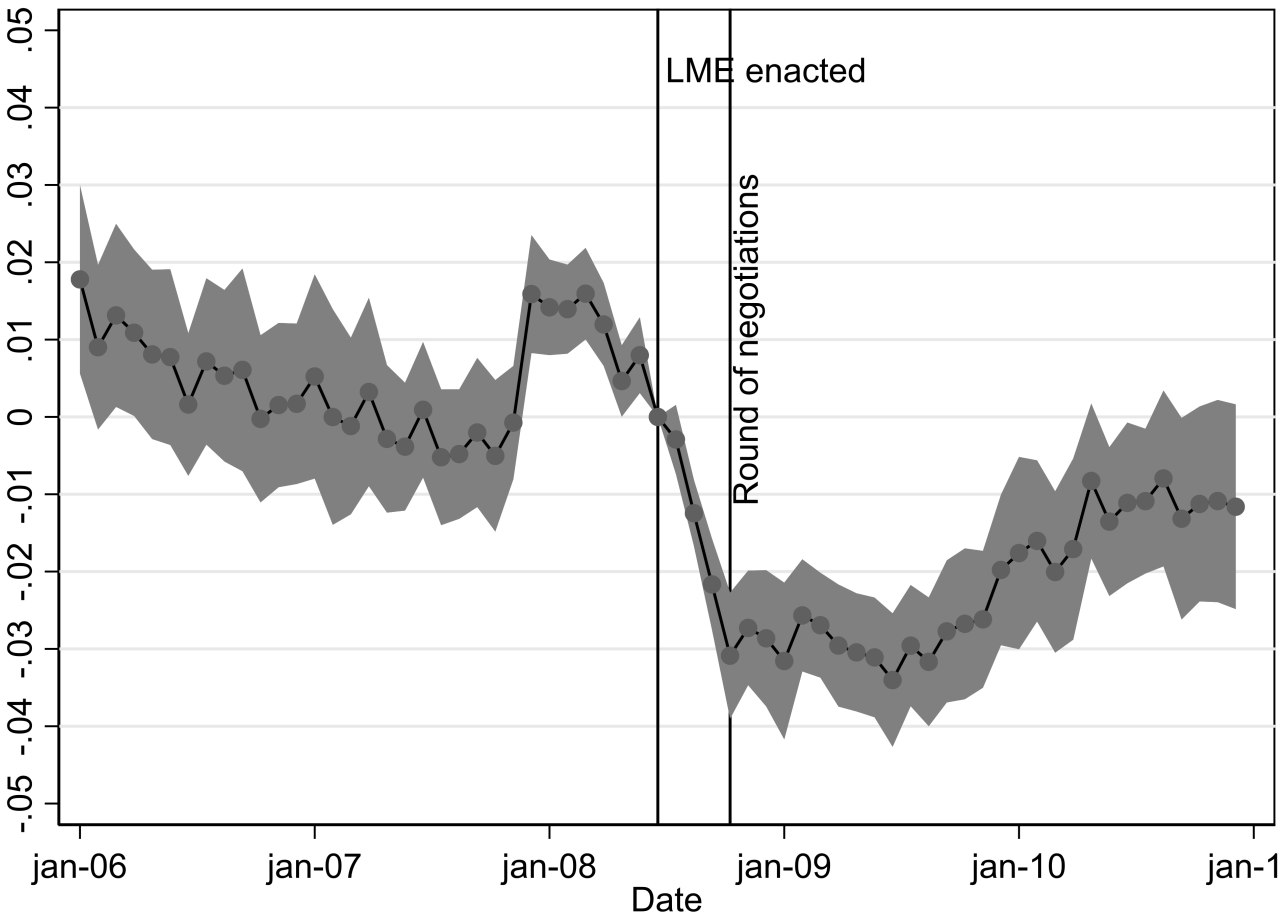
Dependent variable	(log) price (P_{ikt})		
		With monthly trend	
	Baseline	Chain	Category
	(1)	(2)	(3)
Treatment × PostLME	-0.0152***	-0.0155***	-0.0262***
	(0.0045)	(0.0047)	(0.0052)
PostLME	0.0024		
	(0.0040)		
Chain-product FE	Yes	Yes	Yes
Chain-month FE	No	Yes	No
Category-month FE	No	No	Yes
R^2	0.9885	0.9889	0.9893
Observations	1,921,070	1,920,755	1,921,063

Notes: The observations are weighted by the expenditure shares of food products, calculated at the national level during the pre-LME period. The standard errors, shown in parentheses, are clustered at the chain level. *, **, *** indicate significance at the 10%, 5% et 1% level, respectively.

- The before-and-after regression shows that the price of PL has not changed ($p_B = 0$).
- The LME has reduced by -5.76 €$(= -0.0262x219.83)$ the average monthly price of the shopping basket of NBs compared to that of PLs, ceteris paribus.

