© *Investigaciones Regionales — Journal of Regional Research, 31 (2015) — Páginas 143 a 154*
Sección NOTAS METODOLÓGICAS Y DE INVESTIGACIÓN

Journal of Regional Research
Investigaciones Regionales

The entry of a hard discount supermarket: price effects

Andrés Gómez-Lobo *, Juan Luis Jiménez **, Jordi Perdiguero ***

ABSTRACT: In this paper we study how an incumbent supermarket reacts when entry by a new operator is announced but does not know the product variety that the entrant will offer. We use a database obtained from a special survey for supermarkets in Gran Canaria to estimate how incumbents reacted to entry in the products sold and not sold by the new entrant (LIDL). We show that there is evidence that prices for all goods prior to entry were initially lower in supermarkets close to the future entrant compared to supermarkets further away. However, after entry incumbents' prices for products not sold by the entrant actually rose near the entrant's new stores, compared to a suitable control group of supermarkets farther away.

JEL Classification: L2; L15; L81.

Keywords: Entry; Product Variety; Prices; Retailing.

La entrada de un supermercado de descuento duro: efecto sobre precios

RESUMEN: En este trabajo analizamos cómo reacciona un *incumbente* ante la entrada de un nuevo operador del que desconoce la variedad de productos que éste ofrecerá. Para ello utilizamos una base de datos proveniente de un trabajo de campo propio de supermercados en Gran Canaria en orden a estimar dicha reacción en términos de precios, tanto para productos vendidos como no vendidos por el entrante (LIDL). Nuestros resultados apuntan a una bajada generalizada de precios antes de la entrada por parte de los *incumbentes* afectados por dicha entrada. Sin

* Universidad de Chile.
** Universidad de Las Palmas de Gran Canaria.
*** Universitat Autónoma de Barcelona, GiM & IREA.

Authors acknowledge financial support from the Gobierno de Canarias (Project I+D+i PI2007-030). Authors also thank comments and suggestions received by Javier Campos, Aday Hernández and Aldo González. Nevertheless any omissions or errors are ours.

Corresponding author: University of Las Palmas de Gran Canaria. Facultad de Economía, Empresa y Turismo. Campus de Tafira. 35017. Las Palmas de Gran Canaria. España. E-mail: *juanluis.jimenez@ulpgc.es*. Tlf. +34 928 458 191.

Recibido: 21 de octubre de 2014 / Aceptado: 10 de marzo de 2015.

embargo, dichos supermercados afectados aumentaron los precios de aquellos productos que finalmente no fueron vendidos por el entrante.

Clasificación JEL: L2; L15; L81.

Palabras clave: Entrada; variedad de productos; precios; minoristas.

1. Introduction

This paper analyses the pricing effects of entry in the supermarket industry in the Gran Canaria Island. One of the curious characteristics of the data is that after entry incumbents' prices for certain products did not fall near the entrant's new stores, compared to a suitable control group of supermarkets farther away. This evidence seems to be at odds with the existing empirical literature, which unambiguously indicates that the added competition from a new entrant should decrease prices.

One of the main issues addressed by economic literature are the factors affecting the entry of new competitors (Foster *et al.,* 2006; or Daunfeldt *et al.,* 2010) and how barriers to entry may increase equilibrium prices (Griffith and Harmgart, 2008). Blinkey and Connor (1998) show how the reduction in market concentration reduces prices, especially for perishable products. Aalto-Setälä (2002) states that supermarket chains with greater market share have higher mark-ups.

Focusing on the articles that analyze the effects of new entry, most of the literature analyses the case of the U.S. chain Wal-Mart (Basker, 2005a; Matsa, 2009; Zhu and Singh, 2009). The first analysis of this entry effects on prices was Basker (2005b), who find a general price reduction. Basker and Noel (2009) found that reduction is not homogeneous across all types of operators (majors –0.5%; discount stores –1.8%). It should be noted that they show that the prices of products not sold by Wal-Mart (movie tickets, hairdressers, etc.) did not change as a consequence of entry.

