Retail sector concentration, consumer prices and SMEs performance in Italy.*

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Abstract

We conduct a theoretical and empirical analysis to study the relationship between retailers'countervailing power and price dynamics.

Based on Nielsen structural data on Italian retailers, we propose an empirical model aimed to analyse the relationship between market concentration and price dynamics, with particular reference to the food compartment in Italy in the 2003-2010 time span. We focus on concentration both at the parental company and at the buying group level, in order to investigate how changes in the market and/or buyer power allocation can possibly affect price levels and consumer welfare. We find that local markets characterized by a higher concentration index at the buying group level generally entail lower consumer price levels. As a second step, we analyse the vertical relationship between retailers and producers in order to understand whether this result can be explained by an increase of retailers' bargaining power towards producers (buyer power hypothesis), which could ease the pass-through. We find that in local markets characterized by higher concentration at the buying group level, the production value and size of small local producers are lower, confirming our intuition.

KEYWORDS: Countervailing power, buying group concentration food prices.

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1 Introduction

As the basic link between producer (upstream) and consumer (downstream), the distribution sector is crucial to the functioning of a market economy and plays a major role in price formation. In fact, because distribution margins – the difference between the off-factory price of a good and the price to consumers- account, on average, for between 10 and 50% of the price of a consumer good, the market structure and degree of efficiency of a distribution system has a considerable impact on price levels and dynamics.

About 60% of the firms operating in the distributive trade sector belong to the retail compartment, which is also the most analyzed in the economic and business literature (Euromonitor International, 2000-2010, Pricewaterhouse Coopers, 2000). According to the Euromonitor data, the total number of grocery stores in the euro area is about 850,000: both Italy and Spain have more stores than Germany and France despite their smaller populations. As to the sales area, Germany (40 million sqm) and France (30 million sqm) account for the largest proportion in the euro area (150 million sqm). This inverse correlation captures a strike divide in European grocery: Southern European countries such as Greece, Cyprus, Italy, Portugal, Spain and Malta tend to have more traditional smaller grocery retailers than some of the Northern European countries such as Finland, Germany, France and Austria.

A key feature of the grocery retail sector is the role of buying groups. According to IGD (the Institute of Grocery Distribution), "A buying group is an organization of retailers that combines the buying power of its members in order to be able to purchase goods at a more advantageous rate than might be achieved through individual negotiation. In addition to seeking lower purchase prices, "buying groups may seek to secure a range of other benefits for members, including special promotions, rebates and own brand ranges". Buying groups are important because, by combining the buying power of their individual members, they can achieve a very large scale and potentially alter the balance of power in negotiations between retailers and suppliers. Their existence also implies that measures of competition based on company level data may overstate the true level of competition and understate their bargaining power relative to suppliers. Balan (2007) cites the major generating factors behind the emergence of buying groups as (a) increased power of manufacturers and (b) the need to compete with hard discounters. With regard to the former, she notes that "in France, the first eight global industrial groups in the agri-food sector have a market capitalization higher than Carrefour and that the degree of concentration is very high in some food industries (Kraft represents 44.7% of coffee sales; Procter & Gamble 32.2% of detergents; Nestlé 32.3% of chocolate drinks; Kellog's 43.2% of cereals; Masterfoods 35.7% of pet food (Salto, L., 2007, II-102)." The largest European buying group, EMD, comprises of more than ten national supermarket chains, operating across 19 countries, with a combined turnover of approximately €120 billion. In 2011 this buying group extended its potential purchasing power even further with the admission of Casino (a French retailer with a turnover of almost €30 billion). The net impact of buying groups on competition and social welfare is not straightforward. On the one hand, proponents argue that buying groups help national retail chains compete with large multinational producers and pass-on cost savings to consumers. It is also argued that they potentially provide smaller manufacturers with access to a larger market and opportunities for the production of private

brands that could be distributed at a wider European level. A counter-argument could be that their massive scale provides them with too much bargaining power, especially relatively to smaller producers and smaller retailers.

In Italy, it is alleged that large retailers compel smaller retailers to join buying groups in order to be able to gain access to major suppliers. Although in theory small retailers could benefit from being part of a larger buying group, in practice, the dominant retailer gains a considerable advantage over its smaller rivals. Frequently it will be able to negotiate a lower price for itself than it is applied to the smaller members of the group, plus it also has full knowledge of the terms and conditions under which its smaller rivals are being supplied.

Dobson (1999) argues that the net effects of a buying group are, a priori, uncertain. However, he suggests that the loose affiliation (e.g. no or little cross-ownership, and continued firm-level negotiation with suppliers) within the alliances, as well as the absence of direct (selling) competitors in the same alliance, and the number of competing alliances, mean that the anti-competitive effects are likely to be limited, beyond what results from any supplier economic dependency problem. Chen (2003) proposes a model of cartel applied to the vertical relationship supplier-retailer and explains the consumer welfare enhancing role of countervailing power via the effect that this has on the wholesale prices paid by the fringe firms. In fact, by reducing the latter, countervailing power would induce a fall in final prices. The vertical relationship between producer and retailer in the supermarket industry is also the object of study in Villas-Boas (2009). The author uses demand estimates to compute price-cost margins for retailers and manufacturers under different supply models, when wholesale prices are not observed.

In this article we study the relationship between producers and retailers and the effects of countervailing power on prices, consumer welfare and suppliers' costs and performance. To this aim, we first propose a theoretical model, where we endogenize one possible source of countervailing power: the number of fringe firms that a dominant retailer is willing to admit in its buying group. By optimally choosing the size of the buying group, the dominant retailer is capable to make its counterpart manufacturer's outside option less valuable, gaining some strength in the negotiation process. We also conduct some comparative statics and find a negative relationship between the buying group size and both wholesale and retail prices and consumer surplus.

In the second part of this article, we estimate an empirical model, based on Italian data, that analyses the association between retail market concentration (at the buying group and parent company level) and prices for 8 categories of goods in the grocery food sector between 2003-2008. By assembling a unique data-set, resulting from the merge of AC Nielsen census-ype data on Italian "organized" retailers and price level data from the Italian National Institute of Statistics (ISTAT), we construct the Herfindahl-Hirschman Index (HHI) at the buying group, and at the at the parent company level by province (NUTS3 geographical detail) and investigate the relationship of these measures with price levels across provinces and over time. We find a negative and statistically significant relationship for 6 out of the 8 considered goods, matching the theoretical results.

As a second step, we merge the AC Nielsen data set with the ISTAT Business Survey of Account System of Small and Medium Enterprises (SMEs) database in order to analyze the vertical relationship between retailers and producers. We find that in local markets characterized by an increase of

concentration at the buying group level, production, employment and value added of local producers have decreased. On the other side, we find a negative association between retail market concentration at the buying group level and producers' costs and a positive relationship with average productivity. Our results point to a beneficial effect of grocery retailers' countervailing power on local suppliers' efficiency and productivity, whereas the association with profit margins appears non-significant.

One element of novelty of this study consists in providing a multi-product analysis of the relationship between concentration and prices at different market levels: at the buying group level (where a consortium of retailers and producers bargain the conditions of the retail contract and wholesale prices and selling conditions are established), and at the parent company level (where the degree of concentration influences the relationship between retailers and consumers and final prices are set).

The outline of the paper is the following: in Section 2 we present the theoretical model, serving as a benchmark for discussing our empirical results; in Section 3 we provide a description of the data set and the methods we employ to construct the concentration indices. The econometric analysis and results are discussed in Section 5; Section 6 concludes and proposes possible extensions. Proofs, figures and tables that are not in the main text are provided in the Appendix.

