Supermarket Entry and the Survival of Small Stores

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Abstract

We analyze the effect of supermarket entry on the exit of small stores in the food retailing sector in Montevideo between 1998 and 2007. We use detailed geographical information to identify the link between supermarket entry and the exit of nearby small stores. Entry of supermarkets using small- to medium-size formats creates a competitive threat for the existing small stores, decreasing their probability of survival. The result is robust to several model specifications and varying definitions of what constitutes a supermarket. The impact of supermarket entry is unequivocal for groceries, bakeries, fresh pasta shops, and butcher shops.

Keywords: Supermarket entry; competition; small store attrition.

1 Introduction

In the last 30 years large supermarkets have changed the retail business landscape in many countries through larger store formats, more shelf space, an increased variety of goods and services and extensive marketing strategies. In developing countries, small retailers and producers have increased political pressure in order to mitigate the negative effects of large supermarkets on profits and the probability of survival (see Reardon and Hopkins (2006)).[1] Accordingly, there is a

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[1] As an example, at the time of this writing, the major of the Intendencia Municipal de Montevideo has declared that she will not allow new supermarket entry into the city. This came as a result of the pressure from small groceries, and the new authorities have reached the conclusion that no new supermarket is needed in the city. Bertrand and Kramarz (2002) use the political sign of the government as an instrument for the approval of new supermarkets. They present

growing literature on the effects of supermarket entry on industry concentration, and on the probability of exit of small stores. We contribute to this literature by analyzing the impact of large stores' entry on the probability of exit of small stores in the entrant's neighborhood in Montevideo (Uruguay).

We regress the probability of exit of a small store on the total area occupied by supermarkets in that store's neighborhood and show that the entry of a supermarket in a small store's neighborhood results in a slight but significant increase in its chances of going out of business in that year. In order to control for the endogeneity of the entry decision of supermarkets, we use two complementary techniques that we describe below. Our results are robust to alternative definitions of what constitutes a supermarket and to different model specifications.

Our contribution is threefold: First, ours is the first study to focus on a developing country, so it is an indication that the effects that had been documented previously are robust. Whatever the differences between the developed and developing country markets in terms of shopping habits and entry decisions, the net effect of entry is similar. Second, relative to the prior literature, our use of neighborhood level data allows us to identify better the geographical link between entrants and the effect on nearby small stores (see Jia (2008) and the references therein).

Finally, our third contribution is to shed light on the competitive effects of entrants' responses to existing regulation about an establishment's size. In Montevideo, existing regulation has made it difficult for very large stores to enter the market. Since the local authority has been reluctant to approve the entry of large supermarkets, but not of smaller establishments, supermarket chains have responded by launching smaller-scale outlets, which are located in various neighborhoods.[2] We analyze the resulting competitive outcome, where smaller-scale chain establishments compete with small-single store retailers and examine whether the regulation, which is aimed at protecting small stores, has in fact been effective.[3]

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evidence that leftist governments tend to be more open to supermarket entry.

[2] Another factor that may have contributed to this entry strategy is that Uruguayans do not usually use their cars for shopping. Only a third of homes in Montevideo had cars during the period we analyze. Even if only families who do own cars are considered, it is normally observed that they do not use cars for shopping.

[3] Entry dynamics that we describe for the case of Montevideo may parallel those described in Sadun (2008) for the case

2 Related Literature

The literature has analyzed whether the entry of large stores increases market concentration. Franklin (2001) finds little effect of Wal-Mart supercenters on food seller concentration, while Martens et al. (2006) find that the entry of Wal-Mart stores increases concentration in local markets. More generally, see Jarmin et al. (2004, 2009) and Haskel and Sadun (2009) for descriptions of the retail and supermarket sectors in the US and the UK, respectively.

Our paper is more related to the strand of the literature that analyzes whether the exit of small stores is the consequence of larger supermarkets' entry. The study of the effect of supermarkets' entry on, for example, the probability of survival of small "mom and pop" shops is important for several reasons: First, entry can affect the employment in the sector and the structure of the industry. Second, if prices are lower in supermarkets than in small groceries (see Hausman and Leibtag, 2004), this can have a direct impact on the welfare of consumers. Third, supermarkets' economies of scale and scope can increase the productivity of the retail sector through a creative destruction process (see Foster et. al (2002) for the US, and Haskel and Sadun (2009) for the UK).

The evidence of the impact of large supermarkets on small grocery stores is mixed. Sobel and Dean (2008) study the impact of Wal-Mart's entry on all small retailers and show that there is no long-run effect. Although they do find a reallocation effect on the small business sector as a result of Wal-Mart entry, their results suggest that some sectors expand while others contract. On the other hand, Jia (2008) shows that the entry of Wal-Mart alone explains 37% to 55% of the net change in small retailers in small- and medium-sized US counties. She also finds that when either Wal-Mart or Kmart enter a market, they cause 46% to 58% of discount stores either to become unprofitable or to be unable to recover their sunk costs. When both enter a market, this figure rises to 68.4%.[4] Basker (2005) also finds a reduction in the number of small retailers, following a Wal-Mart entry.[5] For Italy, Viviano (2008) finds that entry by large supermarkets leads to a decrease in

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of UK. That paper analyzes the impact of existing regulation of the retail market in the UK, and concludes that the strategy of large supermarkets could be interpreted as if they aimed to eschew regulation: Supermarkets entered markets using smaller formats that competed more aggressively with small stores.

[4] A similar finding for the UK was established by Competition Commission (2008).

[5] Basker 2005 found that after one Wal-Mart enters the market, three retailers leave within two years of entry; and up to

the number of small shops.

The paper that is most related to ours in terms of its results is Igami (2011). He shows that the entry of a large supermarket increases the chance of exit of larger stores, but has a positive impact on the survival probability of smaller incumbents. He links his results to competition in a differentiated product setting: Different floor sizes of stores imply different products for consumers, which translate into different shopping habits. This literature suggests that the impact of supermarket entry could be linked either to the size of the newcomer or to the size of the incumbents. Finally, another closely related paper is Dubra and Ferrés (2006), who study the consequences of supermarket entry on small firms in Uruguay. We improve on their data set and on their estimation techniques.

