The Effects of Banning Below-Invoice Prices
An Empirical Investigation*

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[Very Preliminary – Comments Welcome]

Abstract

In 1997, a new legislation banning below-invoice retail prices came into force in France. End-of-year quantity discounts could no longer be passed on to consumers. This should have had the same effect has allowing industry-wide price floors and led to a sharp increase in the retail prices of the leading manufacturers' products. Using CPI raw data, we find evidence supporting this claim. Modifying or revoking the existing legislation (as it has been done in Ireland in December 2005) would then be expected to reduce retail prices.

Keywords: retail prices, pricing regulations, resale price maintenance.

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Introduction

Vertical relationships between large food retailers and manufacturers have been recently at the centre of a fierce debate in France. In 2004, the French Finance Minister (Nicolas Sarkozy) negotiated with manufacturers and supermarket market chains a 2% decrease in the retail prices of the leading brands. At the same time, he commissioned a report from a group of experts to evaluate the existing legal framework and propose ways to improve it. The title of this report (Commission Canivet, 2005) on vertical relationships in the food industry - *"Restoring price competition"* - was a clear indication of what was expected from the discussions.

The common feeling was that the introduction in January 1997 of the Galland Act banning below-invoice prices had eliminated price competition between the main retail chains (at least for goods produced by the leading manufacturers) and led to a sharp increase in retail prices. Looking at aggregate data (INSEE), it seems that average price of food products has increased faster than inflation over the 1997-2002 period (11.8% vs. 6.4%), whereas it tended to increase at a slower rate before 1997 (2% vs. 3% over the 1994-1996 period). This inflationary trend seems also to be specific to France where food prices increased substantially faster than in other Euro zone countries (Germany, Italy or Netherlands for instance).

Enacted in January 1997, the Galland Act prevents retailers from reselling "below-cost". Below-cost prices were banned in France since 1963 but the definition of the threshold was relatively unclear. The Galland Act was introduced to simplify billing methods and to "level the playing field" between small businesses and large retail chains. It clearly defined the price below which retailers were not allowed to sell. This threshold was defined as the invoice-price, that is, the price paid by the retailer at the time of delivery. The important aspect of this definition is that it does not include any anticipated rebates that are usually paid at the end of the year (e.g. quantity rebates, discount linked to the increases of annual sales, purchases or turnover, ...) since they are not included on the invoice. It is therefore impossible for retailers to pass such rebates on to final consumers, and these rebates or commercial cooperation agreements thus guarantee a minimum (gross) margin to the retailers. This new definition made it easier to enforce below-cost pricing rules by the authorities since it was now enough to compare the retail price with the invoice price. During the first two months of 1997, DGGCRF services in charge of implementing the new rules

checked 60000 items. Less than 1% were sold below-cost compared to a rate of around 5% before 1997.

In order to understand the possible reason behind the inflationary impact of the Galland Act, it is necessary to understand how actual wholesale and retail prices are formed. Every year (usually in late autumn), producers announce their "general terms of sale" (hereafter GTS). GTS, which by law have to be non-discriminatory, can be set for a particular distribution channel (e.g. GTS for hypermarkets, GTS for supermarkets, GTS for convenience) or be global but include specific terms (e.g. rebates) for a specific channel. The GTS usually specify a wholesale price schedule (the "tariff price") and quantity rebates or channel specific rebates (or free units for instance) that are included on the invoice at the time of purchase. This defines the "net wholesale price" and thus the minimum price (the invoice price) below which retailers cannot sell. GTS can also include rebates that are not included on the invoice at the time of purchase but are paid usually at the end of the year.[1] These rebates are usually linked to the annual quantity ordered by the retailer. The "double net wholesale price" includes these rebates. Finally, a producer and a retail chain often negotiate additional rebates for specific services offered by the retailer to the manufacturer (such as promotional activities, better shelf space, local advertising, ...). These services are billed separately and normally on a yearly basis. Once these rebates are included, the wholesale price actually paid by the retailer is referred to as the "triple net price." The difference between the "net" and "triple net" prices is often called "hidden" or "backward" margin (or hidden rebates) and constitute a guaranteed (gross) margin for the retailer since these rebates cannot be passed on to consumers.

Parties (manufacturers and retailers) seem to agree that, after the enactment of the Galland Act, the negotiation shifted from "upfront" margins (i.e. rebates that can be included on the invoice) to end-of-year rebates and commercial cooperation. According to ILEC (producers' association) the average hidden margin increased from 22% of the net wholesale price in 1998 to 32% in 2003, and for grocery products, the share of the hidden margin in the total margin increased from 74% in 1995 to 88% in 1999.

Pushing this shift to the extreme (i.e. negotiating hidden rebates only) would then be equivalent to allow the manufacturer to set an industry-wide price floor given that none of the rebates obtained by a retailer can be passed on to consumers. The below-invoice price law thus has an inflationary effect since it eliminates competition

[1] Products are usually delivered to retail chains distribution platforms – and thus billed – several times a year.

on the downstream market. In practice, this can only work if the market is extremely concentrated and there are important barriers to entry. New comers (such as hard-discounters), or even existing retailers, might otherwise find it profitable to enter the market (opening a new store) and/or compete aggressively on non-branded products (low price goods or private labels). These two conditions for a relatively important inflationary effect were indeed met on the French market. Firstly the market was extremely concentrated: in 2004, the combined market share of the five largest buying groups accounted for grocery products was over 85% and independent convenience stores were increasingly taken over by the large chains. Moreover, the 1996 Raffarin Act made entry extremely difficult (even for the smaller format) by reducing the threshold for a mandatory retail permit (obtained through a lengthy administrative procedure) from 1000 to 300 sq meters.