2 The Model

In this section we present a simple partial equilibrium model, where we describe the strategic interaction between a dominant producer that sells its good in the wholesale market and a dominant retailer facing a competitive fringe. The model extends Chen (2003) to incorporate the role of buying groups and their interaction with the other players. In our framework, a dominant retailer optimally sets consumer prices in the final market and also chooses how many fringe firms to admit in a buying group it leads. The novelty of the model stays in allowing for an endogenous component in the bargaining power of the dominant retailer: the buying group size.

The outline of the section is the following: in 3.1 we describe the model setup and its elements (players, market structure, rules, strategy profiles, etc.); in 3.2 we solve for the equilibrium, accurately analyzing each agent's optimization problem.

2.1 The Model Setup

We present a version of the classical two-market levels model with asymmetric agents. In particular, we assume that there is an upstream market where one producer acts as a monopolist and sells its good to $(N+1)$ retailers: one dominant retailer (endowed with market power) and N fringe retailers. The latter may or may not be members of a buying group, controlled by the dominant retailer. Then there is a downstream market, where the dominant retailer, given the market demand, sets the consumer price p and all the fringe firms (in or out of the buying group), take p as given and decide how much to offer. The dominant retailer serves the residual demand.

Here we assume a market structure similar to Chen (2003), with asymmetries at the retail level. This modelling choice is motivated by the fact that it provides a realistic representation of the true market structure in Italy, a desirable property, when we use the model results to interpret the data. As

we have mentioned in the previous section, the Italian retail market since the early Nineties has gone through a gradual process of consolidation and polarization, which has brought about the coexistence of large national and international chain stores (Coop, Conad, Auchan, Carrefour, etc.) and smaller independent stores, not necessarily traditional and highly specialized, as it is the case for France.

In this model we address both vertical and horizontal relationships: the one between the producer and the retailer, with particular focus on the role and the magnitude of the retailer's buying group; the relationship among retailers of different size (dominant and fringe) and different membership (within the same buying group or not).

We consider a multistage game with heterogeneous agents: one dominant producer, one dominant retailer and N fringe retailers. Among the fringe firms a number n^* is optimally chosen by the dominant retailer to enter its buying group. To simplify the analysis we suppose that the goods sold by all retailers are perfect substitutes (there is one hogeneous good).

The dominant producer acts as a monopolist in the market of its product and has constant marginal costs that we normalize at zero. In the wholesale market, it charges a two part tariff, (z_i, F_i), $i = BG$, f, depending if the counterpart is the buying group or the fringe firms. The contract (z_i, F_i) consists of a variable wholesale price z_i that is the cost of one unit of the good and a constant fee, F_i that incorporates non-linear pricing such as slotting allowances, volume discounts and rebates.

The dominant retailer has market power, so that he can set the price p in order to maximize its profit, taking as given market demand $D(p)$ and the share served by the fringe $Ns(\cdot)$. We also assume that at a large scale, the dominant retailer is more efficient than the fringe retailers. Thus, in addition to paying the producer a unit wholesale price z_i the former faces a constant marginal retailing costs, c, whereas fringe retailers incur in increasing marginal costs, denoted as $c'(q_j)$, $j = fBG$, f, with $c''(q_j) > 0$ and $c'(0) = 0$. Therefore, each fringe retailer's total cost function takes the form $C(q_j) = (z_j + c) q_j + c(q_j)$.[1] Thus, the fringe firms supply function can be retrieved as the inverse of their marginal cost:

$$\begin{cases} q_f = c'^{-1}(p - z_f) = s(p - z_f) \\ q_{fBG} = c'^{-1}(p - z_D) = s(p - z_{fBG}) \end{cases} \tag{1}$$

where $s(0) = 0$, $s' > 0$ and $s' + (p - c) s'' > 0$ and we also require $s(\cdot) > c(\cdot)$. Then, the total supply of the fringe is:

$$Q_f = n^* q_{fBG} + (N - n^*) q_f \tag{2}$$

In the multistage game, first the dominant retailer optimally chooses how many fringe firms to admit as members in its buying group (n^*), finding a balance along the trade-off between the reduction in its residual demand (which negatively impacts profits) and the worsening of the dominant producer's outside option; then the domiant producer optimally decides the contrsct to offer to the fringe retsilers outside the buying group; successively the bargaining game between the dominat producer and the buying group tskes place, where the terms of their joint contract are established; finally, the dominant

[1] Similarly, the total cost function of the dominant retailer is given by: $C(q_D) = (z_D + c) q_D$, so that average and marginal costs coincide.

retailer sets market price and at that price all the fringe firms sell their quantity according to their supply schedule. The equilibrium concept we adopt is SPNE. We solve by backward induction.

Stage 4

The dominant retailer sets the consumer price p taking the residual demand $Q_D = D(p) - (N - n^*)\, s(p - z_f)$ and the wholesale prices z_i as given

$$\max_p \pi_{DR} = [(p - c - z_D)\, Q_D - n^* c\,(s\,(p - z_D))] - F_{DP} + n^* F_{fBG}$$

Notice that the profit of the dominant retailer is computed based on the residual market demand served by all the members of the buying group that is larger than its own residual demand. As we will see more diffusely presenting the first stage of the game, the $n^* F_{fBG}$ component, the membership fee paid by the fringe firms entering the buying group, is the term that allows us to solve for the optimal price by considering the whole residual demand, as the profit share that should be redistributed to the other firms is retained by the dominant retailer in form of a fixed part of the contract (it will extract all the rent from the fringe members).

From FOC we have

$$p = \underset{MC}{c + z_D} - \underbrace{\frac{(D(p) - (N - n^*)\, s(p - z_f)) - n^* c'(s(p - z_D))\, s'(p - z_D)}{(D'(p) - (N - n^*)\, s'(p - z_f))}}_{Markup} \tag{3}$$

The price is given by a markup on the marginal cost, which, as expected, is higher the higher the market share served by the dominant retailer (market power) and the lower the residual demand elasticity. Regarding the relationship between the wholesale prices and consumer price, the following holds:

Lemma 1 *An increase in the wholesale prices z_f and z_D respectively paid by the fringe firms outside the buying group and by the buying group's members increases consumer price. Moreover, the increase in consumer price due to a marginal increase of wholesale prices paid by the fringe firms is less than unity*

$$0 < \frac{\partial p}{\partial z_f} < 1 \tag{4}$$

$$\frac{\partial p}{\partial z_D} > 0 \tag{5}$$

At the third stage of the game the two dominant firms bargain on the conditions of a contract, regulating their vertical relationship. This stage is interesting as it differs form the standard literature on vertical integration and cartels in that one counterpart is a consortium of players: the dominant retailer and the small members of its buying group. So the dominant producer faces as its counterpart the buying group as a whole, and not the dominant retailer alone. As a consequence, the conditions that it will agree upon are valid for every member, being it a fringe firm or the dominant one. Let us now examine the bargaining stage.

Stage 3 In this stage the dominant producer and all the members of the buying group (dominant retailer and the n^* fringe firms) negotiate a contract (z_D, F_{DBG}) that maximizes the joint net surplus from the negotiation

$$\Pi_{DPBG} = (p - c)\left(D\left(p\right) - \left(N - n^*\right)s\left(p - z_f\right)\right) - n^* c\left(s\left(p - z_D\right)\right) \tag{6}$$

given an exogenous sharing rule $\gamma \in [0, 1]$.