Lira et al (2007) show that prices fell on average between 7 and 11% after entrant of new competitor in Chile. Abe and Kawaguchi (2010) provide evidence that the opening of new supermarkets in Japan generated significant decreases in prices of between 0.4 to 3.1% depending on the product. As far as we are aware, studies examining the effect of entry on prices are scarce or non-existent for the European market.

Summarizing, all the studies indicate that entry reduces equilibrium prices although in some cases these reductions are quite moderate in magnitude. What is not dealt with in the literature is the possible pricing reaction of incumbent's when the announcement of entry in made and there is uncertainty with respect to entrant's product variety and the subsequent pricing strategy once entry is effective and uncertainty is resolved.

Another strand in the literature deals with the degree of competition between different retail formats. For example, Cleeren *et al.* (2010) using German data analyze the degree of intra-format and inter-format competition between hard discount retail-

ers, such as LIDL and ALDI, and traditional supermarkets. They find that inter-format competition exists but is less intense than intra-format competition. Interestingly, they find that entry of up to two hard discounters does not affect the profits of existing supermarkets, although further entry does seem to have an effect.

Following Zhu *et al.* (2006) they interpret this result as indicating that supermarkets can focus on more profitable price-insensitive consumers when a limited amount of competition from discounters is present. We find in this paper evidence that incumbent supermarkets increase prices for products not sold by the discounter after entry.

The purpose of this article is to document the price effects of LIDL entry in the Canary Island supermarket industry after the 'forced' deregulation. A first contribution of this paper is the particular focus placed on analyzing the behavior of prices between products sold by the entrant and those products that the new entrant does not sell. Our difference in difference estimator of prices entry yields to that prices rise for products that the entrant does not sell, while they remain constant for products that it does sell. A second contribution of the paper is to show that a 1.5 kilometers radius around a supermarket is a reasonable cut-off distance for defining the caption area of each store.

After this introduction, section two describes the supermaket industry in Gran Canaria and the data used in this study. The results are presented in section three and the last section presents the conclusions and recommendatios for further research.

2. The case and the data

Initially, the authorities were unwilling to authorize entry by LIDL even though in the municipalities that LIDL wanted to enter the planning regulations were not binding. Apparently, the authorities' opposition was motivated by the negative view they had on the opening of hard discount supermarkets, presumably to protect small and medium size incumbents. A legal battle ensued and LIDL won, paving the way for its entry into those municipalities where planning regulations were not an obstacle. However, in order to placate local sensitivities, LIDL announced that it might enter more as a traditional supermarket rather than a hard discount store[1]. Thus, for incumbents there was uncertainty as to the characteristics and product variety that the future entrant would offer.

A special survey was designed and applied in two waves for a representative sample of supermarkets in Gran Canaria. The price for 30 category products[2] was collected. Note that since the products are the same there are no differences in quality

[1] See «LIDL renuncia al descuento duro», Canarias 7, Sunday, April 2, 2006, page 37, or «LIDL entra en Canarias», Monday October 2, 2006, page 14.

[2] These products have been included as a representative basket of consumer choices in Spain. The products are: rice, cornflakes, spaghetti(*), noodles(*), gofio(*), white bread(*), chicken breast, beef(*), ham(*), canned tuna, eggs, milk, yogurt, banana, olive oil (big and small(*)), water, lentils, potatoes, beer, cola(*), coffee(*), rum(*), chocolate(*), sugar(*), salt, tooth paste, mop, and detergent(*). The asterisk shows those products not sold exactly by LIDL (because it has different size, brand, tipology, etc.).

that may affect the prices set in each supermarket. For some ítems prices for both branded and unbranded products were registered.

The first wave was undertaken on the last week of January 2010 (3 weeks before LIDL opened) and the second wave on the last week of April 2010 (2 months after LIDL opened).