Empirical results

Event-study analysis



Notes: The figure plots the estimated change in prices of national brands between month l and the reference month ($l = 0$) relative to the change in prices observed for private labels between these two months. The reference month corresponds to the month before the introduction of the LME (i.e., July 2008). The shaded area represents the confidence interval of the point estimate at the 5% level.

Empirical results

Heterogeneous price effects

- Among product categories Cat. 1 Cat. 2
- Among retail groups Retail groups

Robustness tests

Our results are robust to:

- potential confounders (2007-08 food crisis and the Great Recession); Estimates
- alternative definitions of the comparison group Estimates
  - All private labels (conventional+discounters+ first-price products).
  - Private labels offered by discounters only (less exposed to the Edgeworth-Salinger Effect).
- alternative definitions of the LME starting date Estimates
  - At the beginning or the end of the next negotiation round 2008-2009.

Conclusion

- We build an original model of multi-product retail competition (private labels, national brands) in a secret contracting environment.
  - Authorizing input price discrimination leads to a potentially ambiguous impact on final prices.
  - Likely effect: decrease in w_A, decrease in p_A, ambiguous but smaller effect on p_B.
  - Less likely: increase in w_A, increase in p_A, ambiguous effect on p_B.

- We provide the first ex-post empirical analysis of *the authorization of input price discrimination* on final prices.
  - We empirically investigate the effect of input price discrimination on a broad range of products (large-scale study).
  - We highlight a significant and negative effect of its lifting on prices by 2.62% on average.

Thank you

Additional details on the model

Assumption 1 Retailers and products are horizontally differentiated: 4 products overall, demand symmetric across retailers and products:

$$D_{ki}(p_{ki}, p_{li}, p_{kj}, p_{lj}) \equiv D(p_{ki}, p_{li}, p_{kj}, p_{lj}).$$

- Products are imperfect substitutes:

$$D_1 < 0, D_2 > 0, D_3 > 0$$

- Cross effects are smaller than direct effects:

$$|D_1| > |D_2|, |D_3| > |D_4|$$

Additional details on the model

Assumption 2: existence and uniqueness of price equilibrium

- For a given vector of input prices W, there exists a unique equilibrium vector of final prices $p^*(W)$;
- Prices are strategic complements: for $i = 1, 2$,

$$0 < \pi^i_{21} \leq -\pi^i_{11} \text{ and } 0 < \pi^i_{12} \leq -\pi^i_{22};$$
$$0 \leq -\pi^i_{23} < \pi^i_{13} \text{ and } 0 \leq -\pi^i_{14} < \pi^i_{24}.$$

Assumption 3 (when needed) a unit increase in the prices of product K at both retailers –e.g. cost shock– affects more the marginal profit of a retailer on this product than his marginal profit on the rival product L: for any vector of positive prices,

$$-(\pi^i_{13} + \pi^i_{11}) > \pi^i_{23} + \pi^i_{21} > 0$$
$$-(\pi^i_{24} + \pi^i_{22}) > \pi^i_{14} + \pi^i_{12} > 0$$
$$-(\pi^i_{24} + \pi^i_{22}) > \pi^i_{23} + \pi^i_{21}$$

Additional details on the model

Some notations:

- Let $P = (p_{Ai}, p_{Bi}, p_{Aj}, p_{Bj})$ denote the vector of final prices.
- π_{ii} correspond to the derivative of retailer's profit π wrt. the k-th argument.

Assumption on profits

- Concavity of π: we assume that retailers' profit function are concave in prices which requires $\pi_{ii} < 0$ for $i = 1, 2$ and $|\pi_{ii}| > |\pi_{ij}|$ for $i = 1, 2$ and $j \neq i$.

Additional details on the model

Subgame price equilibrium

In the price competition stage, each R_i maximises its profit with respect to p_{Ai} and p_{Bi}

$$\pi^i \equiv \sum_{K=A,B} (p_{Ki} - w_{Ki}) D_{Ki}(P) - F_{Ki} \tag{1}$$

This yields the following system of first order conditions for each retailer:

$$\pi_1^i \equiv \frac{\partial \pi^i}{\partial p_{Ai}} = D_{Ai}(.) + (p_{Ai} - w_{Ai}) \frac{\partial D_{Ai}(.)}{\partial p_{Ai}} + (p_{Bi} - w_{Bi}) \frac{\partial D_{Bi}(.)}{\partial p_{Ai}} = 0 \tag{2}$$

$$\pi_2^i \equiv \frac{\partial \pi^i}{\partial p_{Bi}} = D_{Bi}(.) + (p_{Ai} - w_{Ai}) \frac{\partial D_{Ai}(.)}{\partial p_{Bi}} + (p_{Bi} - w_{Bi}) \frac{\partial D_{Bi}(.)}{\partial p_{Bi}} = 0$$

and we obtain the best response functions $p_{Ai}^{BR}(w_{Ai}, w_{Bi}, p_{Aj}, p_{Bj})$, $p_{Bi}^{BR}(w_{Bi}, w_{Ai}, p_{Aj}, p_{Bj})$. Crossing them, we have a unique equilibrium in prices $p_{Ki}^{*}(w_{Ki}, w_{Li}, w_{Kj}, w_{Lj})$.

