Supermarket prices and competition: an empirical analysis of urban local markets.

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Abstract

This paper carries out an empirical analysis of prices of supermarkets located in Barcelona (Spain). Using detailed information on supermarket's exact location, their prices and the neighbourhood attributes, I estimate the extent to which variation in supermarket prices depend on chain policies, store attributes, neighbourhood characteristics and the degree of local competition, as measured by different market structure variables. This provides empirical evidence on the practice of local pricing, or 'flexing', between local markets that are part of a large urban area. The results reveal that although different stores of the same chain may apply different pricing policies, these do not depend on local competition measures.

Keywords: retail, supermarkets, local pricing, competition.

JEL codes: D12, D43, L11, L41, L81, Q18, R30.

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1. Introduction

Does local competition affect supermarkets' pricing strategies? Models of oligopolistic behaviour that link increases in the number of firms in the market with the intensity of competition show that equilibrium prices should fall as the latter increases. However, in the case of multistore retailing activities, such as supermarkets chains, the influence of competition at the local level on prices may depend on additional issues. First, considering what may be thought of as the problem of defining the geographically relevant market, the form of the price-concentration relationship will depend on the distance from which supermarkets are able to exert competitive pressure on each other, as well as on the rate at which such pressure decays with distance. The answer to this question depends on a variety of local circumstances and can only be answered empirically, as revealed by the diversity of thresholds used by competition authorities in different countries when defining local retail markets. The second relevant issue refers to the strategic variable over which supermarkets compete. It may be that the decision that supermarkets make as a response to a given level of competitive pressure in a given area is to enter/exit that particular location, but when present they decide not to modify their pricing policy according to local circumstances. If this is the case, we would not observe any relationship between prices and the presence of competitors at the local level, beyond the one implied by the types of chains that decide to enter the market.

Focusing on the pricing strategies, supermarket chains that operate in independent markets that are subject to different intensities of competition may find it profitable to fix their prices nationally as opposed to following a policy of local pricing, i.e. pricing according to local conditions. Dobson and Waterson (2005, 2008) show that this will be the case when the profits lost in markets where the supermarket is a monopolist may be smaller than the profits gained in competitive markets where a higher-price policy is also followed by independent competitors if they find it credible.

The way in which retail prices respond to local competition has been a concern for some competition authorities. In its 2000 report on the relationship between retailers with multiple stores and their suppliers, the UK's Competition Commission (2000) considered that price 'flexing', meaning varying prices in different geographic locations in a way that was not related to costs was against the public interest. Dobson (2009) discusses that flexing may be regarded as anticompetitive, arguing that the fact that

consumers at some locations end up paying more than they would if more competitors were present cannot be attributed to the practice of flexing, which would reveal the existence of local market power, but not be its cause.

The debate on the consequences of price flexing is quite intense in the UK where the supermarket chains that had reported following local pricing strategies at the time of the CC's market enquiry in 2000 seem to have shifted to national pricing by 2008. According to Skrainka (2012) this shift would have taken place to ally concerns about the explotation of local market power (see also Dobson and Waterson 2008). Other competition authorities do not seem to be concerned about local pricing practices by retailers. In Spain, the Comisión Nacional de Competencia does not mention the practice of national or local pricing as a competition concern in its reports on the food distribution chain, which focus on the existence of buyer market power and the restrictive role of regulations on entry (CNC, 2010; 2011).

Table 1. Difference betwen maximum and minimum prices of stores in the same city

2nd Quarter 2011. (selected chains).

		All food items		Private-label	
City	Chain	max/min	stores	max/min	stores
Madrid	AHORRAMAS	0,91%	37	3,15%	37
Madrid	CAPRABO	4,50%	19	13,27%	19
Madrid	CONDIS	4,55%	14	7,32%	14
Madrid	SUPERSOL	2,65%	13	7,69%	13
Barcelona	CONDIS	9,17%	33	9,84%	33
Barcelona	CAPRABO	8,93%	31	13,76%	31
Barcelona	SORLI-DISCAU	5,93%	18	6,67%	16
Barcelona	BONPREU	7,76%	11	n.a	n.a
Sevilla	EL JAMON	3,88%	15	9,26%	15
Sevilla	SUPERSOL	5,88%	10	8,33%	10
Sevilla	M.A.S.	0,00%	30	0,89%	30
Asturias	ALIMERKA	2,91%	29	6,78%	29
Asturias	EL ARBOL	3,81%	19	8,33%	19
Cádiz	COVIRAN	n.a	n.a	11,01%	10
Granada	COVIRAN	5,50%	16	n.a	n.a
Huelva	EL JAMON	0,98%	14	7,55%	14
Málaga	SUPERSOL	2,88%	10	5,88%	10
Las Palmas	HIPERDINO	2,97%	12	4,24%	14
Zaragoza	EL ARBOL	4,17%	15	13,16%	15

Source: Own calculations from Ministerio de Industria, Turismo y Comercio (2011)

This paper provides evidence on the existence of pricing differences between stores belonging to the same supermarket chain. As preliminary evidence on the magnitude of such price differences, the data in table 1 shows the difference between maximum and minimum prices[2] charged in the same city by a sample of regional supermarket chains for two baskets of goods: all food items and private-brand packaged food.

The empirical application reported in this paper deals with the factors behind those differences, and in particular the role of competition, for the particular case of the city of Barcelona. This city is chosen since it has the advantage of having readily available data on the income level and other economic variables at neighbourhood level, which makes it possible to empircally test the role of demand factors such as income, land costs and market concentration to explain price differences at the local (i.e., infra urban) level. Next section briefly summarises the literature on the price-concentration realtionship in food retailing, while the following one presents the empirical model and the data used in this case. Section 4 discusses the results, which show that the observed differences do not depend on competition intensity. This result is tested with alternative price variables and measures of local competition.Thus, although price flexing exists, it is not competition- related.