In its report, the Canivet working party proposed to modify the below-cost pricing threshold and to set it as the triple net price rather than the net price. There would then be no difference between upfront and backward rebates which could all be passed on to consumers, thereby restoring intra-brand competition (i.e. competition on the retail market).[2] The government (2005 Dutreil Act) did not follow this advice but decided to limit the magnitude of hidden margins to 15% of the net price (compared to an observed average over 30% in 2003) from January 2007.[3]

Legal measures similar to the Galland Act are still or have been in force in other European countries. One interesting example is Ireland, where a very similar legislation banning below-invoice prices was introduced in 1987 (Groceries Order) and revoked in December 2005. Very similar arguments to those used in France were mentioned by the Irish Competition Authority in order to justify their recent move. John Fingleton (then Chairman of the Irish Competition Authority) claimed in September 2005 that *"the abolition of the Groceries Order would bring lower prices."* Two months later, the Minister for Enterprise, Trade and Development justified the change in legislation by the fact that it would *"introduce greater competition into grocery trade by allowing retailers freedom to determine the prices they charge their customers."* Although no empirical study has yet evaluated the impact of the removal of the Groceries Order on retail prices, Collins, Burt and Oustapassidis (2001) evaluated its introduction in 1987. Focusing on one category of products (processed and

[2]The working party also proposed to soften the conditions to obtain a retail permit in order to facilitate new store openings.

[3]A limit of 20% was already introduced in January 2006. Note also that the Raffarin Act has not yet been modified. A working party formed members of Parliament and professional organizations was set up. By contrast to the Canivet working party, it did not include any economist. Its report suggested only minors changes to the current legislation.

preserved fruits and vegetables), they looked at the impact of the Groceries Order on the gross retail margins (i.e. difference between retail and estimated wholesale prices). They showed that the Groceries Order was a significant variable in explaining gross retail margins, and that these margins increases from 15.8% in 1988 to 20.1% in 1993.

Finally, it is interesting to note that the *Conseil de la Concurrence* recently imposed penalties (€14.4 million) on *Buena Vista Home Entertainment* (*BVHE*, the exclusive distributor of *Disney* videos and DVDs in France) and on some of its retailers (*Carrefour* and *Casino*) and wholesalers (*Selection Disc Organisation*) for price fixing.[4] BVHE and some of its retailers were accused of negotiating false rebates, i.e. non-conditional rebates that were nevertheless not included on the invoice at the time of delivery; thereby artificially raising the retail price and removing competition between participating retailers. Price checks done during the investigation showed that almost all *Casino* and *Carrefour* stores were charging the exact same price for each *BVHE* title they were selling.

This paper provides empirical support for the theory that the Galland Act was indeed responsible for the increase in prices that occurred after 1997. Given that it is impossible to directly test this theory, we adopted an indirect approach. We first develop a simple theoretical framework in order to derive simple testable predictions that are compatible with the available data. This theoretical framework is inspired by the existing literature on vertical restraints and resale price maintenance. It is closest to the model proposed by Allain and Chambolle (2005) who show that when tariffs are linear and simultaneously negotiated (à la Horn and Wolinsky (1988)), below-invoice prices legislation has an inflationary impact on retail prices whenever the manufacturer has little bargaining power vis-à-vis the two retailers it faces. When fixed fees, or more generally non-linear tariffs, are allowed and the tariff negotiated by a retailer is never observed by its rivals (*interim unobservability*), the framework we analyze is very similar to that of O'Brien and Shaffer (1992).

The paper is organized as follows. In section 1, we set up the theoretical model of vertical negotiation. In section 2, we derive empirical predictions from the model. Data sources used for the empirical analysis are presented in section 3. Finally, section 4 presents the results of the empirical analysis.

[4] See *Conseil de la Concurrence*, Decision 05-D-70, December 2005.

1 Model

1.1 The Basic Framework

The basic framework, we use to derive testable predictions is very similar to that of Allain and Chambolle (2005). A monopolist manufacturer, M, produces a good at constant marginal cost c. This good is distributed to final consumers through n differentiated retailers, all facing the same constant marginal cost of distribution, γ. Retailers compete in prices on the downstream market, and we denote by p_i the retail price set by retailer R_i.