Lemma 2 *The dominant producer and the buying group optimally agree on a contract* (z_D, F_{DBG}) *such that the wholesale price for each unit of the good*

$$z_D = 0 \tag{7}$$

and the fixed part of the tariff is given by:

$$F_{DBG} = (1 - \gamma)\,\Pi_{DPBG} \tag{8}$$

Proof. *Recalling that* $\frac{\partial p}{\partial z_D} > 0$*, taking the first order condition of* Π_{DPBG} *with respect to* z_D *yields:*

$$\left[(p - c)\,Q'_D + Q_D - n^* c'\left(s\left(p - z_D\right)\right)s'\left(p - z_D\right)\right]\frac{\partial p}{\partial z_D} = 0$$

Therefore the expression in brackets has to be equal to zero and in order for 3 to hold z_D *must be equal to zero.* ■

As expected, the maximization of the joint profits by the dominant producer and its counterpart buying group implies the *no-double marginalization* principle. This is still true, even in a context where one the two players is a coalition of heterogeneous members, the dominant retailer plus the fringe firms admitted in the buying group. Notice, however, that when sharing the gains from trade, $F_{DBG} = (1 - \gamma)\,\Pi_{DPBG}$ is appropriated by the dominant producer while the share $\gamma\Pi_{DPBG}$ is earned by the dominant retailer, that extracts all the surplus from the buying group members up to making them indifferent between participating or not in the consortium. We will discuss this point more diffusely when solving stage 1. Intuitively, given our assumption on the fringe firms' cost function and the timing of the game, being or not a member of the buying group is not a strategic decision for the small firms, which are not fully strategic players. In fact, they are price takers and only decide whether or not to participate in the market. Then, depending on the bargaining power allocation between the dominant producer and dominant retailer, they may or may not enter the buying group, providing that their individual rationality and incentive compatibility constraints are encountered.

Stage 2 In this stage the dominant producer optimally chooses a contract to offer the $(N - n^*)$ fringe retailers left out of the buying group, (z_f, F_f). That is, it maximizes its total profit, the sum of the earnings from the sales to the fringe firms plus the share $(1 - \gamma)$ in the joint profit with the

buying group.

$$\max_{z_f} \pi_{DP} = (N - n^*)\left(z_f s\left(p - z_f\right) + F_f\right) + (1-\gamma)\left(p - c\right)Q_D - n^* c\left(s\left(p - z_D\right)\right) \tag{9}$$

$$s.t. \int_0^{p-z_f} s\left(x\right)dx \geq 0 \ \text{(IRC)} \tag{10}$$

The individual rationality constraint binds, so the dominant producer extracts all the rent from the fringe retailers out of the buying group:

$$F_f = \int_0^{p-z_f} s\left(x\right)dx \tag{11}$$

Substituting the constraint in 9 we obtain:

$$\max_{z_f} \pi_{DP} = (N - n^*)\left(z_f s\left(p - z_f\right) + \int_0^{p-z_f} s\left(x\right)dx\right) + (1-\gamma)\left(\left(p - c\right)Q_D - n^* c\left(s\left(p\right)\right)\right) \tag{12}$$

From 3, we know that p is a function of z_f, therefore the first order condition is given by:

$$\frac{\partial \pi_{DP}}{\partial z_f} = \frac{\partial \pi_{DPf}}{\partial z_f} + (1-\gamma)\frac{\partial \Pi_{DBG}}{\partial z_f} = 0$$

$$z_f = \frac{(N - n^*)\left(s\left(p - z_f\right)\frac{\partial p}{\partial z_f} + (1-\gamma)\left(p - c\right)s'\left(p - z_f\right)\right) - n^*\left(1-\gamma\right)c'\left(s\left(p\right)\right)s'\left(p\right)\frac{\partial p}{\partial z_f}}{(N - n^*)\,s'\left(p - z_f\right)\left(1 - \frac{\partial p}{\partial z_f}\right)} \tag{13}$$

which implicitly defines the equilibrium value for z_f. Regarding the relationship between the wholesale price paid by the frimnge firms z_f and the dominant retailer's countervailing power we have:

Lemma 3 *An increase in the number of fringe firms admitted as members in the dominant retailer's buying group decreases the wholesale prices paid by the fringe firms outside the buying group. Also, the same effect is obtained when there is an increase in the exogenous bargaining power component of the dominant retailer. From 13 we obtain:*

$$\frac{\partial z_f}{\partial n^*} < 0 \tag{14}$$

$$\frac{\partial z_f}{\partial \gamma} < 0 \tag{15}$$

Proof. *It immediately follows from simple comparative statics on the dominant producer's first order condition.* ■

The negative relationship between the wholesale price paid by the fringe outside the buying group and the number of fringe firms admitted as members in the buying group (n^*) goes in the same direction as Galbraith's countervailing power hypothesis. In fact, because $\frac{\partial p}{\partial z_f} > 0$, through this channel the formation of buying groups is beneficial to consumers. This effect also reminds the one analyzed in Chen (2003), when the relationship between consumer surplus and the profit share of the

dominant retailer (γ), interpreted as countervailing power was considered. The main difference with respect to our framework is the fact that here the dominant retailer is endowed with the possibility of influencing its countervailing power: the buying group. In fact, Chen proxies countervailing power with an exogenous parameter, that players take as given, whereas in our framework, the dominant retailer can decide to increase its bargaining power by admitting more members in its buying group. Doing so, the dominant retailer can influence the producer's outside option, by simply trimming the fringe outside. So, once the optimal n^* has been chosen, the only instrument left to the dominant producer to"fight back", is to increase the market share served by "its" fringe firms through a reduction in the wholesale price z_f.[2]

Stage 1 The dominant retailer optimally chooses n^* and the participation fee (F_{fBG}) paid by the fringe firms to enter the buying group, which are made a tke-it-or-leave-it offer, so to

$$\max_{n^*} \pi_{DR} = \gamma \Pi_{DPBG} - \gamma (p-c) n^* s(p) + n^* F_{fBG}(p, n^*, N) \tag{16}$$

$$s.t.\ \gamma (p-c) n^* s(p) - F_{fBG} \geq \int_0^{p-z_f} s(x)\, dx - F_f = 0 \ \text{(ICC)} \tag{17}$$

the constraint binds, so that the fringe firms accepted as members of the buying group are squeezed up to their indifference, the dominant retailer gets all the extra surplus from the buying group:

$$F_{fBG} = \gamma (p-c) n^* s(p)$$

$$\Pi_{DPBG} = (p-c)(D(p) - (N-n^*) s(p-z_f)) - n^* c(s(p)) \tag{18}$$

Thus, the maximization problem reduces to find the optimal level of n^* that maximizes the joint profit Π_{DPBG}. The first order condition can be decomposed into three effects: a direct effect of n^* on the profits, and two indirect effects: through consumer prices and wholesale prices:

$$\frac{\partial \pi_{DR}}{\partial n^*} = \frac{\partial \pi_{DR}}{\partial n^*} + \frac{\partial \pi_{DR}}{\partial p}\frac{\partial p}{\partial n^*} + \frac{\partial \pi_{DR}}{\partial z_f}\frac{\partial z_f}{\partial n^*} = 0 \tag{19}$$

The second term is zero by the envelope theorem, so we focus on the other two components: the direct effect and the indirect effect through z_f. Thus, we have

$$n^* = N + \frac{s(p-z_f) - c(s(p))}{s'(p-z_f)\frac{\partial z_f}{\partial n^*}}$$

n^* is the "optimal" dimension of the buying group on its leader's point of view. For a fixed N, exogenously given, it can also be interpreted as a measure of buying group degree of concentration In fact, the higher n^*, the lower the number of fringe firms outside the buying group and the less valuable