2. Survey

There is a growing empirical literature dealing with the relationship between prices and competition in the food retailing sector. Given that the exact relationship between market concentration and prices predicted by economic theory depends on the type of oligopolistic model that is assumed, most empirical research has employed reduced form methods to test hypotheses about the impact of concentration on prices. Data for these studies is obtained by sampling from different geographical markets, usually defined as regions or urban areas, from which prices, market structure and variables driving demand and costs are observed. To my knowledge, no tests of the price-concentration relationship have been previously undertaken in local markets that belong to a common large urban area. Therefore, one contribution of this paper to the empirical literature relates to the scale of its analysis, since it uses new store-level data from different supermarkets located within the city of Barcelona, which have not been

[2] The number of stores refers to the number of sampled stores for which price information is available (see below)

previously exploited. Taking into account the endogeneity of the variables that are used to measure the intensity of local competition can be thought of as an additional contribution, as the previous literature estimating price-competition relationships in supermarkets does not seem to have addressed the potential endogeneity bias (Cotterill, 2006). The main exception are Gullstrand and Jörgensen (2012), who estimate price-reaction functions among Swedish food retailers according to their distance, applying Pinkse *et al.* (2002) method to take into account the endogeneity of relative distances. They find a substantial impact of competitive pressure by local retailers, although it decays rapidly.

Although most authors have found that higher concentration is associated with higher prices, this conclusion is not as widespread as theoretical models would imply. Cotterill (1986) found a positive relationship between concentration in local markets in Vermont and supermarket prices using store-level data. Asplund and Friberg (2002), using a vast sample of Swedish markets, also estimate a statistically significant effect of market structure on price levels, with higher regional concentration of chains and higher number of stores in the local market being positively correlated with prices at the store level. However, the magnitude of the impact of local competition is relatively small, since most of the variation of prices is explained by factors specific to the store (such as size or chain affiliation) or related to the cost levels in the area. Pita Barros *et al.* (2006) with data from Portugal also find that local concentration has a positive impact on the price set by individual stores. In Chile, Lira *et al.* (2008) use average prices from different cities and find a positive relationship between local competition and prices. These authors also take into account the role of national chains expanding into local markets, which are shown to reduce prices.

However, Newmark (1990) and Claycombe and Mahan (1993) found weak or no influence of market structure on prices. According to Asplund and Friberg (2002), the main explanation for the absence of statistically significant results on the price-concentration relationship in those two papers would be the lack of sufficient geographical variation in the data, something necessary in order to trace what they acknowledge to be a relatively small effect.

Other authors have emphasized that a more relevant problem with this empirical literature is that it does not take into account the potential endogeneity of market

concentration. As Singh and Zhu (2008) point out, the fact that observed market structures are not randomly assigned invalidates one of the assumptions needed for the standard regression models usually employed in the empirical literature to yield consistent estimates. Since such levels of concentration result from strategic decisions by firms when deciding whether to enter or exit a given market, not taking them into account may bias the results in different ways. Markets with high unobserved costs will reveal both high prices and a smaller number of entrants, while those affected by unobserved positive demand shocks would also have high prices, but with higher number of firms. Any reduced form estimation aiming at measuring the impact of market structure on prices should control for the potential endogeneity of market structure measures in order to avoid obtaining biased estimates.

3. Model and data

Different specifications of a standard reduced-form model explaining the variation of supermarket prices in Barcelona are estimated. The price p_{iks} of a basket of food products sold by supermarket i located in k and part of chain s is assumed to depend on a fixed effect of its chain (a_s), store attributes such as the store size (z_i) and the different attributes of the area, in which the socioeconomic or cost variables that influence demand or supply (x_k) are distinguished from measures of the market structure or competition intensity in that particular location (m_k):

$$p_{iks}=f(a_s, z_i, x_k, m_k) + \varepsilon_{iks} \quad (1)$$

A log linear specification is assumed for the econometric model whose parameters will be estimated under different assumptions on the particular form of the market structure variable:

$$\ln p_{iks}= \alpha_s + \beta_i \ln z_i + \gamma_t \ln x_k + m_k + \varepsilon_{iks} \quad (2)$$

Data on supermarket prices are obtained from the food prices survey of the *Observatorio de Precios de Alimentación*, an agency of the Ministry of Industry, Energy and Tourism that between 2008 and 2011 carried out different surveys of supermarket prices in the major cities of Spain. Only the prices corresponding to the 2nd quarter of 2011 of stores located in the city of Barcelona with a selling area above

400 m^2 are used in this analysis. The survey provides different price indexes for each supermarket, of which three are used in this paper: the general index of food items, the index of packaged food with standard (not private) brands, and a private label (own brand) price index. The price of each supermarket is defined in relative terms to the average of the city, which is made equal to one.

Table 2. Within-chain price differences.

2a.Food price index

Chain	Obs	Min.	Max.	Average	st. Dev.	% max/min
CONDIS	33	0.947	1.034	1.002	0.019	9.17%
CAPRABO	31	0.973	1.060	1.024	0.020	8.93%
SORLI-DISCAU	18	1.025	1.086	1.051	0.021	5.93%
MERCADONA	12	0.869	0.877	0.876	0.003	1.00%
BONPREU	11	1.008	1.086	1.045	0.022	7.76%
CONSUM	8	0.912	0.947	0.934	0.012	3.81%
CONSUM BASIC	7	0.895	0.904	0.901	0.004	0.97%
DIA MARKET	4	0.956	0.990	0.971	0.015	3.64%
JESPAC	3	1.034	1.060	1.048	0.013	2.52%
EL CORTE INGLES	3	1.043	1.138	1.086	0.048	9.17%
Other	10					
Barcelona total	140			1.000		