We further assume that the size of the market is given, and when all n retailers set the same price p, the aggregate demand depends neither on the degree of substitution between retailers nor on the number of retailers. In order to keep the presentation as simple as possible we will consider linear demand functions à la Shubik and Levitan (1980), that is:

$$D_i(\mathbf{p}) = D(p_i, \mathbf{p_{-i}}) \equiv \frac{1}{n}\left(\mu - (1+\sigma)\, p_i + \frac{\sigma}{n}\sum_{j=1}^{n} p_j\right),$$

where $\sigma > 0$ is the degree of substitutability between retailers (when $\sigma = 0$ retailers are independent and become closer substitutes as σ increases) and $\mu > c+\gamma$. The "monopoly" price (i.e. industry-profit maximizing (symmetric) price), individual quantity and per-product profit are thus:

$$p^M = c + \gamma + \frac{\mu - c - \gamma}{2},\ q^M = \frac{\mu - c - \gamma}{2n} \text{ and } \pi^M = \frac{(\mu - c - \gamma)^2}{4n}.$$

Interactions between the manufacturer and retailers are modeled using a simultaneous bilateral bargaining framework à la Horn and Wolinsky (1988). More precisely, at the bargaining stage, the manufacturer is simultaneously engaged in bilateral negotiations with each of the retailers over wholesale contracts $\mathcal{C}_i$. A bargaining equilibrium is thus a set of contracts (and retail prices induced by these contracts) that simultaneously solve the Nash-bargaining solutions, where in the negotiation over $\mathcal{C}_i$, the contracts $\mathcal{C}_j$ and the retail prices p_j $(j \neq i)$ are given. We further assume that the manufacturer's bargaining power vis-à-vis each retailer is $0 \leq \alpha \leq 1$.[5]

[5] This modeling choice is the same as the one adopted by Allain and Chambolle (2005) and presents several advantages. It takes into account the fact that negotiations between the manufacturer and a retailer are secret (i.e. discounts offered might not be observed directly by the rival retailer) and allows for different bargaining strengths between the producer and the retailers.

Given that contracts offered to the rival retailers are taken as given, this framework is very similar in spirit to (and lead to the same retail prices as) the concept of "contract equilibrium" first proposed by Crémer and Riordan (1987) and used in a similar context by O'Brien and Shaffer (1992). A weakness of this equilibrium concept is that it focuses on pairwise deviations only and rules out multilateral deviations. Alternative frameworks, such as focusing on equilibria with passive beliefs in a more standard game with secret take-it-or-leave-it offers[6] or explicitly modeling a dynamic multilateral bargaining à la Stole and Zwiebel (1996)[7] would usually yield the same retail prices. However, this does not offer the flexibility to modify relative bargaining strengths.

Following Allain and Chambolle (2005), we assume that the timing of the game is identical with and without laws banning below-invoice prices:

1. The manufacturer announces a unique (i.e. non-discriminatory) wholesale non-linear tariff (*"General Terms of Sales"*).

2. The manufacturer and retailers simultaneously bargain over secret (off-invoice) non-linear rebates.

3. Retailers simultaneously set their retail prices. Quantities are then ordered so as to meet demand, contracts are enforced and profits realized.

Although it is similar in spirit, this game presents two differences with that of Allain and Chambolle (2005). Firstly, we assume that retailers never observe the contract accepted by their rivals and the game is thus one of *interim unobservability* whereas they implicitly assume that, although contracts remain secret during the bargaining process (at stage 2), retailers observe the terms of the accepted offers before setting their retail prices (i.e. game with *interim observability*). More importantly, we do not restrict attention to linear wholesale contracts and consider more general tariffs. This seems consistent with recent empirical evidence as demonstrated by Bonnet, Dubois and Simioni (2005) and Bonnet and Dubois (2006) in the case of vertical relationships between bottled water producers and French supermarket chains, and by Berto Villas-Boas (2006) in the case of vertical contracting between yoghurt producers and supermarkets in California.

[6] This is for instance the strategy adopted by Hart and Tirole (1990) or McAfee and Schwartz (1994). In the case of intense price competition, equilibria with passive beliefs may however fail to exist as shown by McAfee and Schwartz (1995) and Rey and Vergé (2004).

[7] This is for instance the route followed by de Fontenay and Gans (2006).

The only difference between the two legal regimes relates to the constraints faced by the retailers when choosing their prices. When below-invoice prices are not banned, retailers freely choose their retail prices. Therefore, the public announcement made by the manufacturer at stage 1 is irrelevant and the game is equivalent to:

1. The manufacturer and retailers simultaneously bargain over secret (off-invoice) non-linear wholesale tariffs.

2. Retailers simultaneously set their retail prices.

On the other hand, when below invoice prices are banned, retailers cannot resell at a price lower than the public per-unit price, i.e. rebates obtained at the bargaining stage (stage 2) cannot be passed on to consumers. Therefore, the situation is equivalent to one where imposing an industry-wide minimum resale price is permitted. The game is thus equivalent to:

1. The manufacturer sets the minimum retail price $\underline{p}$ that retailers will be allowed to charge.

2. The manufacturer and retailers simultaneously bargain over secret (off-invoice) non-linear wholesale tariffs.

3. Retailers simultaneously set their retail prices $\left(p_i \geq \underline{p}\right)$.

In what follows, we will restrict our attention to two-part wholesale tariffs, i.e. tariffs consisting of a constant per-unit price w_i and a fixed fee F_i. This is however not restrictive in this framework since two-part tariff is the simplest tariff that ensures that bargaining is efficient.