[2] As $s'(p-z_f) > 0$ this will boost their supply and correspondently reduce the other players' residual demand. This countermove is also intended to reduce the other player's outside option: the higher the share of market demand served by the external fringe, the lower the share served by the buying group members, the lower the incentive to form a large buying group at all.

the seller's outside option. It is interesting to notice that n^* is lower the larger is market demand and the lower the portion of it served by the fringe firms: when a dominant retailer serves already a large market share, there is no need to give up on profits to increase its countervailing power, as the producer outside option is already quite low. The same holds for high values of γ : if the dominant retailer has a high bargaining power, there is no need to try to reduce the dominant producer's outside option, at the cost of own market shares. We adopt the following definition:

Definition 4 *A buying group is internally consistent if the dominant retailer does not have incentive to exclude any of its members, whereas it is externally consistent if the dominant retailer does not have incentive to admit a new member into it. A buying group is consistent when is both internally and externally consistent.*

In a framework like the one we have presented so far, where the fringe firms are identical, requiring internal consistency is equivalent to requiring that $n^* > 0$, and requiring external consistency simply means that $n^* < N$.

Lemma 5 *The n^*-members-buying group is consistent* $(0 < n^* < N)$.

This result tells us that the dominant retailer has always incentive to form a buying group in order to increase its countervailing power. On the other hand, as long as the fringe firms are not too inefficient, it is optimal not to admit all of them in the buying group, as the membership, by reducing their costs, increases their supply and imposes a sacrifice in terms of residual demand on the dominant retailer. So the latter will choose the buying group dimension in order to find a balance along this trade-off.

Lemma 6 *The higher the dominant retailer's exogenous bargaining power γ, the lower the optimal dimension of the buying group:* $\frac{\partial n^*}{\partial \gamma} < 0$.

This simple result is very intuitive: a dominant retailer that is already in a position of strength in the vertical relationship with its supplier does not have incentive to sacrifice a large market share to further increase its countervailing power, as the cost would exceed the benefit, so it will choose a lower value of n^*.

Proposition 7 *An increase in the dimension of the buying group (a high n^*) translates into a reduction in consumer prices* $\left(\frac{\partial p}{\partial n^*} < 0\right)$ *and into an increase of consumer surplus* $\left(\frac{\partial CS}{\partial n^*} > 0\right)$.

Proof. We provide here a brief sketch of the proof, whereas we relegate the details in the appendix. Regarding the relationship between consumer prices and buying group concentration, $\frac{\partial p}{\partial n^*} < 0$ there are two effects to be considered: a direct effect of n^* on the markup, which is always negative, intuitively if there are more firms in the buying group, the market share of the dominant retailer is lower; an indirect effect through the wholesale prices,also negative, as an increase in n^* generates a fall in z_f, as a reaction of the dominant producer, trying to boost its own outside option. Then, it is straightforward to show that

$$\frac{\partial CS}{\partial n^*} = -D(p)\frac{\partial p}{\partial n^*} > 0$$

■

This result points to a consumer welfare enhancing role of buying group level concentration that is very similar in the spirit to the countervailing power argument à la Galbraith (1954). In our model, an increase in the dimension of a buying group benefits consumers because it makes the outside fringe thinner and also reduces the share of market demand served by the dominant retailer. So there are two ways through which an increase in n^* reduces prices: on the one hand, the dominant producer has incentive to diminish the wholesale price z_f, in order to increase the market share of the external fringe (which it can extract the whole rent from); on the other hand, by admitting more small firms in the buying group, the dominant retailer has to give up some of its market share, as the other members enjoy its same favorable conditions in the vertical relationship with the supplier ($0 = z_D \leq z_f$, so that $s(p - z_D) \geq s(p - z_f)$). These effects depress the markup and increase consumer surplus. As in Chen 2003, also in our framework the countervailing power result does not rely on the dominant retailer passing on a lower wholesale price to consumers, but it is the result of the two dominant firms'strategic use of the competitive fringe, when it comes to their vertical relationship. In Chen 2003 the countervailing power was exogenously given and was represented by the dominant retailer's surplus share γ (bargaining power). In our model, the sources of countervailing power are two a priori: the surplus share, γ, and the possibility to the dominant retailer of forming a buying group. Thus, while the first source is exogenous and may depend on many market factors (often unobservable and idiosyncratic to a specific context), the second one is a choice variable, intended as an instrument to increase, if needed, the retailer's power. We have shown that, if N is fixed, a larger buying group makes the dominant producer's outside option (its profit from selling to the fringe) less viable, inducing a lower wholesale price. The drawback on the dominant retailer's point of view is that, doing so, it gives up a portion of its market share to countervail its opponent. The buying group optimal dimension responds to the need of finding a balance along a trade-off between its market power and its strength in the vertical relationship with the seller.

We are now ready to present the empirical analysis, whose results will be evaluated in the light of the theoretical model's.

3 Empirical Analysis

In this section we propose an empirical analysis, investigating the relationship between retail market concentration (at the vertical and horizontal level) and price dynamics and local producers' performance in Italy, with particular reference to the food compartment. We first provide a detailed description of the data, then present the model and the results. Tables and charts are relegated to the appendix.

3.1 Data

The econometric analysis is based on a unique data set, constructed by merging the structural AC Nielsen data with the consumer price levels data (average prices at the NUTS3 geographical detail)

and with the Business Survey of Account System of Small and Medium Enterprises (SMEs) data , both provided by the Italian National Statistical Institute.

The data-set used in the first part of our empirical analysis is obtained merging:

1. a census-type structural data-set on Italian "organized" retailers (source: AC Nielsen);
2. the price level data from the harmonized consumer survey (average, minimum and maximum recorded in each Italian province, NUTS3 geographical detail) used to compute the HICP and CPI indices for Italy (source: ISTAT).
3. ISTAT census population data as controls.

The data-set used in the second part of our empirical analysis is obtained merging:

1. the structural data from AC Nielsen (see point 1 above);
2. the Business Survey of Account System of Small and Medium Enterprises (SMEs) data (source: ISTAT).
3. ISTAT census population data as controls.

3.1.1 The AC Nielsen Data

The AC Nielsen data set provides structural information on the universe of so called "organized" retailers. To be included in the data-set a retail store has to satisfy the following criteria:

1. **Sector:** it has to belong to the "non- specialized retailers with a prevalence of food products" (NACE Rev. 1.1 G5211);
2. **Size:** its sales area has to be larger than or equal to 100 sqm;
3. **Service:** the store must have self-service aisles.

So, for instance, the specialized stores and very small convenience shops are not included. The time span is 2003-2008. The yearly average number of stores is 28,125. There are 32 parental groups and 9 Buying groups. Anagraphical information is available for each retailer in the population: name, exact address, banner, outlet type (superette, supermarket, hypermarkets and discount), square meters, number of tills, employees (by class), share of turnover, parent company (if any), buying group (if any). These data are used to build different synthetic concentration measures (CR_k, HHI, and so on), based on sqm, tills and turnover. These indices are constructed at different market levels of aggregation, at the store level, at the parent group and at the buying group level.[3] In our empirical analysis we focus on the HHI index constructed using sales area[4]

[3] We choose province as the reference market because our second and third datasets have province level data. Wer also construct the concentration measures at a more local level 5 and 10 km radius, but this level of detail, although very interesting, in terms of market sructure, is not useful to our aim as we are forced to reaggregate ex post taking averages at the province level.