Additional details on the model

Pass-through

Given retailers' symmetry, we can anticipate that $w_{A1} = w_{A2} = w_A$. Plugging w_A into the FOCs (eq. 2), we obtain the variation of prices p^*_{Ai} with w_A.

We make the following regularity assumptions on the profit function:

$$\begin{aligned} |\pi_{24} + \pi_{22}| &> |\pi_{14} + \pi_{12}| \\ |\pi_{13} + \pi_{11}| &> |\pi_{23} + \pi_{21}| \end{aligned}$$

These assumptions implies that a unit increase in the prices of product K at both stores affects more the marginal profit of a retailer on this product K than the marginal profit of the retailer on the rival product L.

Additional details on the model

Pass-through

Under these assumptions, we obtain the following result on equilibrium pass-through:

Lemma 1

Under the above assumption, we have $\frac{dp^*_{Ai}}{dw_A} > 0$ whereas the sign of $\frac{dp^*_{Bi}}{dw_A}$ is ambiguous but $|\frac{dp^*_{Ai}}{dw_A}| > |\frac{dp^*_{Bi}}{dw_A}|$.

Additional details on the model

Contracting under discrimination

The program of the private label producer U_{Bi} is to maximize:

$$\underset{w_{Bi},F_{Bi}}{Max}\,(w_{Bi}-c)D_{Bi}(p_{Bi}^{BR},p_{Ai}^{BR},p_{Bj}^{*},p_{Aj}^{*})+F_{Bi}$$

$$s.t.F_{Bi}=(p_{Ai}^{BR}-w_{Ai}^{d})D_{Ai}(.)+(p_{Bi}^{BR}-w_{Bi})D_{Bi}(.)-\overline{\pi}_{A}^{i}$$

with $\overline{\pi}_{A}^{i}$ independent of w_{Bi}. Solving the FOC, we obtain

Lemma 2

When discrimination is allowed, in equilibrium, $w_{Bi}^{d}=c$ for $i=1,2$.

Additional details on the model

Contracting under discrimination

The program of the national brand producer U_A is to maximize the joint profit:

$$\begin{aligned} \underset{w_{Ai},F_{Ai}}{Max}\ & (w_{Ai}-c)D_{Ai}(p_{Ai}^{BR},p_{Bi}^{BR},p_{Aj}^{*},p_{Bj}^{*})+F_{Ai} \\ & +(w_{Aj}^{d}-c)D_{Aj}(p_{Aj}^{*},p_{Bj}^{*},p_{Ai}^{BR},p_{Bi}^{BR})+F_{Aj}^{d} \\ s.t. F_{Ai} &= (p_{Ai}^{BR}-w_{Ai})D_{Ai}(.)+(p_{Bi}^{BR}-w_{Bi}^{d})D_{Bi}(.)-\overline{\pi}_{B}^{i}. \end{aligned}$$

The supplier optimally sets each fixed fee to capture each retailer's profit, and maximizes the joint profit through the wholesale prices. The FOC gives us

Lemma 3

When discrimination is allowed, there is a unique symmetric equilibrium where $w_{A1}^{d}=w_{A2}^{d}=c$. The unique symmetric retail price equilibrium is $p_{Ki}^{*}(c,c,c,c)=p^{*}$ for $K=A,B$ and $i=1,2$.

Additional details on the model

Ban on discrimination

Nothing change for the private label producer and therefore, in equilibrium, wholesale tariffs for the private labels are cost-based: $w_{Bi}^{nd} = c$ for $i = 1, 2$.

Additional details on the model

Ban on discrimination

The program of the national brand producer A is to maximize the joint profit:

$$\underset{w_A, F_{Ai}}{Max} \sum_i (w_A - c) D_{Ai}(p^*_{Ai}, p^*_{Bi}, p^*_{Aj}, p^*_{Bj}) + F_{Ai}$$

$$s.t., \texttt{for } i = 1, 2, F_{Ai} \leq (p^*_{Ai} - w_A) D_{Ai}(.) + (p^*_{Bi} - w^{nd}_{Bi}) D_{Bi}(.) - \overline{\pi}^i_B$$

Note here that the status-quo profits $\overline{\pi}^i_B$ may now depend on w_A because R_j still offers A.

Given the pass-through results and under the additional assumption

Assumption

For $i = 1, 2$ and $K = A, B$ we assume that $\pi^i_{14} \leq 0$ and $\pi^i_{24} \geq 0$. These conditions imply that a unit price increase for product K at a retailer R_i leads to a larger increase in profit for the competitor R_j when he can sell the two products than when he sells only one product.

$$\frac{\partial \pi^i}{\partial p_{Kj}} > \frac{\partial \pi^{i3}_K}{\partial p_{Kj}}.$$

We thus obtain the following proposition:

Proposition

Under Assumption 4, a ban on discrimination has no effect on the unit wholesale price of the private label products, $w^{nd}_B = c$; however it leads to an increase in the unit wholesale price of the national brand product, $w^{nd}_A > c$.