2.1. Sample design

We considered all supermarkets located in areas with at least 15,000 inhabitants (688 supermarkets and malls). Stratified random sampling by supermarket size was used in the survey design. Almost all supermarkets with more than 1,000 m^2 were surveyed. However, the percentage of supermarkets analyzed (sample size) is representative for all sizes considered.

Some descriptive statistics are presented in Table 1.[3] As regards the potential effects of LIDL, less than 1% of incumbent supermarkets analyzed have a LIDL closer than 250 meters. In a 1,500 meters radius, 13% of incumbent supermarkets have a LIDL nearby. The proportion of products sold by LIDL is 64% of the total number of products.

Table 1. Descriptive Statistics

Variable	*Average*	*S. D.*	*Minimun*	*Maximun*
Number of cash registers	5.8	8.3	1	60
Parking	0.4	—	0	1
Unbranded product	0.33	—	0	1
Population at 250 meters	1,271	1,235	2	5,160
Population at 500 meters	4,365	4,088	17	18,438
Population at 1,500 meters	25,774	27,281	744	116,852
Lidl in 250 meters	0.008	0.09	0	1
Lidl in 500 meters	0.03	0.18	0	1
Lidl in 1500 meters	0.13	0.33	0	1
Minimun distance to a Lidl	12,535	8,570	0	28,621
Products sold by Lidl	0.64	—	0	1

Source: Own elaboration. S.D. is Standard Deviation.

[3] All distances are Euclidean measures. These have been calculated with Matlab codes, available upon request to the authors. Also population figures were obtained assuming a uniform distribution within cities. In fact, we used detailed data on smaller agglomerations than cities (*núcleos poblacionales* in Spanish Statistical nomenclature) by ArcGis software.

2.2. Descriptive analysis of entry

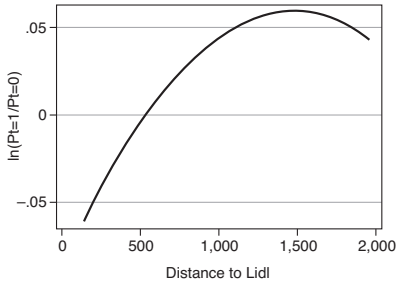
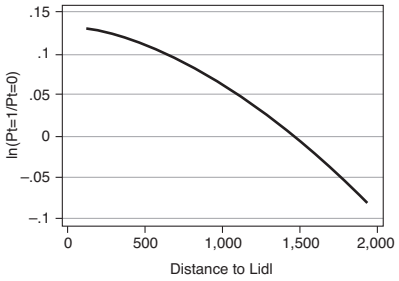
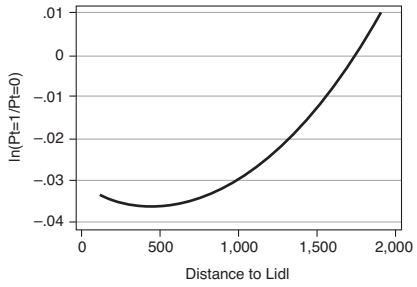
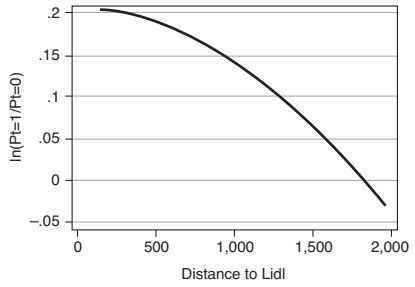
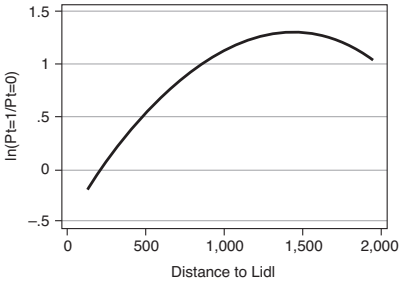
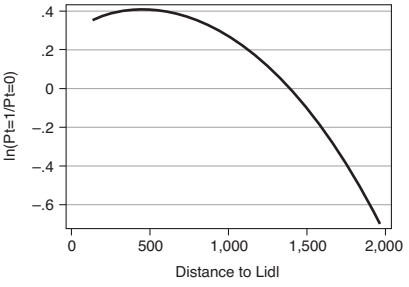
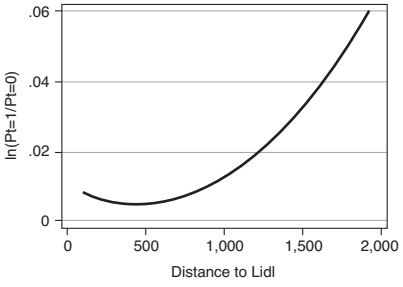
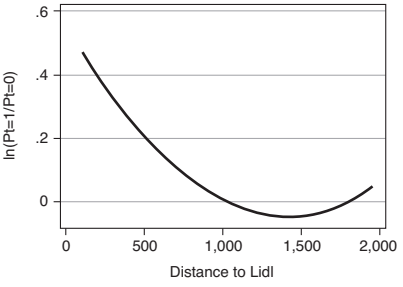
A quadratic relationship between the logarithm of the change in prices of different products (before and after entry) and distance to a new LIDL store was fitted on the data. The results can be seen in Table 2. We have divided the sample into two major product groups. On the one hand, there are products seen post-entry to be sold by LIDL and on the other, products not sold by this new entrant.