[4] We make robustness checks using also the other measures and results did not change.

The general formula employed for HHI is:

$$HHI_j = \sum_{\substack{i=1 \\ i \in j}}^{N} s_i^2$$

and the k-firm concentration ratio is

$$CR_k = \sum_{i=1}^{k} w_i s_i$$

where $i = 1, \ldots, n$ are are the stores or parent groups or buying groups and j is the province (our market of reference). CR_k is k^{th} order statistic, the sum of the k largest firms' market shares, which are given equal weight. Chart 1 depicts a scatter plot of the CR_3 and HHI measures at the buying group level for our data-set. The two measures provide an analogous description of market concentration. In chart 3, we present a description of concentration dynamics (HHI measures) at the different market levels in the last four years in Italy. Concentration decreases at the store and parent group level, particularly in larger provinces, while it increases at the buying group level. The picture emerging from the AC Nielsen data is one of a quite fragmented market, particularly when we compared to other EU countries[5]. In particular, the TOP 1 retailer (parental group) owns a market share of approximately 22%, whereas the share of independent retailers (i.e. not belonging to any parent company, fringe firms) accounts for 30% of retailers and corresponds to a sales area of 22%. Stores that do not belong to any buying group account for 20% of firms' population (13% of total sales area).

3.1.2 The Price data

The second source of data we employ in our analysis is the ISTAT(Italian National Institute of Statistics) price levels data, which are the basis for the harmonized index of consumer prices (HICP) computation. These data are available for all the 12 COICOP categories at the 4 digits of detail (apples, milk, bottled mineral water, etc.). The price levels ISTAT releases are average, min and max recorded in a province in a given month. Due to missing data, we choose the 2-digit level of detail (non-alcoholic beverages, meat and poultry, dairy products, oil and butter, pasta and cookies, canned tuna, fruit, vegetables) and we restrict our focus to the COICOP1 category (food and non alcoholic beverages). This choice is dictated by the need to consider products that are sold in all our outlet types. For instance, if we were to consider COICOP 3 (clothing and footwear) or 5 (house furniture and household apparels), we would implicitly exclude superettes and smaller supermarkets and discounts from the analysis. So, when looking at the relationship between concentration indices and prices we might be capturing many other elements (and unobservables) and the omitted variables bias could be very serious. Moreover, in the second model, when we look at the relationship with small and medium production enterprises performance, the analysis could be misleading as the approximation to the local market would be much more difficult to sustain. In fact, apart from food products, most of the goods in the other COICOP categories, which are sold in super- and hyper-markets are imported

[5] Euro System task force, Structural Issues Report, 2011.

from China and the Far East and we would incur the risk of capturing import dynamics. Therefore, we select 8 products in COICOP1 that are representative of the average Italian consumption bundle, accounting for over 13% of total average consumer expenditure[6].We aggregate monthly into yearly data for the time period 2003-2008.

3.1.3 The SMEs Performance data

The third source of data is the ISTAT Business Survey of Account System of Small and Medium Enterprises (SMEs) database on small and medium firms. Small and Medium-sized Enterprises (SME) sample survey is carried out annually by sending a postal questionnaire with the purpose of investigating profit-and-loss account of enterprises with less than 100 persons employed, as requested by SBS EU Council Regulation n. 58/97 and 295/2008[7]. The survey covers enterprises belonging to the following economic activities according to the NACE Rev.1.1 classification:

- Sections C, D, E, F, G, H, I, J (division 67), K;
- Sections M, N and O for the enterprises operating in the private sector.

Main variables of interest asked to the SME sampled enterprises are Turnover, Value added at factor cost, Employment, Total purchases of goods and services, Personnel costs, Wages and salaries, Production value. They are also asked to specify their economic activity sector and geographical location in order to test the correctness of the frame with respect to these information. This survey data are collected on a sample of 4.5 millions of firms between 50 and 250 persons employed and having revenues between 7 and 40 million €.

We restrict our attention to those firms that are local producers of food grocery products. In particular, we consider the following ten products: mineral water, meat and poultry, cereals, fruit processing, ice cream, dairy products, oil and butter, pasta and cookies, canned fish and wine. For firms operating in these compartments we look at costs and performance indicators with the objective of shading some light on the relationships among retailers' market structure (in particular concentration at the buying group level) in the downstream market and costs and performance dynamics of their local suppliers.

3.2 Empirical Model 1: Retail Sector Concentration and Consumer Prices

In the first specification, we consider the following model:

$$\ln p_{ijt} = a_t + b_j + c_i + \alpha_i H_{jt}^{BG} + \beta_i H_{jt}^{PG} + \zeta X_{jt} + \varepsilon_{ijt}$$

The dependent variable is the price level (in log) of good i in province j at time t. The main explanatory variable is the Herfindahl Hirschman Index, computed at the buying group $\left(H_{jt}^{BG}\right)$,and at the parent

[6] The hiughest in the EA, but close to France and Spain.

[7] The survey collects data on both small and medium enterprises (4,500,000 overall). Small enterprises are below 50 employees and less than 7 ML € revenues; medium enterprises have between 50 to 250 employees and 7-40 ML € revenue.

company level $\left(H_{jt}^{PG}\right)$.[8] In order to take into account possible differences across product categories, the concentration indices have been interacted with product dummies for the eight classes of interest (the coefficients are indexed by product). We also include year, province and product fixed effects (a_t and b_j and c_i) in the regression, aimed at capturing the common component in prices in a given year (commodity prices, exchange rate, global economic cycle, monetary stance, etc...) and specific characteristics of local markets and goods respectively. Xit is a vector of other explanatory variables having a province and a time varying component that we include as controls. Xit includes province population density, population growth, average age of population, area size and a measure of local labour cost. The errors are clustered by province. The identification strategy of the model is based on the time-spatial variation that is the variability of retail market concentration across years and provinces.

The results of the regression are summarized in table 1. When considering the Herfindahl-Hirschman index at the buying group level, the coefficient is negative and statistically significant for beverages, cookies and pasta, canned tuna, oil and butter and at 5% level for diary products, while it is non significant for meat and poultry and positive and significant for fruit and vegetables (column 3, HHI(B) in Table 1). The interpretation of these findings is that a higher degree of market concentration at the buying group level (many retailers joining together in large purchasing consortia), increasing each retailer's bargaining power towards producers, seem to be associated with negative price dynamics. Thus, we observe in the data the same effect we have been discussing in the theoretical model: in that context a marginal increase in n^* corresponded to a fall in consumer prices, both because of a lower residual demand served by the dominant firm and because of a negative indirect effect on wholesale prices paid by the external fringe firms. The data also point to welfare-enhancing effect of buying group concentration for consumers in these product categories. An exception is represented by fruit and vegetables, whose price is positively related to the HHI at the buying group level. In order to further investigate this issue, we conducted 20 qualitative interviews with market operators, representative of the upstream and downstream markets (10 large retailers and 10 producers/suppliers)[9]. Among other interesting information regarding vertical relationships and the role of buying groups, the operators pointed out the fact that fruit and vegetables are a "special" product category that is not traded through the buying group, but independently. Therefore, our result could reflect a waterbed effect. A dominant retailer that is forced to reduce its prices by an increase in the number of competitors admitted in its buying group, may respond by using the higher market power that it is endowed with in other product categories, where its bargaining power is higher as well. This explanation, far from being exhaustive, could find a rationale in the fragmented structure of the agri food market in Italy.[10]

When we consider the coefficients associated to the Herfindahl-Hirschman Index at the parental

[8] We chose to consider concentration at the parent company rather than at the store level as a proxy of horizontal market power, because we assume that there is no competition among stores within the same parent company .