A simple case: a linear demand (1/2)

Linear demand with inter-brand substitution a and intra-brand subst. b:

$$p_{ki} = 1 - q_{ki} - aq_{li} - bq_{kj} - abq_{lj}$$

- Downstream continuation equilibrium: $\frac{dp^*_{Ai}}{dw_A} = \frac{1}{2-b} > 0, \frac{dp^*_{Bi}}{dw_A} = 0$
- Discrimination is allowed: $w^d_{Ai} = w^d_{Bi} = c; p^d_{Ai} = p^d_{Bi} = p^d$.
- Discrimination is banned: $w^{nd}_A = c + \frac{(1-a)b(1-c)}{2} > c$; $w^{nd}_B = c$; $p^{nd}_{Ai} > p^d$; $p^{nd}_{Bi} = p^d$.
- Result: A ban on input price discrimination leaves p_B unaffected but leads to an increase in p_A.

A simple case: a linear demand (2/2)

- Downstream continuation equilibrium:

$$p^*_{ki}(w_{ki}, w_{kj}, w_{li}, w_{lj}) = \frac{2 - b(1+b) + 2w_{ki} + bw_{kj}}{4 - b^2}$$

$$\frac{dp^*_{Ai}}{dw_A} = \frac{1}{2-b} > 0 \qquad \frac{dp^*_{Bi}}{dw_A} = 0$$

- Discrimination is allowed:

$$w_{Ai} = w_{Bi} = c$$

$$p^d_{Ai} = p^d_{Bi} = p^d = \frac{1 - b + c}{2 - b}$$

- Discrimination is banned:

$$w_A = w_B = c + \frac{(1-a)b(1-c)}{2} > c$$

$$p^{nd}_{Ai} = p^{nd}_{Bi} = p^d + \frac{(1-a)b(1-c)}{2(2-b)} > p^d$$

Figure 1: Price Evolution of Food Products relative to CPI

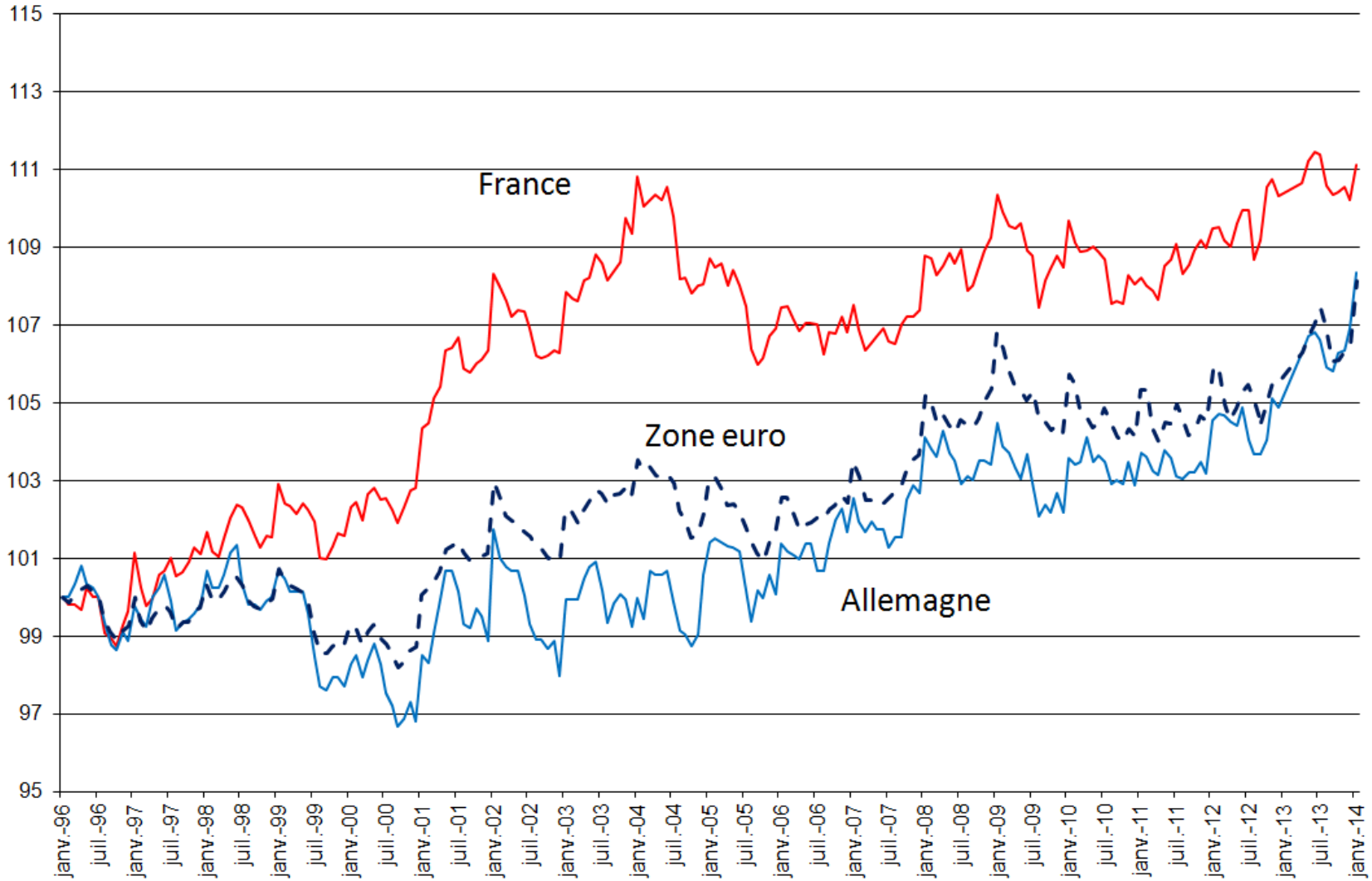
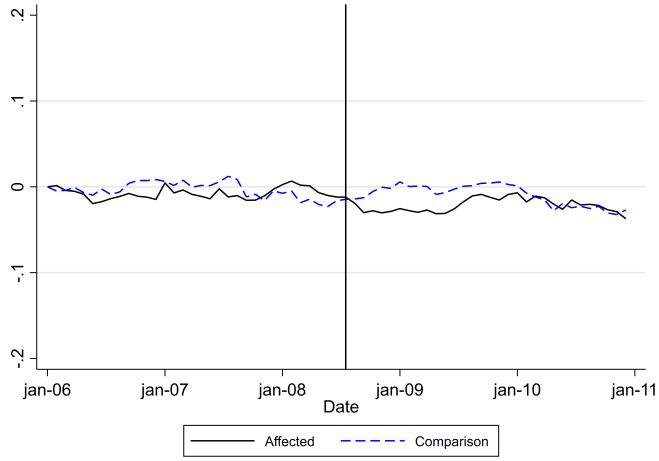
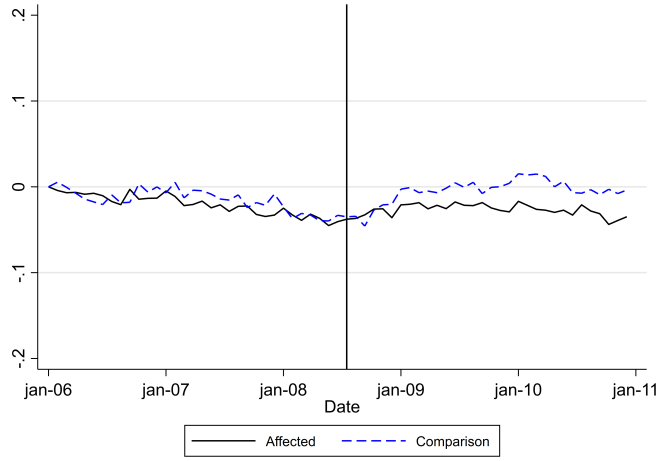


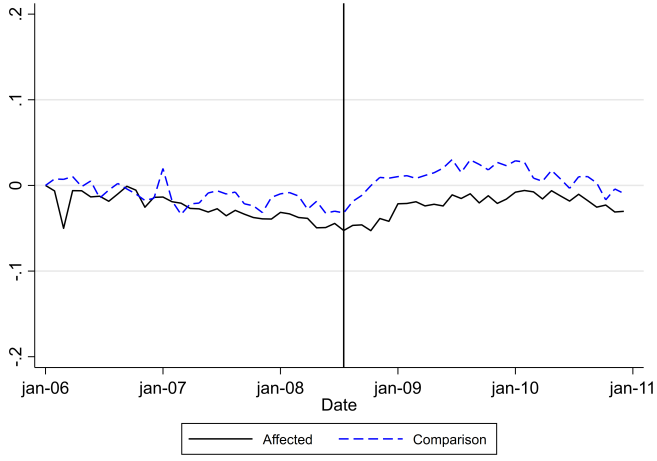
Figure 2: Price Trends for the Most Purchased Categories (Rank 1 to 4)