As can be seen, the relationship between the change in the price of the goods and the distance to a LIDL supermarket is radically different between both groups of products. On average, prices of products sold by LIDL fell or remained constant near the entrant, while in those supermarkets located further away (1,500 meters or more) these prices increased.

In addition to showing the average change over all products, we also present the relationship of a set of three specific products sold by LIDL. The results are very similar. Therefore, for products sold by LIDL prices in the supermarkets near the new entrant remained constant or decrease slightly, while in supermarkets further away they increased.

For products that LIDL does not sell the relationship is completely different. As can be seen from the graphs of Table 2 the average change in their prices is much higher near the LIDL supermarkets than in more distant supermarkets. While supermarkets near LIDL significantly increased prices, supermarkets further than 1,500 meters or more kept prices constant or even reduced them. As in the previous case, it also presents the relationship for three products not sold by LIDL that clearly show this behavior.

Table 2. Fit Quadratic Equations

Products sold by Lidl	*Products not sold by Lidl*
Average of products	Average of products
	
Rice	Cornflakes
	
Beef	Potatoes
	
Beer	Rum
	

Source: Own elaboration.

This evidence has an intuitive interpretation. González-Benito *et al.* (2005) showed that there is greater competitive pressure from supermarkets that have similar formats. If we transfer this idea to the type of product rather than the supermarket format it seems logical that there is greater competitive pressure among products that have the same format, and less or no competitive effect for more distant product formats.

However, the correlations showed in the graphical analysis could have other explanations than the entry of LIDL. Therefore, to find a more robust relationship an econometric approach is needed.

3. Estimations and main results

As a preliminary analysis we first present some tabulation of the data in the tables shown below. First, for each product the price was normalized by the average price (over all supermarkets) for the same good prior to entry. The first tabulation shows the average price over all goods, classified according to whether the product was eventually sold by LIDL or not and whether there is (or, in the case of before the entrance, «will be» in this location) a LIDL less than 0.5 kilometers away.

Table 3. Price index (normalized) before entry

	Is there (will be) a LIDL less than 0.5 kilometers?		
		No	*Yes*
Is (will) this product (be) sold by LIDL?	No	1.008391	0.9562631
	Yes	1.005289	0.9715162

Source: Own elaboration.

Thus, for example, on average normalized prices were 1.0083 for products not sold by LIDL and in supermarkets further than 0.5 kilometers away before entry.[4] We can see from Table 3 that in supermarkets further away from the entrant, prices were slightly above average for all products. However, for supermarkets close to the new entrant, prices are below average (below 1) prior to entry for both groups of products, both those sold and eventually not sold by LIDL.