[9] For a detailed description of the interviews, see Viviano et al. "Il settore alimentare: problematiche dell'industria e della grande distribuzione organizzata", Bank of Italy, 2011.

[10] Italian agriculture is based on small farms, logistically quite inefficient, very easy prey of intermediaries and large distributors.

group level for our eight product categories, we find that they are positive and statistically significant (respectively at 10 and 5 per cent level) for meat and poultry products and canned tuna, while they are non significant for the other categories (Table 1)[11].

A possible explanation to the non-significance of the coeffcients for the parent company concentration measures is that the two indices are correlated (the correlation is 0.73). Because both measures are computed based on market shares in terms of sales area and, because there is often overlapping between the two variables in the data, the resulting indices are obviously correlated. In fact, we can express one in terms of the other one as follows:

$$\begin{aligned} HHI(B) &= \sum_b s_b^2 = \sum_b \left(\sum s_{b,g}\right)^2 \\ &= \sum_b \left(\sum s_{b,g}^2 + 2\sum s_{b,g}s_{b,h}\right) \\ &= \sum s_{b,g}^2 + 2\sum_B \sum s_{b,g}s_{b,h} \\ &= HHI(P) + 2\sum_b s_b^2 \sum \alpha_{b,g}\alpha_{b,h} \end{aligned} \tag{20}$$

where $s_{b,g}$ is the market share of company g in buying group b, $h \neq g$.

This is not necessarily to be seen as a limitation of the way the model is specified, as it reflects a characteristic of the Italian retail market. In fact, the buying group are usually consortia with a leader (dominant firm) and many smaller satellite firms, which do not weight much in terms of sales area. In fact, when we test whether the two measures are equal, we can reject the null at standard confidence level for four out of eight categories: meat and poultry, canned tuna, (the two with a statistically significant coefficient), oil and butter and fruit. In order to disentangle the direct and indirect effects of the HHI(B) regressor, we perform the Gram-Schmidt-Choleski hierarchical orthogonalization and estimate the following model:

$$\ln p_{ijt} = a_t + b_j + c_i + +\beta_{1i} HHI(P)_{jt} + \beta_{2i}\widehat{u}_{ijt} + \pi X_{ijt} + \eta_{ijt} \tag{21}$$

where $\widehat{u}_{ijt}$ are the residual of the auxiliary regression of HHI(B) on HHI(P), interacted with product dummy i. The results of the decomposition are summarized in Table 2. All the coefficient associated to the residual are negative and statistically significant (with the exception of fruit and vegetables that are positive). The coefficent associated to parent company indices are non-significant apart for meat and canned tuna, where we retrieve (as expected) the same positive sign and significance level as before. So the effect of concentration at the buying group level seem to dominate the one at the parental group level. The coefficent associated to parent company indices are non-significant apart for meat and canned tuna, where we retrieve (as expected) the same positive sign and significance level as before. So the effect of concentration at the buying group level seem to dominate the one at the parental group level.

[11] Notice that, though they are not statistically significant, the coefficient associated to fruit and vegetables are negative, showing also in this case a reverse sign compared to the other categories.

An endogeneity problem could affect the results from many sources: on the one hand we can have an omitted variable bias, for instance, if there is an increase in wholesale prices, smaller stores could exit the market or could join a buying group. In this case consumer price increase due to an increase in input costs and buying group level concentration decreases because of a drop in the demand share served by the fringe. Also a reversed causality problem could drive the results: concentration is higher where prices are higher (more profitable to open stores).

We attempt to address these issues by an instrumental variable regression approach. We look for an instrument to proxy retail market concentration that is uncorrelated with prices. Our proposed IV variable is building permits for commercial use only, issued between 2003 and 2008. The reasoning behind this choice is that where many building permits are issued concentration at the local level should be lower. In particular, we restrict our attention to permits of enlargement of existing buildings in order to minimize the risk that the instrumental variable is not exogenous[12]. The instrument appears correlated to our concentration measures (-0.3). The results of the IV regression are shown in table 3 for the buying group level[13]. The coefficent associated to our IV is negative and statistically significant for all our product categories (it is negative and significant at 10% level for meat and poultry), whereas it loses significance for fruit and vegetables. This last result points to a possible problem of spurious correlation in the OLS regression for these product categories, which do not appear statistically relevant when we use the instrument.

We performed many robustness checks on the model: we split the sample, we include the province level CPI (consumer price indices) for COICOP1 and 2 product categories[14] among the controls, introduce lagged variables, replace the dependent variable with minimum and maximum price levels recorded in the province: the results do not change, but we lose significance when we perform the estimate on two subsamples, due to the large number of fixed effects. We also perform the Hausman test for exogeneity, using our IV as the alternative model and cannot reject the null at standard level of confidence.

Our empirical analysis seems to confirm the welfare enhancing role of buying groups. Based on a novel data set, matching the Nielsen structural information on Italian organized retailers and the ISTAT data on price levels aggregated at the province level, we find a negative relationship between the HHI at the buying group level and price dynamics in the years 2003-2008 for the 90 Italian provinces.

3.3 Empirical Model 2: Buying Group Concentration and Local Producers' Performance

In the second specification, we consider the following model:

$$y_{ijt} = a_i + b_j + c_t + \beta_i H_{jt} + \pi X_{jt} + \epsilon_{ijt}$$

[12] For instance, it could happen that a larger number of building permits are issued in those provinces where prices have recorded higher growth, as they have become more attractive for investment. In order to minimize this risk we consider only permits relative to existing buildings.

[13] Note that we change the sign of the IV when we instrument for concentration, as the variables are negatively related.

[14] Food and non-alcoholic beverages and alcoholic beverages and tobacco.

The dependent variable, y is a cost or performance indicator (employment, total cost, unit cost per employee, average production cost, production value, profit margin, value added), for all small and medium enterprises operating in sector i, province j at time t. The main explanatory variable is the Herfindahl Hirschman Index, computed at the buying group $\left(H_{jt}^{BG}\right)$ level.[15] In order to take into account possible differences across product categories, the concentration indices have been interacted with product dummies for the ten classes of interest (the coefficients are indexed by product)[16]. We also include year, province and product dummies (a_t and b_j and c_i) in the regression, aimed at capturing the common component in prices in a given year (commodity prices, exchange rate, global economic cycle, monetary stance, etc...) and specific characteristics of local markets and goods respectively. Xit is a vector of other explanatory variables having a province and a time varying component that we include as controls. Xit includes province population density, population growth, average age of population, area size and a measure of local labour cost. The errors are clustered by province. The identification strategy of the model is based on the time-spatial variation that is the variability of retail market concentration across years and provinces. The results of the regressions are summarized in table 4. We find a negative and statistically significant relationship between the degree of concentration of retailers at the buying group level and employment, total costs and production value of their local suppliers in five out of ten product categories (mineral water at 5% for total cost and at 10% for employment; cereals, pasta and cookies, canned fish and wine at 10% level for the three indicators). The relationship for the other goods is non significant. We also retrieve a positive and statistically significant association between retail sector concentration and local suppliers' average productivity (measured as production value per person employed, apparent productivity) and a negative one when the dependent variable is unit cost of production for the same 5 categories of goods, while for the others we observe the same sign, but we lose statistical significance.