1.2 Equilibrium Retail Prices

In equilibrium, the tariff negotiated between M and R_i is *"bilaterally efficient"*, that is, maximizes their joint profit taking the tariffs (w_j, F_j) and the retail prices p_j as given. The game without minimum RPM, is thus equivalent to that analyzed by O'Brien and Shaffer (1992, proposition 3 – p.305 and on minimum RPM – p.306). This implies that in both games, equilibrium wholesale prices are equal to the manufacturer's marginal cost c.

When retailers are free to choose their retail prices, the equilibrium (symmetric) retail price is competitive and given by:

$$p^* = \arg\max_p \left(p - c - \gamma\right) D\left(p, \mathbf{p}^*_{-\mathbf{i}}\right) \quad \Leftrightarrow \quad p^* = c + \gamma + \frac{\mu - c - \gamma}{2 + \frac{(n-1)\sigma}{n}}$$

Remark that p^* is a decreasing function of the "intensity of competition", where this intensity increases when retailers are closer substitutes (i.e. σ increases) or the number of retailers increases.

When an industry-wide minimum price $\left(\underline{p}\right)$ can be imposed by the manufacturer, the equilibrium (symmetric) retail price will be $p^{**} = \max\left\{\underline{p}, p^*\right\}$. In order, to determine the optimal value of $\underline{p}$, we need to derive the manufacturer's equilibrium profit. If all offers are accepted, the manufacturer and retailer R_i's profits are:

$$\pi_M^{**} = nF^{**} \text{ and } \pi_i^{**} = \pi\left(\mathbf{p}^{**}\right) - F^{**}, \text{ where } \pi\left(\mathbf{p}\right) = \left(p - c - \gamma\right) D\left(\mathbf{p}\right).$$

Consider now the hypothetical situation where the negotiation between M and R_i has failed. In that case, their joint-profit is equal to the manufacturer's profit which is only $(n-1)F^{**}$ it obtains from the other retailers. A successful negotiation thus creates a joint-surplus of $\pi\left(\mathbf{p}^{**}\right)$, of which the manufacturer obtains a share equal to its bargaining strength α. The equilibrium franchise fee F^{**} is thus given by:

$$nF^{**} = (n-1)F^{**} + \alpha\pi\left(\mathbf{p}^{**}\right) \quad \Longleftrightarrow \quad F^{**} = \alpha\pi\left(\mathbf{p}^{**}\right).$$

Given that its equilibrium profit is a fixed fraction of the industry profit, the manufacturer will choose the minimum retail price that maximizes the industry profit. When minimum RPM is allowed (or when prices below-invoice cost are banned, e.g. as following the introduction of the Galland Act), retail prices are set at the monopoly level, that is:

$$p^{**} = \underline{p} = p^M = c + \gamma + \frac{\mu - c - \gamma}{2} \; > \; p^*.$$

This analysis suggests that **laws banning below-invoice prices have indeed an inflationary impact on retail prices.** Moreover, when considering non-linear wholesale contracts, this result does not depend on the different parties' relative bargaining strength. This contrasts with the results obtained by Allain and Chambolle (2005) which suggested that the inflationary mechanism would only be used by producers that are in a weak position when negotiating with retailers.

2 Empirical Predictions

2.1 Alternative Explanations for an Increase in Retail Prices

The theory of harm presented until now has two main caveats. In practice the manufacturer would announce its "general terms of sale" and retailers would then bargain

with the manufacturer over (individualized, i.e. secret) rebates, some of which could be included on the invoice at the time of purchase (i.e. "upfront rebates"), the rest being for instance end-of-year rebates or commercial cooperation fees (the so-called "backward – or hidden – margins"). Therefore, if the law allows individualized upfront rebates, the game post-Galland Act is not one where industry-wide minimum RPM is permitted, but one where retailers bargain over both the minimum price they can charge and the wholesale non-linear tariff. In that case, as we know from O'Brien and Shaffer (1992), minimum RPM has no impact on the equilibrium retail prices which are the same as in game without constraints (pre-Galland Act). With price floors, the retailers' margins are indeed strictly positive and opportunism remains an issue. Eliminating these margins, for instance using price ceilings, is the way to solve the producer's opportunism problem. If the Galland Act is interpreted in that manner, we should not expect to see any impact on retail prices. There are nevertheless several reasons that seem to justify the theoretical model we decided to present in this paper. A first reason is that the law prevents the manufacturer from offering discriminatory conditions to retailers. Therefore, if a retailer observes that a rival of similar size sells at a lower price, it will tend to infer (sometimes wrongly) that its rival has been offered better terms by the manufacturer. The retailer is then likely to force a better deal when renegotiating with the manufacturer and might even ask for retroactive rebates to compensate for the loss it suffered. Although it has later been deemed illegal by a French court, the latter approach has been implemented by one of the biggest chains (namely *Leclerc*) who forced several manufacturers to pay additional rebates when it estimated that some of its rivals had been offered better terms.[8] The second reason is that all the involved parties (manufacturers, large supermarket chains and small businesses) publicly agree that the Galland Act totally eliminated intra-brand competition by shifting the negotiation from "upfront" payments (that retailers were able to pass on to consumers) to "hidden rebates" (that cannot be passed on and only benefit to the retailers). Moreover, the observed increase in retail prices would then have to be explained by changes in demand conditions or increases in production and / or retailing costs. However, these changes are extremely different from the changes predicted by our theory: in the proposed theory of harm, the increase of price is due to the elimination of intra-brand competition while intra-brand competition is not affected in the second scenario. In both scenarii, we should see a positive correlation