[4] This average is not exactly equal to one because each price was normalized by the price of that good for all supermarkets prior to entry. But the weighted average across each row should sum to one, where the weights would be the number of supermarkets in each group.

Although this last result lends some support to the idea that prior to entry supermarkets close to entrants lowered all of their prices, we cannot be too emphatic since unobserved local demand or cost conditions could also influece the price levels in each area. More robust is the comparison between the price tabulation prior to entry and the tabulations after entry, which are shown in Table 4 below.

Table 4. Price index (normalized) after entry

	Is there (will be) a LIDL less than 0.5 kilometers?		
		No	*Yes*
Is (will) this product (be) sold by LIDL?	No	0.9888174	1.02726
	Yes	1.033544	1.019316

Source: Own elaboration.

We can see that in supermarkets far away from entrants, prices fell on average by almost 2% for products not sold by the entrant (from 1.008 to 0.989). The equivalente prices rose for the case of supermarkets close to an entrant, from 0.956 to 1.027, an increase of over 7%.

The same did not occur for prices of goods sold by the entrant. In this case, prices rose by almost 3% in supermarkets not close to the entrant and by almost 5% in supermarkets close to the entrant. These two figures are not very different or at least not as different as the case for products not sold by LIDL.

We can summarize the results of these tabulation as indicating that *a)* supermarkets close to the new entrants had lower prices for all goods just prior to entry compared to supermarkets further away, although this could be due to unobservable cost or demand effects, and *b)* after entry supermarkets close to new entrants raised prices on those products not sold by the new entrant. The same price behaviour was not observed for these goods in supermarkets further away.

In order to test whether these differences are statistically significant we estimate by ordinary least squares the following price change equation:

$$\ln(p_{ij}^1) - \ln(p_{ij}^0) = \beta_0 + \beta_1 \text{ Productnotsoldby Lidl}_i + \beta_2 \text{ LidlinXmeters}_j +$$
$$+ \beta_3 \text{ Prod*Lidlin}_{ij} + \beta_4 \text{ PopulationinXmeters}_j + \sum_{h=5}^{16} \beta_h \text{ City} + \sum_{l=17}^{22} \beta_l \text{ Supermsize}_j + \varepsilon_{ij}$$

where p_{ij}^1 is the price of the product i at supermarket j in period 1 and p_{ij}^0 is the price of the product i at supermarket j in period 0. By taking the difference in log prices we

are controlling for posible unobserved effects at the local level. *Product not sold by Lidl* is a binary variable that takes value 1 if the product *i* is not sold by the entrant. *Lidl in X meters* is a variable that counts the number of LIDL stores that supermarket *j* has in X meters (depending on the specification X can vary from 500 to 1,950 meters). The variable *Prod*Lidlin* is the interaction between the two latter variables. *Population in X meters* is the population surrounded supermarket *j* in a radius of X meters (from 500 to 1,950 meters). Finally the variables *City* and *Supermsize* are fixed effects by geographical and size of supermarket (by square meters of supermarket), respectively.

The idea behind this specification is to compare growth rates of prices in areas close to the new LIDL stores (captured by the *lidlinXmeters* variable) with those further away (control group) and depending on whether the product is or is not sold by the new entrant. The coefficient on the interaction of these two variables will indicate whether there is a different behaviour of prices of goods sold by the new entrant compared to those not sold by the new entrant.

The population, city and supermarket size variables are included to control for any cost shock or behavioral heterogeneity that may have affected different zones and store types.

Alternatively, we could have specified a difference in difference model for each product separately. This can be done by estimating an equation for the price level (or log prices) of each good in each supermarket on a time dummy indicating whether the observation was for a price before or after the entry of LIDL, whether the observation was taken in a supermarket close to the area where a LIDL store opened, and the interaction of these two variables. Then we could have compared the parameter value of this interaction term for each product and see whether they differ on average between products sold by LIDL and products not sold by the new entrant.

