

French grocery store prices: Evidence from a price comparison website

(Very preliminary)

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Abstract:

The French supermarket chain Leclerc operates a price comparison website which allows to compare each of its stores with some local competitors, and provides aggregate chain comparisons at the national level. This papers questions the contribution of this website to consumer information and investigates heterogeneity in local market competitiveness across France.

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1 Introduction

Since the seminal paper of Stigler (1961), a large literature on the topic of consumer search and price dispersion has developed. Following Varian (1980), a paradigm has emerged in which price dispersion results from price randomization by sellers in equilibrium. Empirical research has long been hampered by the scarcity of appropriate data. Recent examples include Chandra and Tappata (2011) and ? which measure and investigate local price dispersion in retail gasoline markets. Distance between sellers is used as proxy for consumer information, whose link with price dispersion is shown to be supported by available data.

Despite the complexity induced by the multiplicity of products, competition between retail grocery stores appears to be a natural candidate for empirical investigations on the role of consumer information. Lach (2002), using store-level monthly prices of four homogeneous products sold in Israel, has documented the persistence of price dispersion over time, with sellers changing ranks in price distributions in a way that is consistent with Varian (1980) predictions. Somewhat surprisingly, very few papers have sought to replicate and challenge the findings with more comprehensive data. A recent example is ?, which yet also focuses on four products sold in French supermarkets.

Using price data obtained from the French price comparison website quiestlemoinscher.com, this paper documents static and dynamic price dispersion between French retail grocery stores. The first part of this paper details the data through a review of the methodology used by the website to compare supermarkets. Store comparisons are shown to be actually often highly sensitive to the basket of goods considered, suggesting that it is very costly for consumers to purchase at the lowest price. TODO: comment results + add public policy conclusions

2 Price comparison on Quiestlemoinscher.com

As of 2015, the French retailing industry was dominated by six firms, which accounted for over 80% of total sales: Carrefour and Leclerc were the two largest with c. 20% market shares each, followed by Intermarche (14%), Casino (12%), Auchan (11%) and Systeme U (10%). An important distinction between firms lies in the ownership structures. While Carrefour, Casino and Auchan own most of the stores operated under their brands, Leclerc, Intermarche and Systeme U are essentially franchise networks.

The creation of the comparison website Quiestlemoinscher.com is part of a long term strategy of the group Leclerc to prove the competitiveness of its store prices. Soon after the launch in May 2006, the website was forced to close by a court decision, following a complaint by Carrefour regarding the lack of transparency and potential biases in store and product choices. An updated version of the website was released on November 2006 and has since then remained online. Legal proceedings nevertheless continued until the rejection by the court of cassation of Carrefour's claims

in January 2010.

A major merit of the legal action undertaken by Carrefour is its consequence for the transparency, namely the release of well identified store product price data. The following section provides an overview of the methodology of the comparison website, two crucial aspects of which are the choices of stores and products.

2.1 Products

Before 2013, the website only offered comparisons at the chain level. For each chain, according to Qlmc, prices were collected at a sample of store expected to be representative of the store network. Broad constraints were thus imposed on store location and size, while exact store choice was claimed to be random.

From 2013 on, the development of the "drive" concept in France has allowed the comparison website to cover far more stores, and thus to start displaying store level comparison. The concept of "drive" generally implies that consumers are offered the opportunity to shop online from a physical store (at the same prices) and collect their purchases whenever it suits them. The collection of prices can then be achieved efficiently on the internet, as opposed to traditional store visits. As of March 2015, Qlmc claimed to cover 60% of the stores of the 10 supermarket chains compared (44% in August 2013).

Regarding store level comparisons, Qlmc methodology states that each Leclerc is compared with a selection of its most relevant competitors within 30 km, based on Leclerc managers' expertise. The website also indicates that stores whose surface is smaller than 1,000 m^2 are excluded, as well as stores belonging to chains which are deemed to be too differentiated (e.g. discounters). Finally, Leclerc stores are not included among potential competitors.