[8] In 2001, *Leclerc* realized that *Carrefour* had been offered better terms (for commercial cooperation) by 28 producers. It then obtained "compensation" from these retailers through payments for services that were never delivered. In November 2005, *Leclerc* was condemned by the Tribunal de Commerce de Nanterre to reimburse €23.3 million.

between retail prices and degree of intra-brand competition before the law was passed. After the introduction of the law, the retail price should no longer react to the degree of competition in the "industry-wide price floor scenario" (what we predict) whereas the correlation would remain unchanged in the "individualized price floors" scenario.

A second caveat of the model is that it does not take into account a second law that was passed at almost the same as the Galland Act. Following the introduction of the 1996 Raffarin Act, it became much more difficult for supermarket chains to open new stores or increase the sales area of the existing ones. This law reduces the threshold for a mandatory retail permit (obtained through a lengthy administrative procedure) from 1000 to 300 sq meters. It was the result of intense lobbying by the main food retailers (all French) in order to (successfully) limit the entry of hard-discount chains (such as *Aldi* and *Lidl*). As for the Galland Act, we should expect this law to have had an inflationary impact on retail prices. When retailers believe that competitors might enter the market if the prices are high and the market looks highly profitable, they cannot fully take advantage of their market power and set rather more competitive prices. Once they know that entry is less likely to occur, prices will be fully determined by the existing level of competition. This also suggests that, although prices would be expected to go up in both situations, the impact of the two Acts (Raffarin and Galland) should be very different. Because of the possible threat of entry, the retail prices prior to the introduction of strong barriers to entry should be expected not to depend much on the existing degree of intra-brand competition at that stage. The Raffarin Act alone would have changed this situation leading to retail prices highly reactive to market conditions. As we have already mentioned earlier, the Galland Act would be expected to have the opposite effect. Finally, although the Raffarin Act was enacted in 1996, restrictions had already been (unofficially) put in place since mid-1993.[9] We thus expect the impact of the Raffarin Act (in 1997) to have been rather limited.

2.2 Empirical Predictions on Retail Prices

The model thus seems to predict a positive correlation between retail prices and the degree of local competition before the enactment of the Galland Act, whereas these two variables are expected to be independent once a ban on retail prices below invoice prices is introduced. In practice, the situation is less extreme for several reasons.

[9] In 1993, the Finance Minister (Alain Madelin) had given instructions to the commissions granting these retail permits to slow down the evaluation process. The number of store extensions and openings decreased significantly after 1993. The Raffarin Act was seen as a way to legalize that practice.

Firstly, the *"general terms of sales"* and the various rebates are negotiated at the national level between a manufacturer and the buying group of a given chain. Large retail chains usually have a unique buying group – or purchasing unit – for the whole chain that might include several "fascias" or brands: for instance the central purchasing unit of the *Carrefour* group negotiates with each manufacturer for all of its "fascias" which include the *Carrefour* hypermarkets but also *Champion* supermarkets, *Ed* and *Dia* hard-discount stores, *Shopi*, *Huit à Huit* and *Proxi* convenience stores. Retail prices are however set locally and depend on the local market conditions. Therefore, the minimum retail price implicitly set by the manufacturer is a nationwide-price based on average market conditions and might not be binding everywhere. Markets that initially had relatively high prices – either because of local demand conditions or of high concentration – are thus unlikely to be affected by the Galland Act, and, *ceteris paribus*, prices would not be affected on these markets. On the other hand, markets where prices were initially lower have been affected by the new minimum price and prices thus went up in these markets. Therefore the inflationary impact should to have been higher on markets where prices were initially relatively low.

Prediction 1 ***Impact of local competition on retail prices***
The correlation between retail prices and the intensity of local competition is lower after the introduction of the Galland Act.

Prediction 2 ***Low Prices Increased More***
The inflationary impact of the Galland Act has been higher in markets where prices were initially low.

Moreover, on a given local market, hypermarkets (sales area over 2500 m^2) compete with supermarkets (sales area between 400 and 2500 m^2), convenience stores (sales area less than $400m^2$) and hard-discount stores. Given that these different format offer different services (free parking spaces, petrol stations, opening hours, ...), they might face different (national) price floors: it is indeed possible for the manufacturers to offer different terms to different formats without being deemed discriminatory. However, these different shops do not necessarily face the same demand (probably less elastic demand for convenience stores and supermarkets located in city centers, low income consumers for hard-discount stores) and thus do not charge the same prices. Therefore, we should expect the impact of the Galland Act to differ across these different types of stores. Hypermarkets that had relatively lower prices should have seen larger price increases than supermarkets and convenience stores.

Hard-discount stores do not often sell branded products and thus would not have seen changes in the terms offered by their suppliers. Therefore, the price increase should have been very limited for this format since it would only be a response (positive if we assume that prices are strategic complements) to the increase in prices of rival formats.[10]

Prediction 3 ***Types of Stores***
The inflationary impact of the Galland Act has been higher for hypermarkets than for other formats.