2b. Standard label packaged foods price index

Chain	Obs	Min.	Max.	Average	st. Dev.	% max/min
CONDIS	33	0.963	1.018	0.985	0.011	5.66%
CAPRABO	31	0.981	1.045	1.003	0.016	6.48%
SORLI-DISCAU	18	1.036	1.100	1.061	0.023	6.14%
BONPREU	11	0.954	1.018	1.000	0.021	6.67%
CONSUM	9	0.963	0.990	0.982	0.008	2.83%
CONSUM BASIC	9	0.972	0.981	0.980	0.003	0.93%
DIA MARKET	4	0.981	1.000	0.990	0.010	1.85%
JESPAC	3	0.972	1.009	0.984	0.021	3.74%
EL CORTE INGLES	3	0.972	1.009	0.997	0.021	3.74%
Other	10					
Barcelona total	132			1.000		

2c. Private label packaged foods price index

Chain	Obs	Min.	Max.	Average	st. Dev.	% max/min
CONDIS	33	1.007	1.106	1.042	0.022	9.84%
CAPRABO	31	0.899	1.023	0.960	0.042	13.76%
SORLI-DISCAU	16	1.114	1.188	1.148	0.016	6.67%
MERCADONA	14	0.908	0.957	0.942	0.014	5.45%
BONPREU	11	1.040	1.114	1.077	0.019	7.14%
LIDL	11	0.858	0.949	0.912	0.024	10.58%
CONSUM BASIC	8	0.916	0.924	0.923	0.003	0.90%
CONSUM	7	0.924	0.933	0.930	0.004	0.89%
DIA MARKET	4	0.891	0.966	0.922	0.037	8.33%
JESPAC	3	0.990	1.023	1.004	0.017	3.33%
EL CORTE INGLES	3	1.023	1.073	1.056	0.029	4.84%
Other	10					
Barcelona total	151			1.000		

Source: Own calculations from Ministerio de Industria, Turismo y Comercio (2011)

All supermarkets considered here belong to national or regional chains, which directly manage them. Different chains offer different ranges of products, qualities, and selling attributes, and apply different pricing strategies, implying that the chain to which each supermarket belongs is expected to be the main explanation of price differences among stores. However, prices do not depend only on the chain to which each supermarket belongs: as table 2 shows there are important differences in the differences that supermarkets of the same chain charge in the three price indexes, which in some cases can be relatively large. The question that this paper wants to answer is if those differences can be explained by local competition differences, after taking into account other market and store-specific attributes.

The rest of the data necessary to estimate the model is obtained from different sources. The postal address of each supermarkets can be obtained from Alimarket, a provider of information on retail establishments. Since this is the same source that the Observatorio uses to identify the population of establishments from which it creates the sample of price collection, it is considered as themost reliable source to identify the population of supermarkets with selling areas larger than 400m^2. The postal addresses of each supermarket obtained from this source have been geocoded, making it possible to compute euclidean distances between all pairs of stores.

Table 3. Income and food prices by municipal districts. Barcelona, 2011.

Municipal district	Household income	Supermarket price indexes. Average values					
		Food products	Obs	Standard label	Obs	Private label	Obs
Ciutat Vella	0.770	1.008	3	0.997	3	0.952	3
Eixample	1.120	1.007	35	1.008	34	0.995	41
Sants	0.751	0.994	16	1.000	14	1.031	16
Les Corts	1.414	1.007	7	0.996	7	1.004	7
Sarrià	1.789	1.012	17	0.995	16	1.003	18
Gràcia	1.058	1.009	9	0.997	10	0.959	8
Horta	0.803	0.972	6	0.983	5	0.970	7
Nou Barris	0.616	1.019	10	1.010	11	1.008	11
St.Andreu	0.741	0.985	20	0.989	16	1.009	19
St. Martí	0.817	0.987	17	1.002	16	1.004	21
Barcelona	1.000	1.000	140	1.000	132	1.000	151

Source: Own calculations from Ministerio de Industria, Turismo y Comercio (2011) and Ajuntament de Barcelona, Department d'Estadística (http://www.bcn.cat/estadistica/angles/index.htm)

Socioeconomic attributes of the local areas in which the supermarkets are located are obtained from different sources, obtained from the Statistics Department of Barcelona City Council[3]. However, availability of such information depends on the specific sub-municipal area that is considered. Barcelona is divided in the following hierarchy of territorial divisions:

- Municipal districts (*distrito municipal*, of which there are 10), are the main administrative units within the municipality.
- Neighbourhoods (*barrio*, 73). Population, population density, land values and household income are available at this level.
- Basic Statistical Areas (*Area Estadística Básica*: *AEB*, 233) is a subdivision of the neighbourhood. Population and population density are available for each AEB.

As a preliminary characterisation of the data, table 3 shows the average income levels at each municipal district together with the average price indexes for the stores in each district, and the number of sample observations in each case. As expected, there is much more variation in income levels across districts than in average prices, but no clear correlation between both variables can be identified from these aggregate data.

4. Results

Tables 4 to 6 (in the appendix) report the estimation results of different specifications of model 1 employing the three available price indexes. Table 4 shows the results of models using the price of food items, table 5 those of packaged food items under standard brands and table 6 the ones estimating the price index of packaged food sold under private labels. Each table reports 24 estimation results, corresponding to 17 OLS estimations of different specifications of model (2) (named A to Q), plus the 2SLS IV specifications of the 7 of them in order to correct take into account potential endogeneity (those models are named with the same letter of the OLS estimation, to which the –IV suffix is added).

Model A corresponds to the simplest specification, where only terms that identify the chain to which each supermarket belongs are included as regressors (all supermarkets

[3] All data used to define the attributes of the local markets, as well as details on the administrative division of the city of Barcelona are available at www.bcn.cat/estadistica

with three or more stores, as reported in table 1, are associated with a chain dummy. Consum and Consum Basic are fascias of the same chain, but they are identified separately in order to identify their different pricing policies). This specification logically reproduces the average prices reported in table 1, and shows that 85% of the variation in food prices (69% for standard labels and 83% for private ones) can be just explained by the chain to which each supermarkets belong. The estimated coefficients for the different chains are stable across the different model specifications that are discussed in what follows.