As of March 2015, only national brand products are covered by the website. Products are identified at the bar code level. There are seven food product categories: meat and fish, vegetables and fruits, bakery, fresh food, frozen food, savoury grocery, sweet grocery, baby food and drinks. Non food products are split in four categories: health and beauty, household, pets and home and textile. Products are further classified within product families. Regarding chain comparisons, the number of products covered within each family is determined by the volume of national hypermarket and supermarket sales, with a global objective of 3,000 products. Within each family, products are chosen based on the national hypermarket and supermarket detention rate. Products whose detention rate is below 30% (i.e. products referenced by less than 30% of the stores) are dropped. This led to a total of 2,461 national brand product references covered for March 2015 (2,510 in August 2013). As regards store level comparisons, all products found at both stores are used in comparisons.

2.2 Price comparison

The comparison of Leclerc with a competing chain can be described in a few simple steps. First, the average price of each product is computed successively over Leclerc stores and over the competing chain’s stores. Whenever a product is carried by too few stores of one of the two chains, the product is dropped from the comparison. The basket of goods compared is then simply composed by all products for which an average price is available for both chains.

The comparison result displayed by Leclerc is then the percentage difference between the price of the basket for the competing chain and for Leclerc:

$$\frac{\sum_i P_{iC} - \sum_i P_{iL}}{\sum_i P_{iL}}$$

where i refers to all products in the baskets, P_{iC} and P_{iL} respectively stand for the average price of product i for the competing chain (C) and for Leclerc (L). The comparison between two stores is very similar except that it uses store prices instead of average chain prices.

3 Data and replication of price comparisons

This section provides an overview of the data collected from the website in 2015 and of the replication of its results. Potential biases in terms of store and product selection are discussed, and the robustness of results is checked with 2007-2012 data. In March 2015, the website was explored with a view to find the best way to extract price data. The only feasible solution appeared to successively crawl comparisons between Leclerc stores and each of their competitors. This implies that obtained data are less exhaustive than the full price database used by QLMC to establish chain level comparisons.

3.1 Leclerc competitors

A total number of 575 Leclerc stores were found to be listed on the website. The comparison of each store with its respective selection of competitors yielded 2,390 pairs of stores, involving 1,815 unique Leclerc competitors (the number of pairs is larger since a store can be listed as a competitor of several Leclerc stores). Data were missing for 14 Leclerc stores and 51 Leclerc competitors. This implies that among competitors of the 561 Leclerc stores for which price data have been collected, 36 out of 1811 are missing ($\leq 2\%$).

Table 1 provides an overview of store coverage for the ten national chains compared on Qlmc. Coverage is high and rather close to coverage in the full qlmc sample for chains which are characterized by large store surfaces: Auchan, Carrefour, Cora, Geant and Leclerc. This can be explained by

the fact that Leclerc is present across all regions and operates rather large stores. Regarding chains with smaller store formats, coverage is lower in percentage and also generally with respect to the full qlmc sample (e.g. 22% for Casino vs. 39% claimed by the website). Two natural explanations are the fact that stores from these chains are generally less likely to be considered relevant local competitors for Leclerc stores, and the slower development of "drive" within smaller stores (which make price collection less costly).

Table 2 provides an overview of competition according to qlmc comparisons (the website does not claim to be comprehensive). On average, a Leclerc store is compared with 5 competitors, and over 50% over Leclerc stores are compared with a store located within 2 km. The furthest competitor is generally within 30 km (15 km for almost half of them), except for 28 stores. For 14 Leclerc stores, the closest listed store is over 10 km away. No store meets these two criteria, hence it does not seem obvious that the lack or omission of nearby competitors led to include stores beyond reasonable distance. For instance, the Leclerc outlet which has the furthest competitor in the data (67 km) is listed with 7 competitors, of which 5 are located within 30 km.

3.2 Products

Price records obtained from the website include all products used in each store level comparison. As a consequence, there are 12,318 unique products in the data as of March 2015. Table 3 provides an overview of the relative weights of each section in terms of product number and value. The five largest sections, regardless of the criterion, are Fresh products, Health and Beauty, Savoury Grocery, Sweet Grocery and Drinks. Families within each sections are detailed in table 4. Drinks and Health and Beauty products tend to have a larger value than other categories', so that they account for a significantly higher share in terms of value than product count.