3 An overview of supermarket entry in Uruguay

Uruguay is a middle-income country, with a population of 3.37 million people, in 2011. Approximately half of the population or 1.7 million people live in the capital city Montevideo and its metropolitan area. The main supermarket chains in Montevideo are: *Grupo Disco del Uruguay* (which manages brand names *Disco*, *Gèant*, and *Devoto*), *Tienda Inglesa*, *Ta-Ta*, *Macro Mercado*, and *Multiahorro*. Of these, *Disco* and *Tienda Inglesa* target consumers with higher incomes. Concentration, transformation, and entry in the supermarket industry characterized the late 1990s, but that trend was slowed by the 2001-2002 financial and economic crises in Uruguay. In the first decade of the 2000s, supermarkets accounted for a roughly stable 35 percent of total sales of the food retailing sector in Montevideo.[6]

Both multinational entry and consolidation prompted lobbying by small retailers in Uruguay to restrict entry and to promote the sector's interest more generally. This led to a law in 1999 that

four retailers depart within five years.

[6] This data are from IdRetail. The reasons for the increased supermarket participation in total sales may be varied and have not been studied in depth. We acknowledge that some recent developments that may have contributed to this phenomenon are the rise in income after the crisis and some poverty alleviation policies, such as the Emergency Plan and its main component, the Citizen Income Plan. See Borraz and Gonzalez (2009a) and the references therein for a discussion of the plans and their impact.

regulated the installation of large retailers in Uruguay.[7] The law required entrants in the food retailing sector, which planned to operate stores of 300 square meters of sales area or more, to obtain special approval from the municipal authority.[8] The administrative requirement applied also to the case of expansions of establishments that would exceed the 300-square-meter threshold, as well as to the opening of new establishments (that would exceed 300 m^2) by incumbents.[9]

Each time a new approval request is submitted, a commission assesses the effect of entry on: a) global supply and demand in the area defined by the local government (mainly whether or not there is excess demand by consumers, which is not being satisfied by incumbent firms); b) small retailers' exit; and c) net employment (which was introduced in 2003). The commission is required to make a decision based on these three criteria.

The Uruguayan law regulating entry in the food retailing sector mirrors European legislation in a number of respects.[10] However, the Uruguayan law has some distinguishing features: First, the threshold of square meters above which a store is considered a supermarket is much lower than in Europe. Second, the Commission has no veto power on a supermarket's entry, since the ultimate decision lies in the hands of the local government. Finally, one member of each Commission is a representative of the central government, who casts the deciding vote in the case of a tie.

4 Data

The city of Montevideo is divided into 18 administrative regions called "*Centros Comunales Zonales*" (Common Zone Centers, CCZ). We identify these administrative regions as "neighborhoods": Each of these zones corresponds to the union of several traditional neighborhoods in the city. Since Montevideo has an area of 540 square kilometers, the CCZs have

[7] One year later, an antitrust law was also passed, mainly to control cartels and abuse of dominance. In the early years, the only cases that were submitted to the antitrust agency were alleged predatory pricing practices from large supermarkets, mainly Gèant.

[8] Law #17.188 "Standards for Large Area Commercial Establishments for the Sale Of Food and Household Items" creates and empowers municipal commissions to make recommendations to the municipal authority to approve or disapprove the installation of large-scale commercial establishments.

[9] In 2003 the law was amended, and the threshold was decreased to 200 square meters of sales area (see Law #17.657 "Large Commercial Area Establishments for the Sale Of Food and Household Items").

[10] See Bertrand and Kramarz (2002) for entry regulation in France, Griffith and Harmgart (2008) and Haskel and Sadun (2009) for the UK, and Viviano (2008) and Schiviardi and Viviano (2011) for Italy.

an average area of 30 square kilometers, or a square of 55 city blocks on each side. Although these regions are fairly large (when considered as neighborhoods), most of the economic activity in each CCZ is concentrated in a much smaller area. Since 60% of Montevideo is rural, the effective size of each neighborhood (CCZ) is much smaller than the 30 square kilometers mentioned above.

4.1- Databases

We collected seven different databases: One contains data on all registered food retailing firms in Montevideo. Four databases contain information about characteristics of all supermarkets operating in Montevideo. Additionally, we obtained socio-economic information about the population of Montevideo from the "Encuesta Continua de Hogares" (ECH, the national household survey). Finally, we gained access to a database on the construction permits that have been issued by the local government of Montevideo (Intendencia Municipal de Montevideo, IMM).[11] In every case the data are annual, for the period 1998-2007.

The database that contains information about all food retailers in Montevideo, with the exception of butcher shops, comes from the *Servicio de Regulación Alimentaria*" (SRA) of the IMM. The SRA is the authority that is in charge of keeping a record of all food businesses in Montevideo and controlling their sanitary condition. Every food store in Montevideo is required to hold a SRA permit to start operations. The SRA database provides information about which food stores were in operation for every year between 1998 and 2007. The SRA database does not contain information with regard to butcher shops since another authority (the *Instituto Nacional de Carnes*, INAC) is responsible for granting operating permits for butchers.

Information about supermarket operations and their characteristics comes from various sources; and, as robustness checks for our results, we use several alternative definitions of what constitutes a supermarket. A database provided by INAC contains information about permits for butcher shops that operate in Montevideo. There are two types of information in this database: One provides the list of permits for supermarkets that sell meat; the other provides the list of small butcher shops. The former list is one of our definitions of a supermarket. A second definition comes from the *Dirección General de Comercio* (DGC) from the Ministry of Economy and Finance, which has a

[11] Details about the databases and their sources are in Annex I

record of establishments that it defines as supermarkets.[12] Finally, we purchased information about size (in square meters), and the number of cash registers, for each supermarket, from two complementary sources: Ciudata, and IDRetail, which are two local consulting firms. As is detailed in section 4.2, the four sources of information about supermarkets are key to our various definitions of "supermarket".