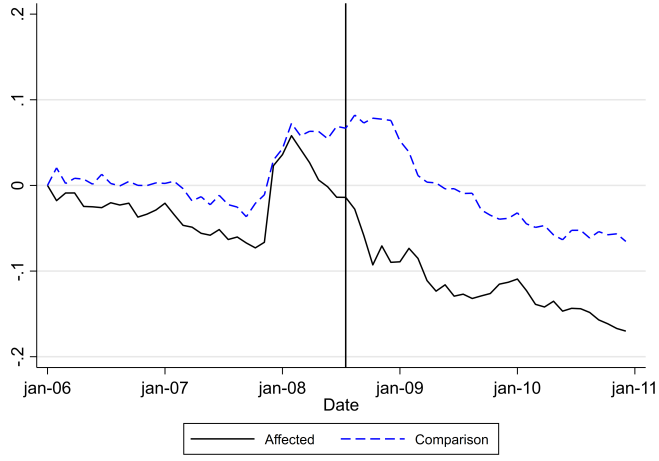
(a) Soft drinks



(b) Aperitif drinks

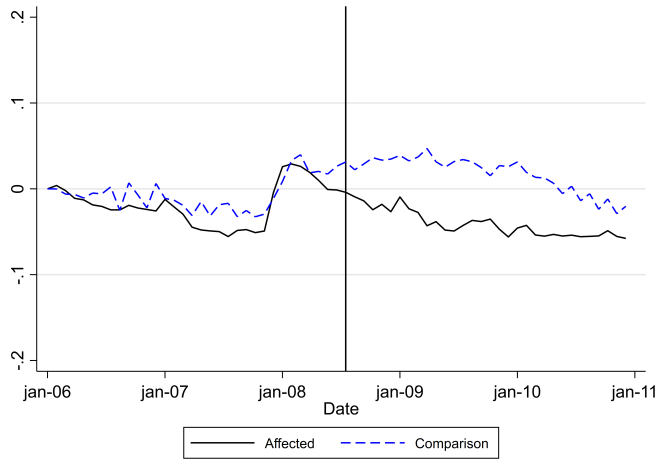


(c) Whiskey and bourbon

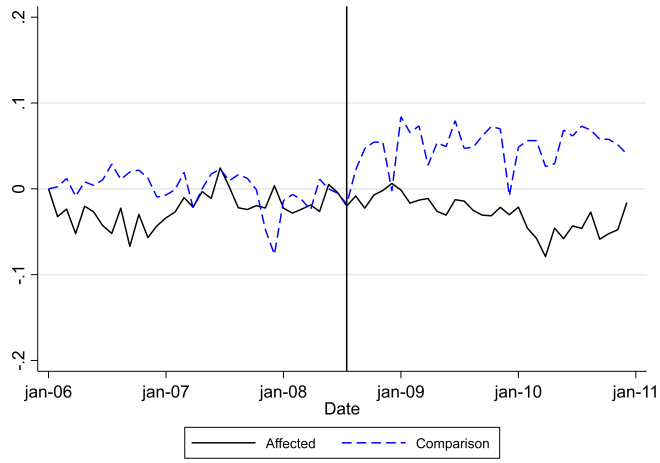


(d) Emmental, Gruyère, Appenzel

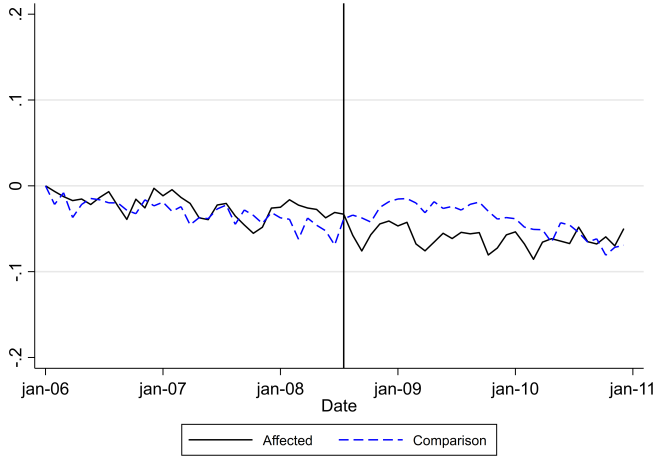
Figure 3: Price Trends for the Most Purchased Categories (Rank 7 to 10)