Overall. the analysis seems to point to a negative effect of retailers' countervailing power on producers' size and turnover. However, it also indicates a positive relationship with efficiency (costs are reduced and productivity shows a positive coefficient). Instead, we do not find any effect on profit margins.

This second analysis, per se quite interesting, is partial and relies on a quite strong assumption: in fact, due to a data availability problem, we are not able to perfectly match the retailers in the Nielsen data set with their corresponding suppliers. We use an approximation, based on a vicinity and size criterion: we restrict our focus to small and medium firms in the food compartment and suppose that for ten very "local" categories of goods they serve local retailers. This assumption is grounded by the responses of our interviewed market operators, who advised us about what classes of products to choose in order to maximize the importance of the local dimension, but it remains prone to measurement error.

Summing up, our empirical analysis seems to confirm the welfare enhancing effect of countervailing power, previously retrieved in the theoretical model. In that framework countervailing power was

[15] Here we are interested in the vertical relationship, so we focus on buying group concentration.

[16] Mineral water, meat and poultry, cereals, fruit processing, ice cream, dairy products, oil and butter, pasta and cookies, canned fish and wine.

represented by the dominant retailer's bargaining power and also by its possibility of increasing its contractual strength, deciding the optimal dimension of its buying group (n^*). In this context, based on a unique data set on Italian retailers' market structure, province level consumer prices and local firms' performance, we estimate two simple models to empirically analyze the relationship between the HHI at the buying group level (countervailing power), consumer prices and suppliers' performance indicators. Also in this context we find a negative association between countervailing power and price levels for all the products in our sample that are traded through a buying group. When we pass to consider the vertical relationship retailers-producers we find that the exercise of countervailing power may stimulate performance and reduce inefficiencies in the upstream market.

4 Concluding Remarks

In the *American Capitalism: The Concept of Countervailing Power* (1952), Kenneth Galbraith writes: "The fact that a seller enjoys a measure of monopoly power, and is reaping a measure of monopoly return as a result, means that there is an inducement to those firms from whom he buys or those to whom he sells to develop the power with which they can defend themselves against exploitation. It means also that there is a reward for them, in the form of a share of the gains of their opponents' market power, if they are able to do so. In this way the existence of market power creates an incentive to the organization of another position of power that neutralizes it." Moreover, Galbraith believed that the exercise of countervailing power was beneficial for consumer welfare, as retailers would use it "on behalf of consumers".

After this seminal contribution, the concept of countervailing power has fostered a large strand of literature and particularly the welfare enhancing effect on consumers has been quite controversial. Most of detractors (Stiglitz, 1954) argued that, in principle, there is no reason why a retailer should pass on (part of) its surplus share to the consumers. Also Dobson and Waterson (1997) find an uncertain relationship between retailers' bargaining power towards producers and final prices: sometimes these can co-move in the same direction. Chen (2003) retrieves Galbraith's result in a model with a vertical cartel and a competitive fringe.

In our paper, the countervailing power result does not rely on the dominant retailer passing on a lower wholesale price to consumers, but it is the result of the two dominant firms'strategic use of the competitive fringe, when it comes to their vertical relationship. In Chen 2003 the countervailing power was exogenously given and was represented by the dominant retailer's surplus share γ (bargaining power). In our model, the sources of countervailing power are two a priori: the surplus share, γ, and the possibility to the dominant retailer of forming a buying group. Thus, while the first source is exogenously given and may depend on many market factors (often unobservable and idiosyncratic to a specific context), the second one is a choice variable, intended as an instrument to increase, if needed, the retailer's power. We have shown that, if N is fixed, a larger buying group makes the dominant producer's outside option (its profit from selling to the fringe) less viable, inducing a lower wholesale price. The drawback on the dominant retailer's point of view is that doing so it gives up a portion of its market share to countervail its opponent. The buying group optimal dimension responds to the

need of finding a balance along a trade-off between its market power and its strength in the vertical relationship with the seller.

The empirical analysis seems to confirm the welfare enhancing effect of countervailing power, previously retrieved in the theoretical model. In that framework countervailing power was represented by the dominant retailer's bargaining power and also by its possibility of increasing its contractual strength, deciding the optimal dimension of its buying group (n^*) . In this context, based on a unique data set on Italian retailers market structure, province level consumer prices and local firms' performance, we estimate two simple models to empirically analyze the relationship between the HHI at the buying group level (countervailing power), consumer prices and suppliers' performance indicators. Also in this context we find a negative association between countervailing power and price levels for all the products in our sample that are traded through a buying group. When we pass to consider the vertical relationship retailers-producers we find that the exercise of countervailing power may stimulate performance and reduce inefficiencies in the upstream market.

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A APPENDIX

Proof. Taking the derivative with respect to n^*

$$\frac{\partial z_f}{\partial n^*} = -\frac{\frac{\partial p}{\partial z_f}(1-\gamma)c'(s(p))s'(p)\left[(N-n^*)s'(p-z_f)\left(1-\frac{\partial p}{\partial z_f}\right)\right]}{\left[(N-n^*)s'(p-z_f)\left(1-\frac{\partial p}{\partial z_f}\right)\right]^2}$$
$$+\frac{s'(p-z_f)\left(1-\frac{\partial p}{\partial z_f}\right)\frac{\partial p}{\partial z_f}\left[(1-\gamma)n^*c'(s(p))s'(p)\right]}{\left[(N-n^*)s'(p-z_f)\left(1-\frac{\partial p}{\partial z_f}\right)\right]^2} < 0$$

■

Proof. We show that the dimension of the buying group is both internally and externally stable. First, from the first order condition of the dominant retailer we get:

$$(p-c)(D(p)-(N-n^*)s(p-z_f))-n^*c(s(p))$$
$$(p-c)s(p-z_f)-c(s(p))+(p-c)(N-n^*)s'(p-z_f)\frac{\partial z_f}{\partial n^*}=0$$
$$(p-c)s(p-z_f)-c(s(p))+N(p-c)s'(p-z_f)\frac{\partial z_f}{\partial n^*}-n^*(p-c)s'(p-z_f)\frac{\partial z_f}{\partial n^*}=0$$
$$n^*=N+\frac{s(p-z_f)-c(s(\cdot))}{s'(p-z_f)\frac{\partial z_f}{\partial n^*}}$$

So it is internally stable. The buying group is externally stable if $n^* < N$, that is if there is no incentive for the dominant retailer to internalize the whole fringe. Because $\frac{\partial z_f}{\partial n^*} < 0$, the denominator is negative, so this condition is satisfied iff $s(p-z_f)-c(s(p))>0$. ■

Proof. We show that the higher the exogenous bargaining power of the dominant producer the lower the dimension of the buying group:

$$\frac{\partial n^*}{\partial \gamma} = \frac{\left(-s'(p-z_f)\frac{\partial z_f}{\partial \gamma}+s'(p-z_f)(1-c'(s(p)))\frac{\partial p}{\partial \gamma}\right)s'(p-z_f)\frac{\partial z_f}{\partial n^*}}{\left(s'(p-z_f)\frac{\partial z_f}{\partial n^*}\right)^2}$$
$$-\frac{\left((s(p-z_f)-c(s(p)))\left(s''(p-z_f)\frac{\partial z_f}{\partial n^*}\left(\frac{\partial p}{\partial \gamma}-\frac{\partial z_f}{\partial n^*}\right)+s'(p-z_f)\frac{\partial^2 z_f}{\partial n^{*2}}\right)\right)}{\left(s'(p-z_f)\frac{\partial z_f}{\partial n^*}\right)^2} < 0$$