Since supermarket size is the main explanatory variable in the analysis, a word of caution is in order. The information about the exact size of supermarkets could not be obtained for each year: we have just one value for each store for the whole period. This implies that we do not measure changes in supermarket size as a source of small grocery stores' exit; instead, we measure the increase in supermarket area (in square meters) that arises from (new) supermarket entry.

The information about supermarket size in each year is difficult to obtain because it is not collected by any source on a regular basis. IdRetail carries out a grocery census once every five years, and Ciudata estimates the supermarket size every year, but the quality of the information is dubious. Also, Ciudata does not keep a record of each unit's information over time. We also have access to information from Montevideo's Supermarket Commission for each supermarket's permit request (for expansion) in the period, but we found that most were regularizations of previous size changes. As a result, we cannot correctly ascribe every size increase to each year. We do find, however, that most of the changes in size were relatively small (less than 100 square meters, as compared to average supermarket size of approximately 700 square meters), and that major increases in supermarket area were the result of supermarket entries.

Given these difficulties, we had to make some assumptions about supermarket size. First, we use the data from IdRetail from 2004 as our main information source. If we have information from the Supermarket Commission, we use that information to set the size of the supermarket. If information of neither IdRetail nor the Supermarket Commission is available for a store, we use data from Ciudata.

[12] These establishments are required to report prices of a consumer goods basket, on a monthly basis. Each supermarket must submit its price levels to DGC if it has more than three cash registers or if it belongs to a chain of supermarkets with four or more business units.

4.2- Definitions of food shops and supermarkets

The SRA classifies each store according to its line of activity (i.e., bakery, greengrocer, fish market, etc.).[13] For example supermarkets are assigned all of the codes that correspond to bakeries, fresh produce, fish selling, etc. In the SRA database, we have identified all supermarkets and also a number of different categories of establishments that compete with supermarkets. We have grouped all existing small stores into four categories: i- "small groceries", which includes small groceries and greengrocers; ii- "bakeries", which includes a long list of bakery (and related) sellers; iii- sellers of freshly manufactured pasta; iv- kiosks. Annex II provides a detailed description of the methodology used to process the data provided by the SRA.

An additional source of information about small stores that compete with supermarkets came from INAC. All butcher shops need a permit from INAC, just as grocery stores need one from the SRA. Thus, a fifth category of small stores came from the INAC database: v- butcher shops.

We have considered four definitions of "supermarket":

i) Stores with more than 200 square meters of sales space. This definition is consistent with the legal definition of a supermarket in Uruguay. The data come from IDRetail and Ciudata.

ii) Stores that had three or more cash registers. The data come from IDRetail and Ciudata.

iii) Stores that are present in the list of supermarkets that have to report prices to DGC.

iv) Stores that have a butcher shop inside and sell other food products (source INAC).

Table 1 presents the correlations between the alternative definitions of supermarkets.

Table 1. Correlation Coefficients

Supermarket Area according to Different Definitions

	> 200 m^2	3+ Registers	DGC	Butcher
> 200 m^2	1.0000			
3+ Registers	0.9972	1.0000		
DGC	0.9983	0.9973	1.0000	
Butcher	0.9171	0.9242	0.9163	1.0000

[13] The SRA database also contains businesses that do not compete with supermarkets: bars, fat processing plants, etc.

As shown in Table 1, the four definitions are highly correlated. Hence, in the analysis, we have concentrated on just the first two: stores that are larger than 200 square meters, and those that have three or more cash registers. The qualitative results do not change if we use the other definitions.

5 Empirical Methodology

We explore the impact of supermarket entry on small retailing activity by exploiting differential additions of supermarket entry (and differential "death rates" for small businesses) in 18 urban areas of Montevideo. For each of the 18 areas (CCZs), we calculated the sales area (in square meters) that belongs to all supermarkets in each CCZ and used it as the main independent variable. The dependent variable is a dummy variable that indicates whether a small store was open or not in a given year.

We focus on identifying the effect of supermarket entry on the probability of survival of small food retailers in each CCZ. Our approach has allowed us to identify specific effects for each CCZ. Studies for other countries have defined much larger geographical areas, such as cities or counties in the US. As supermarkets in Uruguay tend to be small by international standards, and because shopping habits (walking to the shop) make it difficult for supermarkets to compete with small businesses far away, it makes sense to define smaller geographical areas. Moreover, since the law in Uruguay identifies a supermarket as a store with a sales area that is larger than 200 square meters, it makes sense to assess the effect that entry of these stores has on *nearby* small shops (and not in the city in general).

The strategy of analyzing CCZs of Montevideo makes sense only if there is differential entry across regions. The data show that some CCZs had increases of the total supermarket area of 60%, while others remained constant, so there is indeed variation in supermarket area expansion. Overall, the total supermarket area increased by 25% in a decade. This expansion in area occurred while real per capita income fell as a consequence of the economic crisis that hit Argentina and Uruguay in 2002-2003. At the same time, supermarket expansion may be explained by an increase in inequality (Borraz and Gonzalez, 2009b) and by the rise in the income of higher

deciles. Other factors that may have induced entry are increased female participation in the workforce, and increased availability of cars and of fre ezers.

Table 2 shows the summary information for the variables that are used in this paper.