Model B adds the size of the supermarket, which is the only store attribute available in the dataset. The negative sign of its coefficient reveals the existence of economies of scale in food retailing, which result in lower prices for larger stores, as has been shown by previous literature (Pita Barros *et al*., 2006, among others)

The next two models consider the role that socioeconomic and cost characteristics of the area in which the supermarket is located have in determining prices. As has been mentioned above, information on household incomes, land values and population density is available for the neighbourhood in which the supermarket is located. In the case of density the variable can also be defined at the smaller 'basic statistical area' (AEB). Model C adds these variables at the neighbourhood level (computed as logarithms of their relative value with respect to the city average), while model D uses the residential density at the corresponding AEB. Given that in all the specifications no estimate of these variables is shown to be significantly different from zero, it can be concluded that the socioeconomic characteristics of the neighbourhoods do not influence on food prices.

From model E onwards different variables measuring the degree of competition among supermarkets in each location are added. Models E to H include the number of supermarkets located at a distance smaller than 250, 500, 750 and 1000 meters, respectively, from the one whose prices are observed. Given that a 'border effect' may take place, whereby supermarkets located near the administrative limit of the municipality may be subject to the (unobserved) competition by stores in nearby towns (Barcelona forms an urban continuum with municipalities at its NE and SW borders), only the data from neighbourhoods that do not belong to those limits is included. This implies a small reduction of the sample, since 12 of the 73 neighbourhoods of the city

are excluded. The results of the models specified in this way clearly show that none of the relevant coefficients is significant.

However, this is the point where the previous discussion on the endogeneity of the market structure measures should be recalled, since such variables cannot be considered as purely exogenous in price-concentration regressions. The potential role of demand and cost factors influencing the presence of supermarkets in a way that may also affect prices needs to be taken into account in order to avoid obtaining biased estimates, which implies employing appropriate instruments. In this case, the obvious variables are the socioeconomic attributes of the neighbourhoods that have been shown not to be related to prices, but which would influence the presence of a of supermarkets: income, population density and land values. Models E-IV to H-IV, therefore, report the 2SLS estimation of the previous models. As can be seen in the tables, the coefficients competition variables continue to be not significantly different from zero.

The following models continue testing the impact of alternative measures of concentration on prices. Model I considers the distance to the nearest competitor, which has been used by authors such as Fik (1988) in order to identify the intensity of competition. This variable is shown to have a significant effect, albeit of a sign contrary to the positive one that would be expected, on the prices of private label goods. However, when this variable is instrumented in the way described above the coefficient is not statistically different from zero (model I-IV).

Model J considers the HHI in a radius of 500 meters from the location of the supermarket, where shares are defined according to the size of each establishment and aggregating the ones of those that belong to the same chain. Again, when correcting for the potential endogeneity of the market structure variable, its significance in the price equation vanishes. In model K, where the market share of the store (in terms of size) with respect to supermarkets located at less than 500 meters is used, a similar result is obtained.

The next set of models try to identify if the nearby presence of a store belonging to a particular chain exerts some type of influence on prices. This hypothesis is tested with respect to the presence of stores belonging to the four chains with the largest price effects in model A (Lidl, Mercadona, Dia and Consum Basic). Distances of 250 and

500 meters were considered in order to measure the number of one of such competitors, and in each case the establishment of the same-chain whose prices are observed are excluded from the sample. As all models L to Q show in all price indexes, no significant pressures on prices can be identified from the presence of nearby establishments of these chains, which are the ones with a higher image of discounters.

5. Conclusions

This paper reports an extensive empirical analysis of the price determinants of supermarkets located within a large urban area. The main conclusion that is obtained is that price differences are explained by the strategies set by the chains supermarkets belong, and that they do not respond to local (at the infra-urban level) competitive conditions. The only variable that has been seen to have an impact on prices beyond the chain of the supermarket is its selling area, in the sense that economies of scale lead to lower prices.

The results on the lack of price pressure by local rivals are robust to corrections for endogeneity that show the magnitude of the bias that may be otherwise present. The relative proximity to the stores of the chains with the most aggressive pricing policy does not have a significant impact, either.

Thus, the main conclusion of the paper is that although price differences with each chain exist, they are not explained by competitive pressure exert by local competitors. This is a somewhat surprising conclusion, given that competition has been the main, if not the only, argument used in the literature to rationalise local pricing strategies.

The results reported here can be compared with the conclusion reached by Asplund and Friberg (2002) on the competition between Swedish stores, which is found not to depend on chain affiliation. They explain this result by the fact that the stores of ICA, the largest chain in Sweden, and many of the others, are operated independently, and thus do not follow a price strategy set by the chain. On the contrary, most of the establishments in my sample seem to be directly managed by the chain they belong to. Trying to identify the role in pricing strategies of franchises and contracts that link stores to supermarket chains is one line of further research.