2.3 Wholesale and Retail Prices

We now want to look at the link between wholesale and retail prices. Several competing definitions of wholesale prices can be used depending on the context. In our simple framework, we could have distinguished between the "net price" (i.e. wholesale price before rebates) and the "triple net", that is, the average price actually paid by the retailer.

In both settings, pre- and post-Galland Act, it is relatively easy to compute the triple net or average wholesale price. Denote by v^* the pre-Galland Act average wholesale price, we have:

$$\pi_P^* = (v^* - c)\, q^* = F^* = \alpha\,(p^* - c - \gamma)\, q^*$$

implying that:

$$v^* = c + \alpha\,(p^* - c - \gamma) = c + \frac{\alpha(\mu - c - \gamma)}{2 + \frac{(n-1)\sigma}{n}}.$$

Similarly, when an industry-wide price floor can be set by the manufacturer, the average wholesale price v^{**} is:

$$v^{**} = c + \alpha\,(p^{**} - c - \gamma) = c + \frac{\alpha(\mu - c - \gamma)}{2}.$$

Using these average wholesale prices, we can compute and compare the retailers' gross margin (i.e. the difference between retail and wholesale prices). We get that this gross margin increased when the below-invoice price legislation was introduced:

$$p^{**} - v^{**} - \gamma = \frac{(1-\alpha)(\mu - c - \gamma)}{2} > p^* - v^* - \gamma = \frac{(1-\alpha)(\mu - c - \gamma)}{2 + \frac{(n-1)\sigma}{n}},$$

which is consistent with the results obtained by Collins, Burt and Oustapassidis (2001) in the Irish case.

[10] Given that the period we looked at also corresponds to the development of the hard-discount format in France, it might even be the case that hard-discount prices went down during that period.

Unfortunately, it is usually difficult to compute the retail margins since data on wholesale contracts is extremely difficult to obtain. Moreover, given that we do not have consumption data, it is impossible for us to recover the wholesale prices through the estimation of a structural model in a way that has been done by Bonnet, Dubois and Simioni (2005) for instance.

We do however have aggregate data on wholesale prices for categories of products, but these prices are more often "net" or "double net" wholesale prices (i.e. not including hidden margin). From the theoretical point of view, this price is identified only in the post-Galland Act situation. In that case, the net price is simply the price floor set by the manufacturer and is thus equal to the retail price. However, this is only a theoretical result, since in practice not all local markets will be constrained by the national price floor. Therefore, the correlation between wholesale and retail prices will not be equal to 1 but will nevertheless be high.

In the pre-Galland Act scenario, the theoretical model only identifies the global margin, not the split between upfront and hidden rebates. We know however that the net wholesale price will be somewhere in between the average wholesale price v^* and the retail price p^*. Under retail competition, increases in net wholesale prices are not fully passed on to consumers. The correlation between (net) wholesale and retail prices thus tends to lower.

Prediction 4 ***Correlation between wholesale and retail prices***
The enacted of below-invoice price legislation increases the correlation between producers' prices (i.e. net wholesale prices) and retail prices.

3 Data

The empirical part of the article is based on three datasets : a dataset on retail prices, one on the local structure of the retail industry and one on industrial prices by product categories.

3.1 Retail Prices

We have access to a unique database on individual retail prices, collected by INSEE, the French statistical institute, to compute the Consumer Price Index (CPI, *Indice des prix à la consommation*). Because this database is the basis of the CPI, it covers the whole national territory. Stores and products are sampled to ensure representativeness. Prices in a given store for a given product are surveyed on a monthly

basis. Whenever a store is shut down, it is replaced in the sample by a similar store within the same area. In practice, the retail price of product i in store j at time t is surveyed by an INSEE employee visiting the store and recording the price as well as other relevant information (such as brand, promotion ...). The result is a large panel dataset where the statistical unit followed over time is product i in store j. We use a monthly panel covering the period 01/1993 to 12/1999. Depending on the regression we carry out, the data is aggregated at the quarterly or yearly level.

Stores are classified according to type and size (measured by sales area). All stores within a type category by and large follow the same business model. The various types (*"formes de vente"*) are:

- **Hypermarkets** are large stores (sales area over 2500m^2) generally located at the periphery of large cities.
- **Supermarkets** have sales area between 400 and 2500m^2 and usually located in city centers or at the periphery of smaller cities.
- **Convenience Stores** have sales area smaller than 400m^2 and are located closer to the customers.
- **Hard-discounters** can have sizes comparable to that of supermarkets or convenience stores. However, they do not sell the same range of products (usually do not offer the leading brands) and do not not same services.
- ***"Magasins Populaires"*** are the traditional of multipurpose stores in city centers. They have sizes comparable to that of supermarkets, but do not primarily focus on food items.

For each store in the sample, data include the fascia as well the type and the city administrative code. More precise location within the city is out of reach, except for the three largest cities (Paris, Lyon, Marseille) where the *"Arrondissement"* is known.[11] This code is used to match the retail price data with local data.