Table 2. Data Summary

	Observations	Mean	Median	St. Dev	Min	Max
Open Groceries	49,980	0.54	1.00	0.50	0.00	1.00
Open Bakeries	17,970	0.57	1.00	0.50	0.00	1.00
Open Pasta	1,970	0.48	0.00	0.50	0.00	1.00
Open Kisoks	25,300	0.60	1.00	0.49	0.00	1.00
Open Butcheries	6,610	0.65	1.00	0.48	0.00	1.00
Supermarket area	180	6.49	5.57	4.12	0.37	25.03
Commercial permits	180	5.65	0.81	21.17	0.00	201.00
Population	180	0.71	0.74	0.27	0.16	1.29
Household size	180	2.90	2.87	0.40	2.15	3.72
Per capita income	180	5.14	4.83	2.21	2.02	10.97
Groceries per Km^2	180	18.22	14.55	12.29	4.02	55.39
Non-Groceries per Km^2	180	0.22	0.14	0.20	0.03	0.75
Bakeries per Km^2	180	7.13	4.47	6.08	1.37	27.80
Non-Bakeries per Km^2	180	0.34	0.24	0.25	0.06	1.06
Pasta per Km^2	180	0.64	0.39	0.52	0.00	2.12
Non-Pasta per Km^2	180	0.40	0.27	0.31	0.08	1.26
Kiosks per Km^2	180	11.87	5.71	11.67	0.72	45.43
Non-Kiosks per Km^2	180	0.29	0.21	0.20	0.07	0.83
Butcheries per Km^2	180	2.82	2.13	1.97	0.34	6.91
Non-Butcheries per Km^2	180	0.38	0.26	0.29	0.07	1.22
Dummy Gèant	180	0.02	0.00	0.15	0.00	1.00

Source: IdRetail, Ciudata, IMM, INAC, INE, Supermarket Commission, and authors calculations.

Variables Supermarket area and commercial permits are defined at the CCZ level (mean is a simple average); Per capita income is defined at the CCZ level and measured in thousands of 2005 constant Uruguayan pesos (simple average); Population is defined at the CCZ level and measured in hundred thousands of inhabitants; Variables Non-Groceries per Km^2, Non-Bakeries per Km^2, Non-Pasta per Km^2, Non-Kiosks per Km^2, Non-Bucheries per Km^2 are expressed in hundreds of the unit value.

The variable Open is our dependent variable; it takes a value of 1 if a given store was open in a year and 0 otherwise. The variable “Commercial permits authority area” will be our instrument for supermarket expansion: it measures the area for construction of all commercial buildings (or their expansion) that was authorized by the IMM in a given CCZ. Finally, Gèant is a large supermarket that opened in the outskirts of Montevideo during the period. We incorporate in our analysis a dummy variable that assumes a value of 1 for the CCZ closest to the Gèant supermarket, in the years in which it was open.

Table 3 shows the average supermarket size and the Herfindahl-Hirschman concentration index

(HHI) for each CCZ.

Table 3. Concentration

	Supermarket definition			
	Bigger than 200 square meters			
	Average supermarket		HHI	
CCZ	1998	2007	1998	2007
1	606	547	1,582	1,271
2	579	537	771	658
3	1,151	864	4,691	3,761
4	518	474	1,906	1,420
5	1,018	855	1,431	1,159
6	590	557	1,667	1,241
7	526	487	1,844	1,678
8	1,198	1,002	2,103	1,932
9	524	608	1,841	1,653
10	682	538	5,003	3,813
11	659	637	2,454	1,595
12	494	444	1,343	1,346
13	1,015	1,007	5,146	5,223
14	372	849	1,833	2,758
15	874	874	3,364	3,364
16	1,145	913	4,365	3,897
17	366	970	10,000	6,939
18	252	472	3,408	3,930
Average	698	702		

Source: authors' calculations.

The average supermarket size ranges from 252 to 1,198 square meters in 1998 and from 472 to 1,007 in 2007. On average, small supermarkets increased and larger supermarkets decreased their sizes. As a result, concentration, as measured by the HHI, generally decreased in the period.

We estimate five regressions: one for each kind of store. In each regression, we estimate the probability that a small food store is open during the year, using instrumental variables, in order to capture the link between supermarket entry and the probability of survival of small shops. Each regression is a version of the following non-linear model that controls for demand- and supply side effects:

$$Pr\left[a_{ijt}=1\right]=F\left(X_{jt}\beta+S_{jt}\delta+\lambda_j T_j+\gamma DG_{jt}\right) \qquad i=1,2,...,10183; t=1998,...,2007; j=1,...,18,$$

where

1. a_{ijt} is a dummy variable that takes a value of 1 if the grocery "i" in CCZ "j" was open at time "t";
2. F is the logistic function (logit model);

3. X_{jt} are demand control variables such as per capita income in period t, for the CCZ in which grocery i is located; also we control for the CCZ population and competition intensity, defined as the number of stores of the same kind per square kilometer in that CCZ; as a control for unobserved general business conditions, we also control for stores of all other kinds per square kilometer in that CCZ;
4. S_{jt} is the supermarket area in the CCZ where grocery i is located, at time t. In our original regressions this variable was defined as the sum of square meters of supermarkets in the CCZ where grocery i is located; due to endogeneity reasons, we instrumented S_{jt} with square meters of the commercial permits (of all kinds) that were authorized by the IMM for construction in t (henceforth "commercial permits");
5. T_j is a time trend for the j^{th} CCZ. In order to further reduce endogeneity concerns (for example, supermarkets could enter in CCZs where economic conditions are improving, and that could bias our estimates) we include a different time trend for each CCZ; and
6. DG_{jt} is a dummy variable to account for the installation in 1999 of the biggest supermarket in Uruguay (Gèant, 11,000 square meters). This supermarket is so large that its effect on small stores was different from that of other supermarkets, so we treated it separately. Although this supermarket is not located in Montevideo proper, it lies in its outskirts, in the larger metropolitan area.

We are now able to specify exactly what it is that our paper estimates: The coefficient on S_{jt} measures the effect on the probability of survival of a small store (at time t) of the addition of new supermarkets in the CCZ (changes in S come only through the addition of new stores, since in our databases supermarkets never change in size). Since we instrument S with the square meters of commercial permits of all sorts that were authorized, we capture the effect on small stores of the entry of new supermarkets that are not caused by the specific conditions of the market where supermarkets operate.

We ran separate regressions for each of the five kinds of stores in our sample: small groceries, bakeries, pasta shops, kiosks, and butcher shops. Our aim in running these regressions separately was to study whether differences in the characteristics of small businesses had an impact on their

probability of survival.