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TABLE 5. Price equations: packaged food standard label																
	A		B		C		D		E		F		G		H	
Dep var: ln(IPEST)																
Estimation method	OLS		OLS		OLS		OLS		OLS		OLS		OLS		OLS	
Variable	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat.*	Coeff.	*t-stat.*
C	-0.034	*-6.09*	0.059	*2.25*	0.241	*1.55*	0.248	*1.66*	0.029	*0.94*	0.019	*0.63*	0.021	*0.68*	0.020	*0.63*
BONPREU	0.034	*4.33*	0.022	*2.62*	0.021	*2.49*	0.020	*2.32*	0.024	*2.76*	0.024	*2.77*	0.024	*2.77*	0.025	*2.81*
CAPRABO	0.036	*5.65*	0.022	*3.08*	0.023	*3.12*	0.022	*2.98*	0.026	*3.24*	0.028	*3.41*	0.027	*3.34*	0.027	*3.35*
CONDIS	0.019	*2.95*	0.000	*0.06*	0.001	*0.18*	0.000	*0.04*	0.005	*0.54*	0.006	*0.69*	0.006	*0.62*	0.006	*0.67*
CONSUM	0.015	*1.61*	0.007	*0.71*	0.007	*0.74*	0.007	*0.70*	0.008	*0.83*	0.009	*0.93*	0.009	*0.90*	0.009	*0.91*
CONSUMB	0.015	*1.96*	-0.003	*-0.29*	-0.003	*-0.32*	-0.004	*-0.40*	0.002	*0.21*	0.003	*0.28*	0.002	*0.23*	0.003	*0.28*
CORTEINGLES	0.030	*2.52*	0.027	*2.32*	0.026	*2.15*	0.026	*2.23*	0.027	*2.27*	0.028	*2.40*	0.027	*2.33*	0.027	*2.32*
DIA	0.027	*2.27*	0.007	*0.57*	0.005	*0.42*	0.005	*0.38*	0.013	*0.95*	0.012	*0.94*	0.012	*0.92*	0.012	*0.93*
JESPAC	0.018	*1.50*	0.004	*0.31*	0.004	*0.29*	0.003	*0.21*	0.007	*0.57*	0.009	*0.69*	0.008	*0.65*	0.008	*0.67*
SORLI-DISCAU	0.093	*13.34*	0.076	*9.26*	0.077	*9.38*	0.077	*9.38*	0.082	*8.85*	0.083	*8.97*	0.083	*8.93*	0.083	*8.97*
ln SIZE			-0.012	*-3.63*	-0.011	*-3.24*	-0.010	*-3.00*	-0.008	*-2.09*	-0.007	*-1.90*	-0.007	*-1.94*	-0.007	*-1.93*
ln INCOME					-0.011	*-1.00*	-0.012	*-1.10*								
ln DENSITY*					0.003	*0.90*	0.004	*1.19*								
ln LAND VALUE					0.029	*1.26*	0.031	*1.39*								
COMP250									0.000	*0.14*						
COMP500											0.001	*1.14*				
COMP750													0.000	*0.93*		
COMP1000															0.000	*1.11*
Observations	132		132		132		132		115		115		115		115	
R^2	0.6947		0.7246		0.7328		0.7341		0.7234		0.7268		0.7256		0.7256	
Adjusted R^2	0.6722		0.7019		0.7033		0.7048		0.6938		0.6976		0.6963		0.6963	
St. Error regression	0.0184		0.0176		0.0175		0.0175		0.0173		0.0172		0.0173		0.0173	
Sum Sq Resid.	0.0413		0.0373		0.0362		0.0360		0.0309		0.0306		0.0307		0.0307	
Ln L	345.222		352.031		354.012		354.340		309.516		310.225		309.983		309.983	
F Stat	30.8447		31.8397		24.8892		25.0584		24.4845		24.9046		24.7606		24.7606	
Prob F Stat	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	

Table 5 (cont.) . Price equations: packaged food standard label																
	E+2SLS		F+IV		G+IV		H+IV		I		I+IV		J		J+IV	
Dep var: ln(IPEST)																
Estimation method	2SLS		2SLS		2SLS		2SLS		OLS		2SLS		OLS		2SLS	
Variable	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat.*	Coeff.	*t-stat.*
C	0.012	*0.33*	0.014	*0.40*	0.018	*0.55*	0.018	*0.56*	0.064	*2.32*	0.128	*1.51*	0.044	*1.65*	0.047	*1.69*
BONPREU	0.024	*2.57*	0.024	*2.75*	0.024	*2.76*	0.025	*2.82*	0.022	*2.63*	0.024	*2.35*	0.020	*2.42*	0.020	*2.45*
CAPRABO	0.029	*3.27*	0.029	*3.40*	0.027	*3.35*	0.027	*3.35*	0.023	*3.12*	0.028	*2.61*	0.023	*3.20*	0.023	*3.17*
CONDIS	0.007	*0.74*	0.007	*0.77*	0.006	*0.65*	0.006	*0.69*	0.001	*0.09*	0.004	*0.39*	0.002	*0.22*	0.001	*0.18*
CONSUM	0.009	*0.86*	0.009	*0.97*	0.009	*0.92*	0.009	*0.93*	0.007	*0.79*	0.018	*1.05*	0.009	*1.02*	0.009	*0.93*
CONSUMB	0.003	*0.32*	0.003	*0.32*	0.002	*0.24*	0.003	*0.30*	-0.002	*-0.26*	0.000	*0.01*	-0.003	*-0.31*	-0.003	*-0.31*
CORTEINGLES	0.031	*2.40*	0.029	*2.43*	0.027	*2.35*	0.027	*2.32*	0.028	*2.38*	0.037	*2.06*	0.025	*2.24*	0.026	*2.26*
DIA	0.013	*0.97*	0.012	*0.93*	0.012	*0.91*	0.012	*0.93*	0.008	*0.60*	0.012	*0.74*	0.007	*0.55*	0.007	*0.56*
JESPAC	0.008	*0.65*	0.010	*0.76*	0.009	*0.68*	0.009	*0.69*	0.004	*0.32*	0.006	*0.43*	0.003	*0.27*	0.003	*0.28*
SORLI-DISCAU	0.082	*8.51*	0.084	*8.91*	0.083	*8.91*	0.084	*8.93*	0.076	*9.25*	0.077	*7.83*	0.076	*9.44*	0.076	*9.41*
ln SIZE	-0.006	*-1.55*	-0.007	*-1.71*	-0.007	*-1.84*	-0.007	*-1.88*	-0.011	*-3.53*	-0.009	*-1.84*	-0.009	*-2.57*	-0.010	*-2.48*
COMP 250m	0.004	*1.00*														
COMP 500m			0.001	*0.97*												
COMP 750m					0.000	*0.88*										
COMP 1000m							0.000	*0.95*								
ln DIST NEAREST									-0.001	*-0.62*	-0.018	*-0.88*				
HHI 500m													-0.018	*-2.05*	-0.014	*-0.96*
Observations	115		115		115		115		132		132		132		132	
R^2	0.6999		0.7256		0.7253		0.7265		0.7255		0.6131		0.7339		0.7334	
Adjusted R^2	0.6679		0.6963		0.6960		0.6973		0.7003		0.5777		0.7096		0.7089	
St. Error regression	0.0181		0.0173		0.0173		0.0172		0.0176		0.0209		0.0173		0.0173	
Sum Sq Resid.	0.0336		0.0307		0.0307		0.0306		0.0372		0.0524		0.0360		0.0361	
Ln L									352.243				354.304			
F Stat	22.6602		24.7653		24.7248		24.8465		28.8334		20.5029		30.0944		29.7333	
Prob F Stat	0.00		0.0000		0.00		0.00		0.00		0.00		0.00		0.00	