3.3 Chain and store level comparisons

Results for chain level comparisons performed according to the methodology described in the website documentation are reported in table 5.

3.4 Comparison history

Collected data can be used to compare prices across periods and therefore to explain part of the changes recorded in successive chain price comparisons displayed by the website. Inflation between two successive periods is computed by comparing the sum of average prices of all products available over the two periods. Variations can then be multiplied to obtain statistics over longer periods.

Leclerc prices between May 2007 and May 2012 have increased by 1.13% (average annual increase of 0.25%). Until May 2011, other chain display similarly low variations. This translates in a relative

status quo in chain comparison results. Geant Casino is then the most expensive chain (+6% to +10% vs. Leclerc), followed by Cora and Carrefour Market (+5%). Auchan, Carrefour, Geant Casino, Intermarche and Systeme U display rather similar price levels (+3-4%). After May 2011, most chains display a progressive loss in competitiveness as compared to Leclerc. A remarkable exception is Geant Casino which, after a peak at +13.8% vs. Leclerc in September 2012, becomes increasingly price competitive from May 2013 on. Carrefour appears to be willing to match this progression in 2014, and then to give up in 2015. As a consequence, while Geant Casino was the most expensive chain at the beginning of the period studied, it is the closest competitor of Leclerc in terms of price level as of March 2015 (+1.3% vs. Leclerc, to be compared with +12.2% in March 2013). Intra-chains comparisons between May 2014 and March 2015 suggest that the relative loss in price competitiveness of Carrefour actually results from a mild change in prices by Carrefour (-1.4%) contrasting with significant cuts implemented by other chains (e.g. -4.3% for Auchan, -5.1% for Leclerc, -5.2% for Intermarche). Geant Casino achieves its unprecedented level of price competitiveness through an 8.5% decrease.

4 Measuring and accounting for price dispersion

Since its creation in 2007, Qlmc prominently displays aggregate comparisons with its major national competitors. On the one hand, such information may be considered relevant by consumers willing to adopt a rule of thumb which weighs the cost/time of transportation with prices and products expected to be offered in a store of a given chain. On the other hand, without being deceptive per se, such comparisons could simply reflect differences in store characteristics such as location, size, market competitiveness etc. In order to address this issue, this section first investigates price dispersion within chains, and then discusses the possibility to account for prices through observed store and market characteristics.

4.1 Chain pricing policies

French supermarket chains are known not to implement uniform national pricing policies. Empirical investigations however reveal different degrees of price dispersion within chains.

4.2 Differentiation, market and store characteristics

4.3 Rank reversals

Todo: report on rank reversals intra and inter periods. Link with distance between stores?

4.4 Market dispersion

Todo: quantify and explain market dispersion. Link with competition intensity?

References

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A Store data

Table 1: Representation of major national chains

	France	QLMC		Data	
	Nb stores	Nb stores	Coverage	Nb stores	Coverage
Auchan	142	125	88%	112	79%
Carrefour	222	188	85%	171	77%
Carrefour Market	925	421	46%	239	26%
Casino	392	151	39%	76	19%
Cora	58	58	100%	54	93%
Geant	108	108	100%	92	85%
Intermarche	1,770	1,022	58%	530	30%
Leclerc	579	579	100%	561	97%
Simply Market	305	50	16%	49	16%
Systeme U	1,030	632	61%	413	40%
Total	5,531	3,334	60%	2,297	42%

Data about store chains were provided by LSA, which is the source used by Qlmc.