Though we initially included (as a measure of wealth) control variables that indicated the household's durable goods ownership, these were dropped because they were not significant in any of the regressions. For example, an extensive literature shows that the availability of cars, refrigerators, and freezers favors the existence of consuming habits that tend to increase supermarket consumption (see Reardon and Berdegue (2002) and the references therein). For our estimation period, we found an almost perfect correlation between per capita income and the availability of specific durable goods. Hence, we conclude that our income variable captures the effect of ownership of durable goods.

The main challenge in our econometric estimation is to control for the potential endogeneity of the entry decision of supermarkets. If supermarkets entered in neighborhoods where they expected business conditions to be good, and those favorable conditions also affected small stores, the deleterious effect of supermarkets on shops would be underestimated. In order to correct for this potential problem, we introduce two modifications to the basic specification.

First, instead of including as a right-hand-side variable the total supermarket area in CCZ j in time t, we instrument supermarket area with the square meters of the commercial permits (of all kinds) that were authorized by the IMM for construction in CCJ j in time t. Construction permits is an instrument of supermarket entry, as they signal the relevance of a specific CCZ for commercial expansion. Although this instrument is broader than that used in Basker (2005 and 2006), it is in the same vein: using planned opening space as a proxy for supermarket expansion. In that way, we lessen the endogeneity of the explanatory variables.

To understand our second control for potential endogeneity, imagine that unobservable business conditions are improving in one CCZ but not in another, and that after a few years, supermarkets start entering in the more dynamic CCZs. Even if the entrance of the supermarket is harmful for the small stores, that is not likely to be reflected in the estimation. If we include a different time trend for each CCZ, however, this trend will capture the differential unobserved evolutions, and the estimation will reflect the effect of the supermarket on the chance of survival of small stores.

Despite our attempts to find good instruments, and to control for the potential endogeneity issues with the CCZ specific time trends, we believe that some endogeneity or simultaneity problems may remain. The reason is that most variables that affect the decisions of supermarkets to enter or expand will also affect the decisions of small stores to close, and vice versa. However, we believe that instrumenting the main explanatory variable and including the time trends, as we did, is the best that can be done. In addition, we ran a series of robustness checks that included using only lagged values of supermarket area (S_{jt-1}) and lagged values of square meters of the commercial permits (of all kinds) that were authorized by the IMM for construction in t-1. Since these variables are predetermined, there is less reason to be concerned about biases in the estimates of the main coefficient of interest. In those regressions the sizes of the coefficients did not vary significantly.

Lastly, as an additional robustness check, we conducted a duration analysis in order to test if supermarkets have an effect on the small shops' decision to remain open. More specifically, we ran Cox's Proportional Hazard model to estimate the effect of supermarket entry on the probability that a store will be open in each period. As the previous estimating methodology drops the information about shops that remain open throughout the period, we use the whole sample to check the consistency of our results.[14] In terms of our model, we want to incorporate into the analysis the period until a grocery opens, and how this decision is influenced by the expansion of supermarket area.

6 Results and Robustness Check

Table 4 presents the main regressions of our analysis. In each case, the dependent variable is a dummy variable that captures whether small store i in CCZ j was open at time t; the independent variables include the number of square meters of supermarket area in the CCZ of store i, in period t, instrumented by commercial permits; demand factors (population and per capita income in CCZ j), at time t; a supply-side factor (the number of retailers of the same kind per square kilometer in CCZ j, at time t); ; a demand-side factor (the number of retailers of other kinds per square kilometer in CCZ j, at time t); a dummy variable that accounts for the Gèant supermarket in a nearby

[14] We are grateful to the editor for suggesting this robustness check.

suburban area; and an individual effect for each CCZ.[15] In order to concentrate on the main results, the dummy variables and the trend effects for each CCZ are omitted from Table 4. We estimate our empirical model using a logit regression.

Table 4: Impact of Supermarkets area on small stores
Dependent Variable: Retailer open
Logit Model. Instrumental Variables Estimation. Marginal effects

Variables	Grocery	Bakery	Pasta	Kiosk	Butcher shop
Supermarket area	-0.0088***	-0.0084***	-0.0274***	-0.0022	-0.0143***
	(0.0018)	(0.0031)	(0.0103)	(0.0027)	(0.0047)
Population	-0.0378***	0.0065	-0.0319	-0.0367*	0.0883**
	(0.0132)	(0.0234)	(0.0758)	(0.0222)	(0.0358)
Household size	0.2276***	0.1696***	-0.0760	0.1753***	0.0667
	(0.0167)	(0.0274)	(0.0831)	(0.0234)	(0.0436)
Same Retailers per Km^2	0.0017***	0.0005	-0.0011	0.0009***	0.0014**
	(0.0002)	(0.0004)	(0.0011)	(0.0003)	(0.0006)
Other Retailers per Km^2	-0.0000	0.0001*	-0.0000	0.0001*	-0.0001
	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0001)
Per capita income	0.0274***	0.0148***	0.0340***	0.0224***	-0.0028
	(0.0026)	(0.0041)	(0.0123)	(0.0032)	(0.0067)
Dummy Gèant	0.0956***	0.0853	0.2168	0.0106	0.1531**
	(0.0362)	(0.0605)	(0.1885)	(0.0598)	(0.0707)
CCZ Time Effects	Yes	Yes	Yes	Yes	Yes
Observations	49,980	17,970	1,970	25,300	6,610

Robust Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Variable Supermarket area and per capita income are defined at the CCZ level and measured in thousands of the unit value; Population is defined at the CCZ level and measured in hundred thousands of inhabitants; Other Retailers per Km^2 is expressed in hundreds of the unit value.

A Chow-like F-test rejects the null that there should be one regression for the five categories of small stores.[16] This means that there are idiosyncratic elements that explain the differences in the probability of exit of the various kinds of small stores. Also, trend effects are jointly significant in the specification (not reported). We find that for grocery stores, bakeries, fresh pasta sellers, and butcher shops there is a negative and significant impact of new supermarkets on the probability

[15] Note that the number of retailers per square kilometer in a CCZ at time t could also be interpreted as a measure of unobserved business conditions.