Table 5 (cont.) . Price equations: packaged food standard label																
	K		K+IV		L		M		N		O		P		Q	
Dep var: ln(IPEST)																
Estimation method	OLS		2SLS		OLS		OLS		OLS		OLS		OLS		OLS	
Variable	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat.*	Coeff.	*t-stat.*
C	0.042	*1.45*	0.036	*1.04*	0.059	*2.24*	0.059	*2.24*	0.058	*2.23*	0.058	*2.20*	0.058	*2.22*	0.058	*2.21*
BONPREU	0.021	*2.52*	0.021	*2.47*	0.022	*2.60*	0.022	*2.61*	0.022	*2.63*	0.022	*2.63*	0.022	*2.66*	0.021	*2.51*
CAPRABO	0.023	*3.17*	0.023	*3.19*	0.023	*3.09*	0.022	*3.03*	0.023	*3.09*	0.022	*3.05*	0.023	*3.11*	0.022	*3.04*
CONDIS	0.001	*0.13*	0.001	*0.16*	0.001	*0.08*	0.000	*0.05*	0.001	*0.09*	0.000	*0.05*	0.001	*0.09*	0.000	*0.02*
CONSUM	0.008	*0.90*	0.009	*0.95*	0.007	*0.72*	0.006	*0.70*	0.007	*0.73*	0.007	*0.70*	0.007	*0.77*	0.006	*0.69*
CONSUMB	-0.002	*-0.27*	-0.002	*-0.26*	-0.002	*-0.26*	-0.003	*-0.29*	-0.002	*-0.25*	-0.003	*-0.30*	-0.003	*-0.32*	-0.003	*-0.31*
CORTEINGLES	0.026	*2.30*	0.026	*2.29*	0.027	*2.34*	0.026	*2.27*	0.027	*2.32*	0.027	*2.33*	0.027	*2.36*	0.027	*2.30*
DIA	0.007	*0.57*	0.007	*0.57*	0.008	*0.60*	0.007	*0.57*	0.007	*0.58*	0.007	*0.56*	0.004	*0.35*	0.003	*0.25*
JESPAC	0.004	*0.30*	0.004	*0.30*	0.004	*0.34*	0.004	*0.29*	0.004	*0.31*	0.004	*0.31*	0.076	*9.16*	0.076	*9.16*
SORLI-DISCAU	0.076	*9.33*	0.076	*9.33*	0.076	*9.23*	0.076	*9.22*	0.076	*9.22*	0.076	*9.23*				
ln SIZE	-0.009	*-2.27*	-0.008	*-1.55*	-0.012	*-3.63*	-0.012	*-3.61*	-0.012	*-3.60*	-0.012	*-3.58*	-0.012	*-3.60*	-0.012	*-3.59*
SHARE 500m	-0.012	*-1.26*	-0.017	*-1.00*												
LIDL 250m					0.002	*0.38*										
LIDL 500m							0.000	*-0.13*								
MERCADONA250m									-0.002	*-0.38*						
MERCADONA500m											0.001	*0.37*				
DIA 250 m													0.004	*0.69*		
DIA 500 m															0.002	*0.68*
Observations	132		132		132		132		132		129		129		132	
R2	0.7282		0.7250		0.7247		0.7249		0.7249		0.7265		0.7264		0.7282	
Adjusted R^2	0.7033		0.6997		0.6994		0.6997		0.6997		0.7033		0.7032		0.7033	
St. Error regression	0.0175		0.0176		0.0176		0.0176		0.0176		0.0177		0.0177		0.0175	
Sum Sq Resid.	0.0368		0.0373		0.0373		0.0373		0.0373		0.0370		0.0370		0.0368	
Ln L	352.894		352.111		352.040		352.109		352.106		343.137		343.130		352.894	
F Stat	29.2276		28.7542		28.7117		28.7527		28.7514		31.3367		31.3323		29.2276	
Prob F Stat	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	