■

Proof. We have to compute $\frac{\partial p}{\partial n^*}$. Recall that

$$p = c - \frac{(D(p)-(N-n^*)s(p-z_f))-n^*c'(s(p))s'(p)}{(D'(p)-(N-n^*)s'(p-z_f))}$$

Therefore, we obtain

$$\begin{aligned}\frac{\partial p}{\partial n^*} &= \frac{-Q'_D\left[s\left(p-z_f\right)-\left(N-n^*\right)s'\left(p-z_f\right)\frac{\partial z_f}{\partial n^*}+c'\left(s\right)s'\left(p\right)\right]}{-Q'_D\left(2Q'_D+n^*c''\left(s\right)s''\left(p\right)\right)+Q''_DQ_D} \\ &+\frac{\left(Q_D-n^*c\left(s\left(p\right)\right)s\left(p\right)\right)\left(s'\left(p-z_f\right)+s''\left(p-z_f\right)\frac{\partial z_f}{\partial n^*}\right)}{-Q'_D\left(2Q'_D+n^*c''\left(s\right)s''\left(p\right)\right)+Q''_DQ_D}\end{aligned}$$

where $Q_D=\left(D\left(p\right)-\left(N-n^*\right)s\left(p-z_f\right)\right)$. The denominator is always negative, as $Q'_D<0$, $Q''_D<0$. The numerator is positive as $\frac{\partial z_f}{\partial n^*}<0$, $c'\left(\cdot\right)$ and $s'\left(\cdot\right)$ are positive and $s''\left(\cdot\right)\leq 0$. ■

B Figures and Tables

Chart 1: HHI and CR_3 at the buying group level, years 2003-2008.

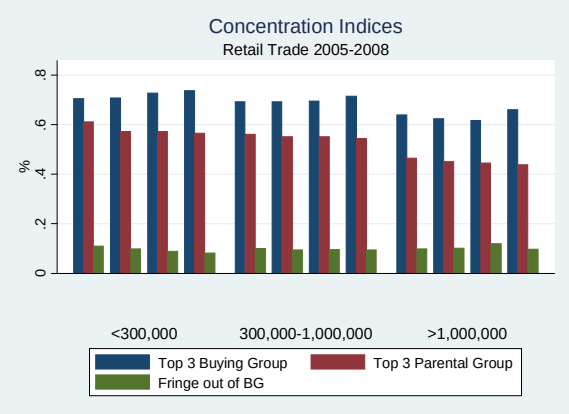

Chart 2: HHI at the buying, parental group and store level by population clusters.

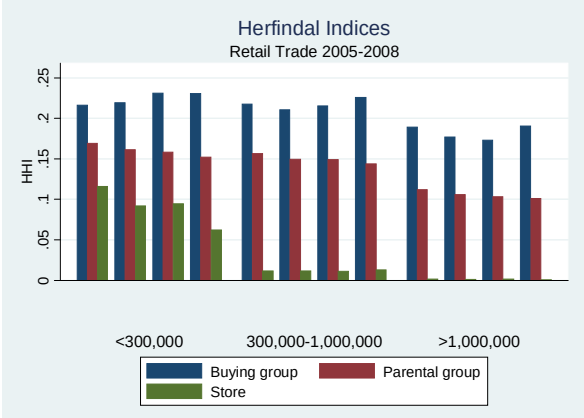

Chart 3:Concentration measures at the buying, group level by population clusters.

Table 1: Effect of province-level concentration on sectoral prices.

		Buying Group		Parental Group
	Coef.	Std. Err.	Coef.	Std. Err.
HHI*Beverages	-0.871***	0.302	0.372	0.182
HHI*Cookies, Pasta	-0.200	0.296	0.444	0.172
HHI*Meat	-0.236	0..315	0.232*	0.199
HHI*Canned Tuna	-1.0467***	0..407	0.239**	0.311
HHI*Oil and Butter	-0.813***	0.368	0.150	0.261
HHI*Dairy	-0.461***	0.305	0.142	0.188
HHI*Vegetables	0.611***	0..784	-0.079	0.105
HHI*Fruit	0.944***	0..257	-0.362	0.111
Controls:				
Province dummies	yes			
Year dummies	yes			
Population density	yes			
Population growth	yes			
Average age pop.	yes			
Local labour cost	yes			

Obs.20,410
Source:our calculations on Nielsen structural data„ ISTAT price levels, ISTAT population census data.
Notes: Dependent variable is price level year average by province and product category.

Table 2: Gram Schmidt Choleski Hierarchical Orthogonalization.

Results		
	HHI(P)	$\widehat{u}$
Beverages	0.373	-0.939***
	(0.321)	(0.312)
Cookies, Pasta	0.444	-0.746*
	(0.313)	(0.304)
Meat	0.233*	-0.123
	(0.335)	(0.326)
Canned Tuna	0.239**	-1.337***
	(0.440)	(0.424)
Oil and Butter	0.150	-1.075***
	(0.397)	(0.382)
Dairy	0.141	-0.553**
	(0.324)	(0.316)
Vegetables	-0.079	0.842***
	(0.270)	(0.265)
Fruit	-0.362	1.059***
	(0.274)	(0.267)
Controls:		
Province dummies	yes	
Year dummies	yes	
Population density	yes	
Population growth	yes	
Average age pop.	yes	
Local labour cost	yes	
Obs.20,410		
Source:	Authors' calculations on Nielsen and ISTAT data.	

Table 3 IV regression (permits of building enlargement)

	(OLS)	(IV)
HHI(B)		
Beverages	-0.627***	-2.078***
Cookies, Pasta	-0.513***	-2.052***
Meat	-0.089	-1.525*
Canned Tuna	-0.896***	-2.586***
Oil and Butter	-0.723***	-2.280***
Dairy	-0.374**	-1.888***
Vegetables	0.550***	-0.810
Fruit	0.697***	-0.898
Controls:		
Province dummies	yes	
Year dummies	yes	
Population density	yes	
Population growth	yes	
Average age pop.	yes	
Local labour cost	yes	

Obs.20,410
Source:Authors' calculations on Nielsen and ISTAT data.

Table 4 Concentration at the buying group level and SMEs performance. Results: HHI(B)

	Total Production	Total Cost	Employment
Mineral Water	-2.555**	-4.599**	-4.142*
	(1.364)	(2.327)	(2.210)
Meat	-0.834	-0.915	-0.358
	(0.818)	(1.397)	(1.326)
Cereals	-2.680***	-4.804***	-4.555***
	(0.940)	(1.604)	(1.523)
Fruit Processing	-1.336	-1.804	-0.935
	(0.971)	(1.656)	(1.573)
Ice Cream	0.998	-2.007	1.957
	(0.167)	(2.861)	(2.717)
Dairy	0.749	-1.380	-1.794
	(0.906)	(1.547)	(1.469)
Oil and Butter	0.141	-0.776	-1.082
	(1.223)	(2.088)	(1.982)
Pasta/Cookies	-3.288***	-4.446***	-4.121***
	(0.865)	(1.476)	(1.401)
Canned Fish	-5.138***	-6.251***	-5.941***
	(1.403)	(2.394)	(2.273)
Wine	-0.181*	-1.835	-1.824
	(1.060)	(1.810)	(1.718)
Controls			
Population density	yes	yes	yes
Population growth	yes	yes	yes
Average Age	yes	yes	yes
Labour Cost Index	yes	yes	yes
Population growth	yes	yes	yes