The products distributed in these stores are coded according to a classification specific to the CPI. We only retain products classified as "homogeneous products" (e.g. sugar, milk). These products are sufficiently homogeneous across stores and dates. We thus exclude intrinsically heterogeneous products such as clothes or furniture. Although, characteristics such as brand can change from one store to the other or from one date to another, our data also include the brand name. We further restrict our sample by selecting only products that are widely distributed across all types of

[11] Paris, Lyon and Marseille are divided in respectively 20, 9 and 16 arrondissements.

retailers. The CPI product code is also used to match retail prices with upstream PPI prices based on NACE classification (see below).

3.2 Data on Groceries and Catchment Areas

Three sources are used to characterize local markets. The 1999 Census provides local population, originally at the city level. Income tax files provide information on household income at the city level (percentage of households paying income tax, average reported income).

The local structure of retail market is provided by a unique dataset constructed by the authors using the *"Atlas de la grande distribution"*, a yearly national index of stores of all types listed above. This index is used as reference by retailers themselves. In principle, this source lists all stores across the national territory. Fascia, sales area and address are available. Insee city code has been recovered by the authors from the address. Data is available for 1994, 1996 and 1999 (stocks of stores are evaluated at the start of each year). This dataset is exhaustive for all stores above 120 m^2. So far, we have used only data on the largest stores (excluding convenience stores) but retaining hard discounters regardless of their size.

For each city code, we use a file available at INSEE to compute the cartesian coordinates of city barycenters. Using these coordinates, we compute distances across all pairs of cities within the CPI sample of stores. We associate to every city a list of neighboring cities characterized by their code, distance to the reference city, and the list of all stores (and sales area) within the city. It is thus possible to compute statistics summarizing the local retail structure around each CPI city, accounting for distance.

Downstream competition in the retail industry takes place locally. Delineating geographical relevant markets is however an issue in itself. For the sake of simplicity, we construct catchment areas encompassing all cities distant to the reference city from less than 5 km as the crow flies. This type of approach is similar Barros, Brito and de Lucena (2006) and consistent with assessment of the European Commission in the *Kesko / Tuko* and *Carrefour / Promodès* merger cases. Our catchment is however smaller than the previous ones because we include small stores in our sample.[12] Concentration indices based on sales area are constructed over these catchment areas. They are defined as the sum of the squared market shares in sales area.

[12]For instance Barros, Brito and de Lucena use a distance of 30kms but focus on very large stores only.

3.3 Producer Price Indices

We use the data collected by INSEE to construct the Producer Price Index (PPI, *"Indice des prix de vente industriels"*). A representative sample of French plants is surveyed on a monthly basis. Plants report the prices at which they have sold their products, coded according to the NACE classification. Individual prices are then aggregated by INSEE into indices of producer prices, to which we have access. Series of price indices are available at a 4-digit product level. These series have no local variation, they are constructed at the national level. They are first available every quarter, then every month. In order to maximize the number of series available from 01/1993 to 12/1999, we use all series aggregated at the quarterly level.

For the empirical analysis, we retain all products for which we can obtain a satisfactory matching between the CPI product classification and the NACE classification.

4 Empirical Analysis

4.1 Long-Term Price Increase

According to our predictions, retail prices should have increased more in stores where they were initially lower. We test this prediction over the 1994-1999 period. For each year, each store and each product, we compute the average of retail prices. This allows not only to account for every day low prices, but also for sales and temporary special offers. For each store and product, we want to regress the change in retail price logarithm between 1994 and 1999 on some measure of relative initial price. Stores may have low prices due to permanent characteristics or because of past idiosyncratic shocks. In the latter case, we would expect a bias of reversal to the mean. In order to avoid this statistical artefact and solely capture the structural information included in lower prices, we average out prices between 1994 and 1996, for each store and each product. A balanced set of 9388 product-store pairs is then built. For each product, we compute the quartiles of this measure of initial price. We then regress the 1994-1999 change in price logarithm on dummies of initial price quartile, controlling for the types of stores, for the size and wealth of the population in the catchment area and for the change in local market concentration.

Results of these regressions are presented in Table 1. It shows a clear pattern for prices, consistent with our prediction: retail prices increased more when they were initially lower. The same regression using 1994 prices instead of 1994-1996

Table 1
Price log change between 1994 and 1999

Type of Store	Supermarkets (400-2500m^2)	-0,008**
		(0,003)
	Hard discount	-0,083***
		(0,009)
	Convenience (<400m^2)	0,042***
		(0,007)
	Magasin Populaire	0,013*
		(0,007)
	Hypermarket (>2500m^2)	ref.
Initial price (average 1994 to 1996)	First quartile	0,084***
		(0,005)
	Second quartile	0,065***
		(0,005)
	Third quartile	0,036***
		(0,004)
	Last quartile	ref.
	Δ Market concentration	0,040
		(0,025)
	Number of observations	9388

Note: Robust OLS estimators clustered by towns. R squared : 0,26. In parenthesis: standard errors. 3, 2 and 1 stars respectively mean 99, 95 and 90 percent significance for a symmetric test. Not reported : trends by product, log(market population) and log(market income) (not significant). Sources : IPC, CENSUS, LSA.

average confirmed that reversal to the mean would have been an issue. Besides, the same regressions carried out without controlling for the types of retailers lead to quite comparable results. Thus, even though hard discounters are often in the lower quartile for each product, it does not lead to identification problems and our results are not driven by the heterogeneity of types of stores. We also get qualitatively identical results if we use deciles instead of quartiles in our regressions, as well as continuous measures such as deviation to the median or to the upper decile. All these regressions confirm the robustness of our prediction.