TABLE 6. Price equations: Madrid, Barcelona & Valencia																
Dep var:ln(priceind)	A		B		C		D		E		F		G		H	
Comp. mesure							**DIST250**		**DIST500**		**DIST750**		**DIST1000**		**NEAREST**	
Variable	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat.*	Coeff.	*t-stat.*
C	-0.058	*-2.72*	-0.025	*-2.20*	-0.028	*-2.67*	-0.028	*-2.67*	-0.027	*-2.57*	-0.028	*-2.55*	-0.029	*-2.68*	-0.031	*-2.88*
INCOME	3.2e-6	*2.58*	1.6e-6	*2.19*	1.5e-6	*2.46*	1.5e-6	*2.44*	1.5e-6	*2.40*	1.5e-6	*2.40*	1.5e-6	*2.49*	1.6e-6	*2.63*
DENSITY	7.2e-7	*2.25*	-2.4e-7	*-1.16*	4.7e-8	*0.27*	3.7e-8	*0.20*	6.4e-8	*0.33*	5.4e-8	*0.27*	-1.0e-8	*-0.05*	6.1e-8	*0.35*
AREA (000)	-1.7e-6	*-3.37*	1.0e-6	*1.13*	1.1e-6	*2.22*	1.1e-6	*2.22*	1.1e-6	*2.17*	1.1e-6	*2.19*	1.1e-6	*2.25*	1.1e-6	*2.31*
FRANCHISE	-0.015	*-0.70*	-0.008	*-0.79*	-0.012	*-1.20*	-0.011	*-1.17*	-0.012	*-1.21*	-0.012	*-1.20*	-0.011	*-1.14*	-0.012	*-1.26*
ALCAMPO			-0.039	*-3.69*	-0.038	*-6.62*	-0.038	*-6.60*	-0.038	*-6.59*	-0.038	*-6.54*	-0.038	*-6.48*	-0.039	*-6.72*
BONPREU			0.018	*2.59*	0.018	*4.87*	0.018	*4.82*	0.018	*4.86*	0.018	*4.85*	0.018	*4.88*	0.018	*4.89*
CAPRABO			0.005	*0.76*	0.006	*2.16*	0.006	*2.16*	0.006	*2.14*	0.006	*2.15*	0.006	*2.13*	0.006	*2.13*
CARREFOUR			-0.036	*-2.96*	-0.036	*-5.55*	-0.036	*-5.54*	-0.036	*-5.53*	-0.036	*-5.52*	-0.035	*-5.45*	-0.037	*-5.66*
DIA			...		-0.018	*-2.66*	-0.018	*-2.63*	-0.019	*-2.66*	-0.018	*-2.65*	-0.018	*-2.62*	-0.019	*-2.69*
EROSKI			-0.029	*-3.07*	-0.027	*-3.81*	-0.027	*-3.76*	-0.027	*-3.79*	-0.027	*-3.76*	-0.026	*-3.67*	-0.033	*-3.73*
ESCLAT			0.017	*1.80*	0.016	*2.34*	0.017	*2.34*	0.016	*2.31*	0.016	*2.32*	0.017	*2.35*	0.016	*2.33*
HIPER USERA			-0.015	*-1.81*	-0.012	*-2.15*	-0.012	*-2.15*	-0.012	*-2.10*	-0.012	*-2.12*	-0.012	*-2.17*	-0.012	*-2.10*
MAXI DIA			...		-0.014	*-2.45*	-0.014	*-2.42*	-0.014	-2.42	-0.014	*-2.44*	-0.014	*-2.45*	-0.014	*-2.44*
MERCADONA			-0.024	*-4.00*	-0.023	*-8.87*	-0.023	*-8.82*	-0.023	-8.81	-0.023	*-8.83*	-0.023	*-8.73*	-0.023	*-8.85*
SORLI DISCAU			0.041	*5.27*	0.041	*8.06*	0.041	*8.03*	0.041	8.03	0.041	*8.03*	0.041	*8.03*	0.041	*8.07*
SUMA			0.018	*2.00*	0.018	*2.57*	0.018	*2.50*	0.018	2.57	0.018	*2.56*	0.018	*2.53*	0.018	*2.62*
SUPER VALU			-0.016	*-1.47*	-0.014	*-1.44*	-0.014	*-1.43*	-0.014	-1.40	-0.014	*-1.41*	-0.015	*-1.49*	-0.013	*-1.36*
SUPERCOR			0.015	*1.89*	0.018	*3.12*	0.018	*3.12*	0.018	*3.06*	0.018	*3.10*	0.018	*3.12*	0.018	*3.09*
EL CORTE INGLES			0.042	*6.01*	0.044	*10.88*	0.044	*10.84*	0.044	*10.81*	0.044	*10.81*	0.044	*10.85*	0.044	*10.88*
SUPERM. HIBER			0.021	*1.89*	0.024	*2.51*	0.024	*2.45*	0.025	*2.50*	0.024	*2.48*	0.024	*2.41*	0.025	*2.54*
SANCHEZ ROMERO			0.114	*10.11*	0.118	*12.16*	0.118	*12.08*	0.117	*12.00*	0.118	*12.01*	0.118	*12.11*	0.116	*11.98*
SUPERSOL			0.011	*1.54*	0.014	*3.17*	0.014	*3.17*	0.014	*3.16*	0.014	*3.15*	0.014	*3.15*	0.014	*3.18*
COMPETITION							**1.7e-4**	***0.25***	**-6.1e-5**	***-0.20***	**1.0e-5**	***-0.06***	**5.2e-5**	***0.47***	**2.7e-6**	***1.15***
Observations	154		154		154		154		154		154		154		154	
R^2	0.155		0.865		0.845		0.845		0.845		0.845		0.845		0.847	
Adjusted R^2	0.132		0.819		0.819		0.817		0.818		0.818		0.818		0.819	
St. Error regression	0.021		0.009		0.010		0.009		0.010		0.010		0.010		0.010	
Sum Sq Resid.	0.0651		0.0103		0.0119		0.0119		0.0119		0.0119		0.0119		0.0118	
Ln L	379.730		521.354		510.2665		510.3030		510.2909		510.2686		510.3963		511.0509	
F Stat	6.8491		18.8507		32.4517		30.8211		30.8154		30.8048		30.8653		31.1771	

Prob F Stat	0.00	2.7e-34	1.6e-42	8.9e-42	9.1e-42	9.2e-42	8.3e-42	4.9e-42

* Including 19 additional supermarket fascia dummies.