However, our specification has several advantages. First, not all products are sold by each supermarket and estimating a product by product equation results in poor estimates due to the small number of observations for some goods. Second, our specification allows us to directly identify the different effects of LIDL entry on products sold and not sold by the new entrant without having to do a complementary analysis of results.

The results of estimating the model are presented in Table 5. It shows that the interaction parameter is positive and statistically significant when X is equal to and greater than 500 meters and smaller than 1,500 meters. This coefficient indicates that for those products not sold by LIDL the growth in prices was larger for supermarkets with an entrant closeby compared to supermarkets further away. Furthermore, this effect decreases as we consider supermarkets further away from the new entrants. Past 1,500 meters there is no further discernible effect.

These results indicate that supermarkest close to a new entrant increased prices significantly on those products not sold by LIDL after entry, while similar supermarkets further away did not increase the prices on these goods. We interpret these results

as confirming our prior expectations that supermarkets close to new entrants may have reacted to the entry announcement by lowering prices on all goods and then, once entry occurs they raise prices on the goods that the new entrant does not sell. This effect would not be present for the same goods in supermarkets further away.

Table 5. Estimation of change in prices $\ln(p_{ij}^1/p_{ij}^0)$

Distance (meters)	*Product not sold by LIDL*	*LIDL near in X meters*	*Interaction*	*Constant*
500	0.043 (0.012)***	–0.031 (0.045)	0.125 (0.062)**	–0.033
750	0.037 (0.013)**	0.015 (0.031)	0.126 (0.043)**	–0.033
1,000	0.039 (0.013)**	0.008 (0.031)	0.086 (0.041)**	–0.035
1,250	0.039 (0.013)**	–0.011 (0.027)	0.059 (0.036)**	–0.035
1,500	0.039 (0.013)**	–0.003 (0.026)	0.056 (0.034)*	–0.039
1,750	0.042 (0.014)**	–0.008 (0.027)	0.036 (0.033)	–0.034
1,950	0.043 (0.014)**	–0.009 (0.026)	0.032 (0.033)	–0.034
Number observations	2,631	R^2 (Average)	0.019	

Note 1: *** 1%, ** 5%, * 10% significance test. Standard errors in brackets.
Note 2: All estimations include population, size of supermarket and fixed effects by city, which are not included in this table.
Note 3: All estimations are jointly significant.

4. Conclusions

The results of this paper are not consistent with the existing literature. We find that after entry by LIDL in the Gran Canaria supermarket industry prices actually rose in the incumbent stores close to the new entrants compared to a suitable control group further away. However this increase occurred mostly for products not sold by the new entrant. How do we explain this pricing behavior?

One possible explanation is that the effect of entry may be incorporated into prices when entry is (credibly) announced and much earlier than when actual entry occurs. This is consistent with similar findings in other countries (Lira *et al.,* 2007). It is also consistent with the finding in this paper that indicates that prices for goods just prior to entry were initially lower in supermarkets close to the future entrant compared to supermarkets further away for all goods. Unfortunately, since we do not have prices prior to the entry announcement and because there may be unobserved local effects that explain price differences between entry and no entry areas, we cannot test this proposition. However, if confirmed by future research, this hypothesis implies that care must be taken by researchers when trying to estimate the effects of

entry on incumbent's prices. It will make a difference whether benchmark prices are registered before entry is announced or during the interim period between announcement and actual entry.

The empirical analysis undertaken in this paper also shows that incumbents' prices rose by close to 9% after entry in areas close to the new entrants. However, only for the goods eventually not sold by the entrant. The same did not occur for goods sold by the entrant. In this case, price increased by a similar amount in supermarkets close to the entrant compared to supermarkets further away. What can explain this result?