Table 2: Overview of competition around the 575 Leclerc stores in Qlmc

	Nb competitors	Distance (km) to			
		closest	furthest	mean	median
Mean	5.0	2.4	15.9	8.8	8.5
Std	1.6	2.5	9.7	5.1	6.0
Min	1.0	0.1	0.9	0.8	0.5
Q10	3.0	0.7	4.6	3.0	2.5
Q25	4.0	1.1	8.4	4.8	3.7
Q50	5.0	1.8	15.3	7.8	6.5
Q75	6.0	2.7	21.5	12.3	12.5
Q90	7.0	4.7	26.3	15.7	18.0
Max	12.0	21.1	67.0	28.6	28.5

B Product data

Table 3: Overview of product section weights

	All products		≥ 500 obs		≥ 700 obs	
	Nb %	Value %	Nb %	Value %	Nb %	Value %
Baby and dietetic food	4.7	4.3	3.9	3.0	3.3	2.4
Drinks	10.0	15.3	10.9	20.4	11.1	21.9
Fresh products	21.1	15.5	19.8	16.7	18.4	15.2
Frozen food	3.0	3.1	3.0	3.9	2.4	3.1
Health and beauty	17.3	26.9	11.5	12.8	12.4	13.4
Home and textile	2.5	3.4	0.5	0.7	0.3	0.4
Household	5.5	6.8	5.5	6.8	5.8	7.2
Pets	1.9	2.8	3.0	4.4	3.0	4.5
Savoury grocery	16.5	9.4	19.6	12.5	20.4	12.6
Sweet grocery	17.0	12.3	22.1	18.8	22.8	19.2
Vegetables and fruits	0.5	0.4	0.2	0.2	0.2	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total Nb or Value (euros)	12,318	43,883	3,467	9,138	2,578	6,682

Table 4: Overview of product families within sections

Section	Families
Baby and dietetic food (573)	Baby food (418); Dietetic products (155)
Drinks (1,233)	Beer and Spirits (443); Fizzy drinks and Cola (244); Water (176); Juices and Smoothies (110); Squash and Cordial (101); Wine, Champagne and Cider (159)
Fresh products (2,595)	Butter and Cream (199); Meat (490); Cheese (491); Milk and eggs (150); Fish (98); Delicatessen (660); Yoghurts and Chilled Desserts (507)
Frozen food (368)	Ice cream and Frozen yoghurt (101); Frozen vegetables and fries (91); Frozen pizzas, pies and ready meals (128); Frozen Meat and Fish (48)
Health and Beauty (2,127)	Kitchen Roll and Tissues (86); Oral care (169); Feminine care and Baby changing (138); Drugstore (97); Haircare (558); Face and body skincare (951); Men toiletries (128)
Home and textile (308)	DIY and Car (9); Kitchen and dining room (50); Home Office (171); Batteries, lightbulbs and plugs (54)
Household (679)	Air fresheners and insect killers (118); Laundry (124); Cloths, Gloves and Scourers (45); Cleaning (225); Dishwashing (64); Specialist laundry and Washing machine cleaner (103)
Pets (239)	Cat and dog food (233); Litter (6)
Savoury grocery (2,032)	Snacks (214); Condiments and Spices (609); Canned goods (406); Pre-cooked dishes (205); Pasta, Rice and Flour (328); Soups (270)
Sweet grocery (2,099)	Biscuits (294); Coffee and Tea (368); Chocolates and sweets (450); Desserts, Sugar and Sweeteners (318); Breakfast (453); Cakes (215)
Vegetables and fruits (65)	Fruits (65)

C Comparison data

Table 5: Comparisons at the chain level

	Nb stores		Nb products		Comparison vs. Leclerc			
	Qlmc	Data	Qlmc	Data	Qlmc	Data	Bias 10%	Bias 20%
Auchan	125	112	1,976	2,382	+7.6%	+6.5%	+5.5%	+5.0%
Carrefour	188	171	1,294	1,284	+7.8%	+8.2%	+7.0%	+6.0%
Carrefour market	421	239	2,032	3,401	+13.5%	+12.4%	+11.6%	+10.2%
Casino	151	76	na	1,650	+16.7%	+16.8%	+15.8%	+15.4%
Cora	58	54	1,326	2,994	+10.2%	+9.4%	+8.3%	+7.3%
Geant Casino	108	92	1,582	1,582	+1.8%	+1.5%	+0.7%	+0.4%
Intermarche	1,022	530	1,971	6,287	+7.0%	+7.1%	+5.8%	+5.0%
Simply market	50	49	na	1,070	+12.9%	+13.4%	+11.6%	+11.2%
Systeme U	632	413	2,386	4,565	+6.7%	+5.8%	+4.8%	+4.7%

Comparisons are based on 561 Leclerc stores (vs. 581 in Qlmc). In the column "Bias 10%", the 10% products which compare most favorably for Leclerc in terms of percent price difference are dropped.