TABLE 6. Price equations: Madrid, Barcelona & Valencia														
Dep var:ln(priceind) **Comp. mesure**	**HHI (500m)**		**DIA<250m**		**DIA<500m**		**LIDL<250m**		**LIDL<500m**		**MERCADONA<250m**		**MERCADONA<500m**	
Variable	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat*	Coeff.	*t-stat.*
C	-0.027	*-2.60*	-0.026	*-2.36*	-0.027	*-2.38*	-0.028	*-2.65*	-0.028	-2.59	-0.024	-2.16	-0.022	-1.88
INCOME	1.5e-6	*2.48*	1.3e-6	*2.12*	1.4e-6	*2.19*	1.4e-6	*2.40*	1.5e-6	2.45	1.2e-6	1.89	1.2e-6	1.82
DENSITY	2.0e-8	*0.11*	6.6e-9	*0.04*	4.0e-9	*0.23*	4.4e-9	*0.02*	4.2e-8	0.24	3.5e-8	0.19	1.1e-7	0.59
AREA (000)	1.1e-6	*2.26*	1.1e-6	*2.26*	1.1e-6	*2.21*	1.1e-6	*2.29*	1.1e-6	2.19	1.2e-6	2.50	1.0e-6	2.14
FRANCHISE	-0.010	*-1.04*	-0.011	*-1.12*	-0.011	*-1.08*	-0.011	*-1.14*	-0.011	-1.13	-0.011	-1.14	-0.012	-1.30
ALCAMPO	-0.038	*-6.54*	-0.038	*-6.56*	-0.038	*-6.53*	-0.038	*-6.61*	-0.038	-6.59	-0.038	-6.94	-0.038	-6.93
BONPREU	0.018	*4.84*	0.018	*4.84*	0.018	*4.81*	0.018	*4.88*	0.018	4.85	0.018	5.00	0.017	4.98
CAPRABO	0.006	*2.17*	0.007	*2.25*	0.006	*2.16*	0.007	*2.24*	0.006	2.15	0.007	2.38	0.006	2.26
CARREFOUR	-0.035	*-5.52*	-0.036	*-5.53*	-0.036	*-5.50*	-0.036	*-5.57*	-0.036	-5.53	-0.036	-5.90	-0.036	-5.82
DIA	-0.018	*-2.53*					-0.018	*-2.58*	-0.018	-2.60	-0.018	-2.67	-0.019	-2.82
EROSKI	-0.026	*-3.64*	-0.027	*-3.74*	-0.027	*-3.76*	-0.027	*-3.75*	-0.027	-3.78	-0.027	-3.94	-0.027	-4.01
ESCLAT	0.016	*2.32*	0.017	*2.34*	0.016	*2.29*	0.017	*2.36*	0.016	2.31	0.016	2.41	0.016	2.41
HIPER USERA	-0.013	*-2.18*	-0.013	*-2.17*	-0.012	*-2.12*	-0.013	*-2.20*	-0.012	-2.15	-0.012	-2.23	-0.012	-2.09
MAXI DIA	-0.014	*-2.47*					-0.013	*-2.35*	-0.014	-2.45	-0.013	-2.41	-0.014	-2.48
MERCADONA	-0.023	*-8.77*	-0.023	*-8.75*	-0.023	*-8.72*	-0.023	*-8.80*	-0.023	-8.78				
SORLI DISCAU	0.041	*8.02*	0.040	*7.86*	0.041	*7.97*	0.041	*7.92*	0.041	8.02	0.040	8.17	0.041	8.30
SUMA	0.018	*2.54*	0.018	*2.48*	0.018	*2.54*	0.018	*2.50*	0.018	2.56	0.017	2.57	0.018	2.64
SUPER VALU	-0.014	*-1.45*	-0.014	*-1.41*	-0.014	*-1.46*	-0.014	*-1.39*	-0.014	-1.43	-0.014	-1.48	-0.014	-1.53
SUPERCOR	0.018	*3.14*	0.018	*3.09*	0.018	*3.10*	0.018	*3.12*	0.018	3.12	0.018	3.25	0.018	3.21
EL CORTE INGLES	0.044	*10.83*	0.045	*10.81*	0.044	*10.67*	0.045	*10.88*	0.044	10.76	0.045	11.35	0.045	11.30
SUPERM. HIBER	0.024	*2.42*	0.024	*2.39*	0.024	*2.48*	0.023	*2.40*	0.024	2.49	0.024	2.52	0.025	2.68
SANCHEZ ROMERO	0.119	*11.88*	0.118	*12.08*	0.118	*11.86*	0.118	*12.16*	0.118	11.91	0.119	12.72	0.117	12.23
SUPERSOL	0.014	*3.07*	0.015	*3.21*	0.014	*3.11*	0.015	*3.21*	0.014	3.12	0.015	3.43	0.015	3.42
COMPETITION	-0.002	*-0.49*	0.001	*0.76*	0.001	*0.36*	0.001	*0.76*	4.8e-4	0.20	0.002	0.84	-0.001	-0.57
Observations	154		149		149		154		154		136		136	
R^2	0.845		0.843		0.843		0.846		0.845		0.847		0.847	
Adjusted R^2	0.818		0.817		0.817		0.818		0.818		0.818		0.817	
St. Error regression	0.010		0.010		0.010		0.010		0.010		0.009		0.009	
Sum Sq Resid.	0.0119		0.0118		0.0118		0.0119		0.0119		0.0095		0.0095	

Ln L	510.4104	492.2385	491.9761	510.6060	510.2899	457.6899	457.4566
F Stat	30.8720	32.5093	32.3737	30.9649	30.8149	28.5337	28.4184
Prob F Stat	8.2e-42	4.1e-41	5.1e-41	7.0e-42	9.1e-42	3.3e-36	4.0e-36