[16] The value of the test is 166, and the critical value is 2. Also notice that because our measure of supermarket area is at the CCZ level, we estimate clustered standard errors at that level.

that the store is open in that year: an increase in the total supermarket area in a CCZ reduces the chances of survival of those stores in that CCZ. The same negative effect is present, but is not significant, for kiosks.

An analysis of the difference in the effect of supermarket entry on the various kinds of stores is beyond the scope of this paper. We will focus mainly on small grocery stores, which are almost half of the shops considered, and are also the closest competitors of supermarkets. Nevertheless, we conjecture that when one visits the butcher, or the small grocer,[17] one usually needs to buy other things that are not provided by those sellers, whereas a visit to the supermarket would take care of all needs at once. Therefore, entry of a new supermarket also affects stores other than grocers or butchers. As will become clear shortly, the sign of the effect of supermarket entry on the probability of survival of small stores is robust to the model specification, and to the inclusion of different variables and lags. Only the significance of the coefficient of supermarket area on the kiosks regression varies; for the rest of the stores, the effect is always significant. This is possibly because supermarkets are not as close substitutes for kiosks as they are for grocery shops, bakeries, pasta sellers, or butchers.

The results of our estimations do not change for the other three different definitions of what constitutes a supermarket. Also, in regressions that are not reported in this paper, adding lagged variables of supermarket area did not change the results, and the added variables were not significant. OLS estimates also yield similar results.

In the regressions of Table 4 we capture the effect of supermarket *area*, on the probability of survival. In order to quantify the effect of the entry of one new supermarket, remember that the average supermarket size is approximately 700 m^2, so that if a new supermarket enters in a CCZ, it will cause the probability of survival of a grocery store to fall by 0.62% = 700 x 0.88% (recall that in the regression a change of 0.88% corresponds to an increase in the supermarket area of 1,000 square meters). The effect is almost twice that for butchers, and over three times that value for pasta sellers (the chance of survival decreases by 2% in this case). Also, supermarket area

[17] We do not give much weight to the result on pasta sellers, since there only 190 in the sample, compared to, for example, almost 5,000 grocery stores.

increased by an average of 1,200 m^2 per CCZ in the whole period, so the effect of supermarket entry on grocery shops is a reduction in the chance of survival of about 0.6% every 5 years. This effect does not seem large, since in our sample, the average probability that a store will close in a given year is 13%. Note however that this is the *net* effect of supermarket entry: If one store opens, and another closes, the effects tend to cancel out.

As explained, we estimate the effect of supermarket entry on the probability of survival of small stores. This does not include the deleterious effects that entry might have on the profitability of those shops.[18] Also, since in our data processing we ignored changes of ownership that allowed the continued physical operation of stores, and we did not know the sale price of the businesses, we cannot assess whether entry of a new supermarket led to an incumbent owner's selling a shop to a new owner at a loss. If that were the case, our estimates would constitute a lower bound on the effect of entry on the owners of small stores.

We now turn to the analysis of the control variables: As expected, when significant, household size, and per capita income have a positive effect on the probability of survival. The population variable enters into the butcher shop regressions with positive sign and into the grocery and kiosk regression with negative sign. The negative sign of the population variable may seem counterintuitive if one thinks of it as a demand variable. We note however that in our database the larger CCZs are also the ones with more rural area and less population, and the reverse holds for smaller CCZs. Therefore, the positive sign of the coefficient on this variable could be interpreted as follows: more people in one CCZ are an indication of other non-observable variables that make small stores more profitable and less likely to close.

To simplify the presentation of the tables, in Table 4 the variable "Same retailers per Km^2" is "Groceries per Km^2" in the Groceries regression, "Butchers per Km^2" in the Butchers regression, and so on. Similarly, the variable "Other retailers per Km^2" is the variable "Non-groceries per KM^2" in the Groceries regression, "Non-butchers per Km^2" in the Butchers regression, and so on.

The coefficient of the variable "Same retailers per Km^2" is positive in three of the regressions. If one interprets the variable as a measure of competition, the result is counterintuitive. However, as

[18] Confidentiality of tax records did not allow the Ministry of Economics and Finance to give us that information.

noted in the analysis of the Population variable, may capture the effect more stores in one CCZ are an indication of other non-observable variables that make small stores more profitable and less likely to close. Also, the variable "Other retailers per Km^2", which is intended to capture this effect has the expected positive sign. We note that in several specifications, if one includes CCZ-specific quadratic time trends in order to capture better the differential effect that the economic crisis of 2002 had in the different neighborhoods, the coefficient on "Same retailers per Km^2 " ceases to be significant.[19]

Note that the coefficient on the dummy variable that accounts for the opening of the Gèant supermarket has a positive sign. A similar result was obtained by Igami (2011) and by Gould et al. (2005). Our result suggests that the opening of a very large store in the outskirts of Montevideo favored the survival of small stores in the neighborhood of the city that was close to Gèant. This may indicate that families may have abandoned medium-sized supermarkets, and switched to a few monthly visits to Gèant, together with more regular visits to the local grocery stores. This result can be interpreted as a differentiated effect of supermarket entry on the probability of survival of small shops, depending on the characteristics of the entrant, in line with the literature.

Robustness

As another robustness check, we ran a duration model that uses the whole database. In this case, we are interested in estimating the effect of supermarket entry on the probability that a small store will remain open. We estimate Cox's proportional hazard model. The survival analysis is concerned with studying the length of time that a store is in a given state before transition to another state. In our case, we are modeling the length of time that a store is open. So, as before, we also take into account the time that a store is closed before entering the market. The results are shown in Table 5 below.

[19] These regressions are not reported here. Between 2002 and 2003, real GDP per capita fell by approximately 25%. This slump in the data affected different neighborhoods in varying ways, and the inclusion of non-linear trends may capture some of the unobserved variation in economic conditions, which may be reflected in the sign of this coefficient.