Table 6: Comparisons between Leclerc stores and their competitors by chain

	Nb pairs	Comparison of Leclerc stores vs. competitors by chain						
		Mean	Std	Min	Q25	Q50	Q75	Max
Auchan	118	+6.5%	3.3%	+1.6%	+4.1%	+5.7%	+8.3%	+19.5%
Carrefour	175	+8.2%	5.2%	-3.5%	+5.8%	+8.1%	+9.4%	+36.2%
Carrefour market	235	+13.8%	3.3%	+1.3%	+11.7%	+13.5%	+15.8%	+24.5%
Casino	57	+17.9%	4.8%	+0.5%	+16.8%	+18.7%	+21.0%	+27.5%
Cora	57	+8.6%	2.4%	+3.6%	+6.7%	+8.4%	+10.3%	+15.6%
Geant Casino	99	+1.8%	1.5%	-0.6%	+0.7%	+1.3%	+2.3%	+5.3%
Intermarche	525	+7.1%	2.8%	+2.0%	+5.4%	+6.6%	+8.2%	+28.4%
Simply market	49	+13.4%	6.2%	+6.5%	+9.8%	+10.6%	+15.4%	+31.8%
Systeme U	355	+6.7%	4.0%	+1.1%	+3.8%	+5.8%	+8.7%	+26.0%

Pairs are required to include 400 products or more. There are 118 comparisons between a Leclerc store and an Auchan store. On average, an Auchan store is 6.5% more expensive than its Leclerc competitor.

D Chain pricing policies

Table 7: Distribution of the frequencies of the most common price per product

	Nb	Mean	Std	Min	Q25	Q50	Q75	Max
Auchan	416	0.19	0.11	0.05	0.12	0.16	0.22	0.63
Carrefour	319	0.29	0.17	0.07	0.17	0.23	0.36	0.87
Carrefour Market	777	0.33	0.19	0.11	0.20	0.26	0.42	1.00
Geant Casino	417	0.89	0.10	0.45	0.83	0.91	0.97	1.00
Casino	157	0.37	0.15	0.06	0.29	0.33	0.44	0.86
Cora	364	0.20	0.11	0.06	0.14	0.17	0.23	0.90
Intermarche	1,326	0.25	0.19	0.05	0.13	0.18	0.29	0.97
Leclerc	1,788	0.38	0.23	0.03	0.14	0.38	0.59	0.95
Systeme U	1,077	0.39	0.12	0.09	0.32	0.37	0.44	0.91

On average, 38% of all Leclerc stores set the very same price for a given product.

Table 8: Distribution of the frequencies of "standard" prices per store

	Nb	Mean	Std	Min	Q25	Q50	Q75	Max
Auchan	107	0.01	0.01	0.00	0.00	0.01	0.01	0.02
Carrefour	146	0.07	0.03	0.00	0.05	0.08	0.09	0.13
Carrefour Market	223	0.12	0.05	0.00	0.10	0.13	0.15	0.21
Geant Casino	91	0.80	0.23	0.06	0.70	0.94	0.96	0.98
Casino	74	0.04	0.02	0.01	0.03	0.05	0.06	0.09
Cora	54	0.01	0.00	0.00	0.01	0.01	0.02	0.02
Intermarche	513	0.07	0.03	0.00	0.05	0.08	0.10	0.17
Leclerc	552	0.28	0.12	0.01	0.19	0.31	0.38	0.51
Systeme U	409	0.08	0.05	0.00	0.04	0.06	0.12	0.17

A price is considered "standard" if it is shared by 50% of the chain stores or more. On average, a Leclerc store sells 28% of its products at a "standard" price.