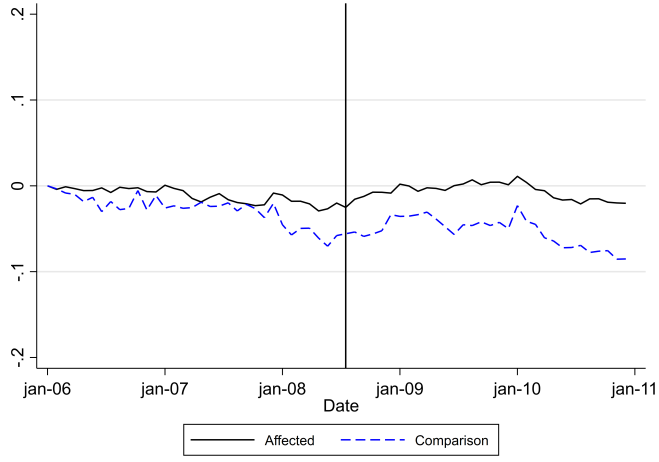
(a) Processed, fresh, salted cheeses



(b) Frozen fish, crustaceans, surimis



(c) Frozen dishes and starters

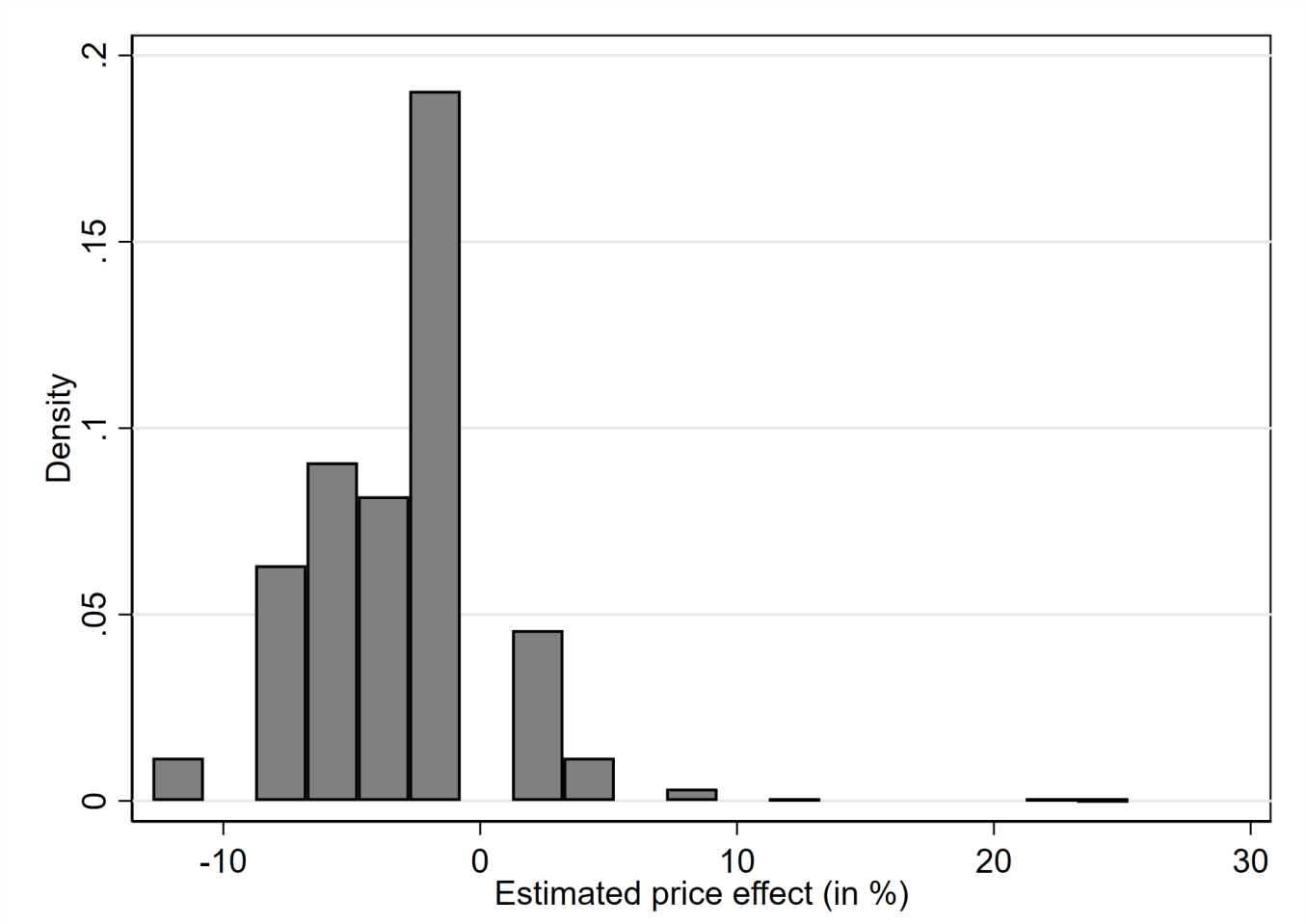


(d) Sweeteners

Table 2: Summary Statistics for Affected and Comparison Products

	Affected group	Comparison group	Total
Panel A: Product			
Number of products	17,747	8,913	26,660
Number of product categories	76	76	76
Average number of products per category	233.51	117.28	350.79
Number of chain stores	77	69	86
Panel B: Brand type			
Percentage of national brand products	100	–	66.57
Percentage of private label products	–	100	33.43
Panel C: Price			
Mean of monthly average product price	10.57	8.24	10.04
S.D. of monthly average product price	24.35	16.42	22.82
Min. of monthly average product price	0.01	0.07	0.01
Max. of monthly average product price	3307.89	6328.02	6328.02
Panel D: Purchase transaction			
Number of purchase observations	6,219,791	3,174,957	9,969,687
Total expenditures	23,129,828	8,584,074	31,713,902

Figure 4: Distribution of Estimated Price Effects



Notes: The graph presents the distribution of the price effects, estimated at the product category level (when statistically significant). The observations are weighted by the expenditure shares of product categories, calculated at the national level during the pre-LME period.