Table 5. Impact of M^2 of Supermarkets on Retailer Opens
Cox Proportional Hazard Model for Openness Duration
Instrumental Variables Estimation

Variables	Grocery	Bakery	Pasta	Kiosk	Butcher shop
Supermarket area	-0.0013***	-0.0010***	-0.0334***	-0.0009***	-0.0099***
	(0.0001)	(0.0002)	(0.0060)	(0.0001)	(0.0016)
Population	0.0172	0.1561	0.0878	0.0826	0.7451***
	(0.0788)	(0.1256)	(0.4500)	(0.1065)	(0.1693)
Household size	-0.3891***	-0.1872**	-0.8307**	-0.2267***	-0.5830***
	(0.0580)	(0.0878)	(0.3464)	(0.0709)	(0.1422)
Same Retailers per Km^2	-0.0435***	-0.0024	-0.9797***	-0.0243***	-0.1584***
	(0.0047)	(0.0095)	(0.1702)	(0.0066)	(0.0494)
Other Retailers per Km^2	0.0121***	-0.0002	0.0041**	0.0021***	0.0030***
	(0.0017)	(0.0006)	(0.0019)	(0.0007)	(0.0010)
Per capita income	-0.0596***	0.0220	-0.2916***	-0.0106	-0.0932***
	(0.0167)	(0.0235)	(0.0730)	(0.0184)	(0.0360)
Dummy Gèant	0.1347**	0.0789	0.6432	0.0355	-0.2333
	(0.0676)	(0.1150)	(0.8890)	(0.1036)	(0.2021)
CCZ Time Effects	Yes	Yes	Yes	Yes	Yes
Observations	49,980	17,970	1,970	25,300	6,610

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Variables Supermarket area and per capita income are defined at the CCZ level and measured in thousands of the unit value; Population is defined at the CCZ level and measured in hundred thousands of inhabitants; Others Retailers per KM^2 is expressed in hundreds of the unit value

The results are in line with those of the main specification: supermarkets have a negative effect on the probability of survival of small stores. For each kind of store, we ran the Cox proportional hazard model with supermarket area instrumented with commercial permits. The variable of supermarket area has a negative, small but significant, effect on every kind of store's survival probability. Finally, note that control variables like "per capita income" and "household size" have changed sign, now. While both variables presented a positive sign in the estimated logit model, they present an opposite sign in the Cox proportional hazard estimation. In this specification, the variable "Same Retailers per Km^2" has the expected negative sign, while the demand side variable "Other Retailers per Km^2" has the expected positive sign.

All estimations point to the same result: there is a small but significant negative impact of supermarkets on small shops, and this negative effect varies with the line of business of the small store.

7 Concluding Remarks

This paper analyzes the effect of supermarket entry on small food retailers' exit in Montevideo. Dubra and Ferrés (2006) is the only prior attempt to study the effect of supermarket entry on small retailers in Uruguay, and in the developing world to the best of our knowledge. Uruguay, and its capital city Montevideo in particular, are a good case study because big supermarket penetration is still low (compared to other Latin American countries) and because there is an ongoing political discussion about the overall effects of supermarket entry but limited empirical evidence that is relevant.

Using several datasets for Montevideo, we study the impact of entry of large retailers on the exit decision of five different categories of small food stores. We focus on the 1998-2007 period, which is a time interval when supermarket area increased by 25% overall in Montevideo, due largely to the entry of new supermarkets. We perform the analysis at the CCZ level, which allows us to disentangle the effects of supermarkets opening at a more detailed level than a city-level study would allow.

Entry of supermarkets using small- to medium-size formats creates a competitive threat for the existing small stores, decreasing their probability of survival. In particular, we find that the probability of survival decreases between 0.6% and 2% as a small- or medium-size supermarket enters a given neighborhood. The figure, although significant, is relatively small compared to a 13% per annum unconditional probability of exit. The result is robust to several model specifications and varying definitions of what constitutes a supermarket.

We find a differentiated impact of supermarket entry on the probability of survival of smaller shops. Supermarket entry impacts a store's probability of exit depending on the kind of store. Indeed, we find evidence of a differentiated impact of supermarket entry on the survival of smaller shops, depending on lines of business. Pasta shops are more negatively affected by supermarket entry. This negative relationship persists - with a lower intensity - for the case of grocery stores, bakeries and butchers. Finally, we found only mild evidence of a negative effect of supermarket entry on the survival of kiosks.

Evidence of a differentiated impact on smaller shops, of varying lines of business, is consistent

with results that were obtained by Igami (2011) and Gould et al. (2005). Our work differs from that of Igami (2011) and Gould et al (2005) as we have used more detailed geographical information that helps with identification. Also our work is the first for a developing market economy.

Annex I. Data Sources.

We collected seven different data bases. The first is from the "*Servicio de Regulación Alimentaria*" (SRA) of The *Intendencia Municipal de Montevideo* (IMM), the executive branch of the province's government (home of the "Intendente"). SRA is the municipal authority that is in charge

of keeping a record of all food businesses, and of controlling their sanitary condition. SRA establishes definitions; it sets standards for management and personnel, food operations, and equipment and facilities; and it handles inspections and suspensions in order to safeguard public health and provide consumers with food that is safe, unadulterated, and honestly presented. The database indicates, for each year between 1998 and 2007, which stores that deal with food were open. All data about "small businesses" comes from this database; the rest of the databases concern data and definitions about supermarkets.

The second database, is from the "*Instituto Nacional de Carne*" (INAC, the meat regulatory body). Every food business in Montevideo is required to obtain a SRA permit to start operations, with the exception of butchers who need permission from the INAC. The INAC issues permits that are valid for two years. The data base from INAC contains two types of data: one is the list of permits for butcheries within supermarkets, and another is the list for small butcher shops.

Our third data base is from the *Dirección General de Comercio* (DGC) from the Ministry of Economics and Finance. DGC provides a public list of supermarkets that are required to report prices of a consumer goods basket on a monthly basis. Each supermarket must submit its price levels to DGC if it has more than three cash registers or if it belongs to a chain of supermarkets with four or more business units.