Following the hypothesis presented above, it would seem that incumbent supermarkets lowered prices on all goods close to the new entrant. Perhaps this was a consequence of the uncertainty as to the format that the new entrant would have and thus the product range that it would offer. Subsequently, once they observed the products sold by the entrant, the incumbents close to the new entrants raised prices on the goods where they did not face competition.

It would imply that incumbent prices do react to entry near their stores. In turn this would confirm that entry barriers that may hinder entry in this industry may be causing harm to consumers. Particularly suspect are regulations, such as those currently in effect in Spain, which places a limit on the total floor area or number of competitors according to population or other demographic parameters in each local market. The evidence presented in this paper also suggests that 1.5 kilometers seems to be a reasonable cut-off point to define the caption area around a supermarket.

References

Aalto-Setälä, Ville (2002): «The effect of concentration and market power on food prices: evidence from Finland», *Journal of Retailing*, 78, 207-216.

Abe, N., and Kawaguchi, D. (2010): «Incumbent's price response to new entry: the case of Japanese supermarkets», *Journal of the Japanese and International Economics*, 24, 196-212.

Basker, E. (2005a): «Job creation or destruction? Labor market effects of Wal-Mart expansion», *Review of Economics and Statistics*, 87(1), 174-183.

— (2005b): «Selling a cheaper mousetrap: Wal-Mart's effect on retail prices», *Journal of Urban Economics*, 58, 203-229.

— (2007): «The causes and consequences of Wal-Mart's growth», *Journal of Economic Perspective*, 21(3), 177-198.

Basker, E., and Noel, M. (2009): «The envolving food chain: Competitive effects of Wal-Mart's entry into the supermarket industry», *Journal of Economics and Management Strategy*, 18(4), 977-1009.

Blinkey, J. K., and Connor, J. O. (1998): «Grocery market pricing and the new competitive environment», *Journal of Retailing*, 74, 273-294.

Cleeren, K.; Verboven, F.; Dekimpe, M. G., and Gielens, K. (2010): «Intra- and Interformat Competition Among Discounters and Supermarkets», *Marketing Science*, 29(3), 456-473.

Daunfeldt, S.; Orth, M., and Rudholm, N. (2010): «Opening local retail food stores: A real-options approach», *Journal of Industry, Competition and Trade,* 10, 373-387.

Ellickson, P. B. (2006): «Quality competition in retailing: A structural analysis», *International Journal of Industrial Organization*, 24, 521-540.

— (2007): «Does Sutton apply to supermarkets?», *RAND Journal Economics*, 38(1), 43-59.

Foster, L.; Haltiwanger, J., and Krizan, C. J. (2006): «Market selection, reallocation, and restructuring in the U.S. retail trade sector in the 1990s», *Review of Economics and Statistics*, 88(4), 748-758.

González-Benito, O.; Muñoz-Gallego, P. A., and Kopalle, P. K. (2005): «Asymmetric competition in retail store formats: Evaluating inter- and intra-format spatial effects», *Journal of Retailing*, 81, 59-73.

Griffith, R., and Harmgart, H. (2008): «Supermarkets and planning regulation», *CEPR Discussion Paper No 6713*.

Lira, L.; Rivero, R., and Vergara, R. (2007): «Entry and prices: Evidence from the supermarket sector», *Review of Industrial Organization*, 31, 237-260.

Matsa, D. (2009): «Competition and product quality in the supermarket industry», *The Center for the Study of Industrial Organization*, Working Paper No 103.

Uusitalo, O. (2004): «Competitive reactions to market entry. The case of the Finnish grocery retailing industry», *British Food Journal*, 106(9), 663-672.

Zhu, T.; Singh, V., and A. Dukes (2006): «Local Competition and Impact of Entry by a Discount Rtailer», *Working Paper,* Carnegie Mellon University.

Zhu, T., and Singh, V. (2009): «Spatial competition with endogenous location choices: An application to discount retailing», *Quantitative Marketing and Economics*, 7, 1-35.

Copyright of Investigaciones Regionales is the property of Asociacion Espanola de Ciencia Regional and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.