Table 3: Price Gap between MN vs PL

Dependent variable: (log) price (P_{ijt})		
	(1)	(2)
Treatment × PostLME	-0.0262***	
	(0.0052)	
Treatment × PostLME × Price Positioning 0-20		-0.0113*
		(0.0064)
Treatment × PostLME × Price Positioning 20-80		-0.0261***
		(0.0055)
Treatment × PostLME × Price Positioning 80-100		-0.0310***
		(0.0045)
Chain-product FE	Yes	Yes
Category-month FE	Yes	Yes
R^2	0.989	0.989
Observations	1,921,063	1,921,063

Notes: The observations are weighted by the expenditure shares of food products, calculated at the national level during the pre-LME period. The point estimate of the *Treatment* variable is absorbed by the chain-product fixed effects in Columns (1)-(2) and thus not available. The standard errors, shown in parentheses, are clustered at the chain level. *, **, *** indicate significance at the 10%, 5% et 1% level, respectively.

Table 4: Estimated Price Effect by Retail Groups

Dependent variable: (log) price (P_{kit})		
	(1)	(2)
Treatment × PostLME	-0.0250***	
	(0.0055)	
Treatment × PostLME × R1	0.0022	-0.0228***
	(0.0017)	(0.0053)
Treatment × PostLME × R2		-0.0248***
		(0.0053)
Treatment × PostLME × R3		-0.0187***
		(0.0053)
Treatment × PostLME × R4		-0.0211***
		(0.0054)
Treatment × PostLME × R5		-0.0259***
		(0.0054)
Treatment × PostLME × R6		-0.0306***
		(0.0053)
Treatment × PostLME × R7	-0.0075***	-0.0326***
	(0.0018)	(0.0054)
Treatment × PostLME × R8		-0.0390***
		(0.0067)
Chain-product FE	Yes	Yes
Category-month FE	Yes	Yes
R^2	0.989	0.989
Observations	1921063	1921063

Notes: The observations are weighted by the expenditure shares of food products, calculated at the national level during the pre-LME period. The standard errors, shown in parentheses, are clustered at the retail group level. *, **, *** indicate significance at the 10%, 5% et 1% level, respectively.

2007-08 Food crisis: removing the period Sept. 2007 to Sept. 2008, we obtain a point estimate of 0.0253 that is statistically significant.

Table 5: Changes in relative Market Shares of PL vs. NB over the Great Recession

Dependent variable: relative market share of private label by product category			
	Recession (Post Dec 07)	Recession (Dec 07 - Jun 09)	Recession (Apr 08 - Jun 09)
	(1)	(2)	(3)
Post-December 07	0.0455		
	(0.0401)		
Recession		0.0043	0.0145
		(0.0321)	(0.0286)
Post-recession		0.0825	0.0854*
		(0.0494)	(0.0464)
Category FE	Yes	Yes	Yes
Seasonal FE	Yes	Yes	Yes
R^2	0.7793	0.7805	0.7805
Observations	4160	4160	4160

tiny : The dummy variable Great Recession takes value one from December 2007 onward. The observations are weighted by the expenditure shares of product categories, calculated at the national level during the pre-LME period. The standard errors are clustered at the product category level. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Table 6: Alternative Definitions of the Comparison Group

	$\widehat{\beta}$					
Comparison group	Coef.	S. E.	Obs.	# of Cat.	# of Products	R^2
Baseline (PL)	-0.0262***	0.0052	1,921,063	76	26,660	0.9893
PL & PL-FP	-0.0182***	0.0039	2,143,402	77	31,137	0.9836
PL & PL-D	-0.0127***	0.0041	1,796,541	69	26,452	0.9893
PL, PL-FP & PL-D	-0.0150***	0.0035	2,140,601	75	31,324	0.9834
PL-D	-0.0169**	0.0078	1,679,180	60	20,221	0.9815

Notes: The observations are weighted by the expenditure shares of food products, calculated at the national level during the pre-LME period. The standard errors (denoted S. E.) are clustered at the chain level. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

Table 7: Alternative Time Frames

Period of study	Transitory period	Starting date	$\widehat{\beta}$ Coef.	S. E.	Obs.	R^2
Panel A: Baseline						
2006-2010	No	August 2008	-0.0262***	0.0052	1,921,063	0.9893
Panel B: Starting date & transitory period						
2006-2010	2008/08 to 2008/10	November 2008	-0.0273***	0.0056	1,780,251	0.9892
2006-2010	2008/08 to 2009/02	March 2009	-0.0257***	0.0057	1,521,431	0.9893

Notes: The observations are weighted by the expenditure shares of food products, calculated at the national level during the pre-LME period. The first row reports the point estimate obtained in the baseline scenario for ease of comparison. The change of the date on which the effect of input price discrimination is supposed to materialize requires to select a new sample of products for each sensitivity analysis. The standard errors (denoted S. E.) are clustered at the retail chain level. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.