The fourth and fifth databases are about supermarket size and were purchased from Ciudata and from IDRetail, which are two local consulting firms. They include information about size in square meters, and the number of cash registers for each supermarket. The data from IDRetail were collected in 2005, and the data from Ciudata were surveyed in 2008. We encountered some differences in the observations that were present in each database. In the case of large scale supermarkets, some differences were relatively large. In order to make a quality evaluation of each data source, we interviewed staff members from IDRetail and Ciudata. An important observation is that in the case of IDRetail, the information that is related to the large supermarket chains that operate in Montevideo was reported by *Asociación de Supermercados del Uruguay* (Uruguayan Supermarket Association; ASU), which is the trade association for the majority of the supermarket chains that operate in Uruguay (with the exception of Tienda Inglesa). In the case of large-chain

supermarkets, we used information that was provided by ID Retail (i.e., originally from ASU). In the case of smaller supermarkets, we used information that was provided by Ciudata. We found that the Ciudata database contained information for a larger number of supermarkets than did the IDRetail database. Additionally, for small supermarkets, differences in area information were less significant than for large-scale chain supermarkets. Data about the number of cash registers are based on information that was obtained from Ciudata and *Dirección General de Comercio*.

Our sixth data base is the *Encuesta Continua de Hogares* (ECH, the national household survey). ECH is prepared by *Instituto Nacional de Estadística* (INE) and contains socioeconomic information at the individual and household level. From the ECH we collected data about average income, wealth and population in each CCZ in each year. Care should be taken when working with the income data that are present in the ECH. It is well recognized that, in general, people tend to under report their income levels. Additionally, the information on population that is contained in the ECH presents problems that are due to recent changes in the sampling procedures. In particular, the sample is not representative of the total population of Montevideo.

Finally, our seventh database is the construction permits from the IMM. Since any new construction or remodeling needs a permit from IMM, this database contains year of request, square meters of remodeling or construction, and year of authorization.

Annex II. Data Processing.

The SRA provided five files in xls format: i- Companies, list of active companies; ii- Annulled, list of annulled companies, which are currently not active; iii- Line of Business, list of the main line of business, defined on an *ad hoc* basis, iv- Street codes, list of codes in order to locate stores; v- Complexes, list of housing projects (that do not have street numbers, and where some stores are located). Along the analyzed period, there are 8,871 active companies, and annulled and inactive companies are 16,944 in the SRA database.

To begin, all establishments that operate in lines of business that do not compete with supermarket services were eliminated from the list of active and annulled companies. We were particularly interested in the following areas: groceries, bakeries, pasta shops, and kiosks. The data base shows for each store: i- Main line of business (bakery, grocery store, fish market, etc); ii- Nº of procedure (the number that the SRC assigns to each request for a permit); iii- Street code (each street has a code, and for each store, the street code is the code of the street on which it is located); iv- Street number; v- Complex address (if the store is located in a housing project, the address of the store is just the name of the project in which it is located); vi- Centro Comunal Zonal (CCZ, this information was obtained from the database that was processed by Dubra and Ferres, 2006); vii- Opening dates (registration, authorization, and renewal dates); viii-Closing dates (registration, authorization, renewal dates and annulment dates).

Next, we generated a dummy variable, where a 0 stands for a year in which the company was not active or closed, and 1 for a year in which it was active in the market. This was done following criteria about the date of registration, authorization, renewal, and annulment, as in Dubra and Ferres (2006).

Next, all of the companies that were in the list of annulled companies that were closed and then reopened, were discarded from the list of annulled companies, modifying the corresponding dummy variable in the list of active companies. Last, all of the companies that were never active in the period considered were discarded. For completeness, some details about when a company was considered active follow.

From the list of active businesses, we deleted all of those that should have renewed their

permits before December of 1997, but did not. We assumed that these stores were closed before the start of our study (379 were deleted in this stage). We then eliminated approximately 2.500 stores that had opened more than five years before January of 1998, and had no renewal dates (we assumed that they were not active at that date). Those stores that opened between 1993 and 2002, but had no date of renewal for their permits, were imputed a closing date of five years after their opening. Finally, we "merged" all stores that had opened and closed on the same location. For the purposes of this study, we do not care whether the ownership of a store changed during the period, only if it ceased operations.

To define each category of food shop we use the definitions from the SRA that are in Table 1A.

Table 1A. Definitions of Retail Food Shop Categories

Category	SRA Categories	SRA Numbers (#)
Groceries	Almacén, Fiambrería, Frutas y Verduras, Puesto de Frutas y Verduras, Autoservicio, Supermercado	2, 27, 28, 147, 90, 49, 68
Bakeries	Panadería, Sucursal de panadería, Panificadora, Confitería, Elaboración de facturas, Cocción de facturas y pan, Venta de productos de confitería, Elaboración de pan y factura integral, Sucursal de confitería, Repostería, Elaboración de garlletería y masas secas, Panificados (dorado final), Elaboración de masas secas	36, 48, 84, 9, 118, 196, 228, 283, 151, 88, 307, 246, 323
Pasta	Fabrica de pastas secas, Fábrica de pastas, Sucursal de fábrica de pastas, Venta de pastas	81, 26, 175, 187
Kiosk	Venta de golosinas, Kiosko	29, 32

We did an extensive review of the data. We checked the date of opening for all of the supermarkets in our database. We did this for the main chains (Disco, Devoto, Tienda Inglesa, TATA, Multiahorro), and some other individual supermarkets. We also checked web pages to determine whether these data were available. For those supermarkets for which we could not obtain information about the date of opening from these sources, we maintained the data from SRA.

Finally, we checked the consistency of the supermarket area data, as our two database had, in some cases, huge differences. Multiahorro gave us the exact area of each supermarket in its chain, and in the case of Macromercado we found the information in its institutional web page. We also used information that the supermarkets provided to the Supermarket Commission. Some

supermarkets suggested that we use IdRetail data on store area because it was more reliable. In those cases for which we could not check the data, nor was IdRetail information available, we used the data purchased from Ciudata.

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