However changes in market concentration do not appear to be significant, conditional of our measure of initial price. Nor are the size and the wealth of the catchment area. Compared to hypermarkets, the price change was lower in supermarkets and hard discounts. On the contrary, prices seem to have increased faster in convenience stores and in *"magasins populaires."* Turnover for these two types of stores is very important. Hence, selection bias is likely to be significant. Convenience stores that

survived are likely to be in particular places, or to have different unobservable characteristics, such as quality of service. This is confirmed by our next regression, which is a cross-section regression on the whole dataset.

4.2 Cross-Section Influence of Market Concentration

According to our predictions, local competition should have a larger impact on retail prices before the Galland Act than after its enactment. To address this issue, we estimate a reduced-form price equation:

$$log(P^t_{v,s}) = cst^t + \underbrace{\alpha^t_v.Y0^t_v}_{\texttt{product dummies}} + \underbrace{\beta^t_s.Y1^t_s}_{\texttt{store specific}} + \underbrace{\gamma_l.Y2_l}_{\texttt{catchment area}} + \varepsilon^t_{v,s}$$

Table 2 shows the result of cross-section regressions for 1994 and 1999. Coefficients for both years are simultaneously estimated, in order to allow for a comparison of the coefficients. Data for catchment area include our proxy for local competition ("market concentration"), as well as overall population and wealth. As quoted in the section on data, this information comes from the 1999 Census, and does not vary over time. We also control for the types of stores.

This regression shows that the link between local competition and retail prices unambiguously decreased after the enactment of the Galland Act. It is thus consistent with the predictions of our model. On the contrary, the influence of the other characteristics of the catchment area did not change over the period. Besides, these results on the whole dataset are less likely to be affected by selection biases than these of the previous regression. They suggest that hypermarkets partly caught up with supermarkets during the period, while price differences with hard discounters increased. However, the difference with convenience stores and *"magasin populaires"* remained stable, confirming that, on this issue, the results on the balanced dataset were suffering from selection biases. One primary objective of retail regulations in France was to protect local shops, especially in rural areas. One shared opinion among economists holds that the Galland Act could, very indirectly, have partly achieved this role, by filling a part of the price disadvantages of small village shops compared to hypermarkets. Our results would indicate that this effect might have occurred for hypermarkets and supermarkets, but neither for convenience stores nor for *"magasins populaires"*.

Table 2
Log of price in 1994 and 1999

	1994	1999	1999 vs. 1994
Supermarket	0,056***	0,026***	-0,030***
	(0,004)	(0,004)	(0,004)
Hard discount	-0,363***	-0,435***	-0,072***
	(0,019)	(0,012)	(0,020)
Convenience	0,221***	0,209***	-0.012
	(0,007)	(0,009)	(0,009)
Magasin Populaire	0,069***	0,065***	-0,004
	(0,007)	(0,006)	(0,007)
Hypermarket	ref.	ref.	ref.
Market concentration	0,078***	0,046***	0,032**
	(0,016)	(0,017)	(0,018)
log (market population)	-0,015	-0,023**	0,009
	(0,011)	(0,012)	(0,013)
log (market income)	0,037***	0,038***	0,000
	(0,009)	(0,010)	(0,011)
Number of observations	24914	19108	-

Note: Robust OLS estimators clustered by towns. R squared : 0,997. In parenthesis: standard errors. 3, 2 and 1 stars respectively mean 99, 95 and 90 percent significance for a symmetric test (1999 and 1994) or for a directional test (1999 vs. 1994). Not reported : year dummies by product. Sources : IPC, CENSUS, LSA.

4.3 Short-Term Correlation Between Producer and Retail Prices

Table 3
Short-term change in log of retail price

	1994	1999	1999 vs. 1995
change in log of PPI	0,114***	0,363***	0,249***
	(0,033)	(0,081)	(0,087)
Number of observations	67075	52410	-

Note: Price changes are quarter to quarter slides between year - 1 and year. Robust OLS estimators clustered by PPI series*year*quarter. R squared : 0,033. In parenthesis: standard errors. 3, 2 and 1 stars respectively mean 99, 95 and 90 percent significance for a symmetric test (1999 and 1994) or for a directional test (1999 vs. 1995). Not reported : year dummies by type of store Sources : IPC, LSA.

Finally, our model predicted that producers' and retailers' prices short-term varia-

tion correlations increased after the enactment of Galland Act. To address this issue, we compute quarter slides for each series of individual retail prices, between 1993 and 1994, and between 1998 and 1999. We compute the same slides for producer price indices as well. We then regress short-term evolutions of retail prices on those for the matching producer price indices, controlling for the types of stores. Coefficients for both sets of years are simultaneously estimated, in order to allow for a comparison of the coefficients. Table 3 shows that, as predicted, the correlation is way larger after the enactment of Galland Act.

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