Variance Decomposition of Prices in an Emerging Economy

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Abstract

We use a one million good-level dataset of prices in Uruguay which comprises grocery stores in the capital city of Montevideo to decompose the variance of prices to identify the sources of such variability. We estimate the specific contribution of the product, chain, and individual store to the variability of prices. Estimates are carried out with the data in different periods, with time trend inflation and excluding nonhomogeneous goods to estimate robust results. We use the three-error model to decompose the price variation to find that chain specific shocks account for half of it. The importance of shocks to individual products and product categories common to all stores is the other half. Our results indicate that the importance of chains in price variation in Uruguay is halfway between that of the United States and Chile. Therefore, in an emerging

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economy, the price strategies of retailers are not so much different from those in the United States to compare to what previously thought.

Keywords: prices, variance decomposition, firm strategy, Uruguay.
JEL classification: E31, E52, L10.

1. INTRODUCTION

Understanding the process of price formation is key to both macroeconomics–the design of monetary policy–, and microeconomics–the competitive process in the retailing sector–, especially in a small open economy like Uruguay. This analysis allows a better understanding of the behavior, dispersion, and volatility of prices. In a seminal study, Klenow and Malin (2010) provided an up-to-date and concise overview of the empirical evidence based on microdata. Also, Nakamura and Steinsson (2008), and Bils and Klenow (2004) studied price setting in the United States.

In this paper we analyze one million prices in Montevideo, the capital city of Uruguay, to study the behavior of prices and to decompose its variability in shocks common to stores within a particular retail (chain effect), shocks common across stores selling an identical product and shocks idiosyncratic to the store and product. This analysis allows us to estimate the contribution of retailer and manufacturer shocks to explain price variability. Hence, it is of particular relevance given the regulation in the capital city of Montevideo that restricts the entry of supermarkets.

In a related paper, Nakamura (2008) finds for the case of the United States (USA) that 65% of the price variation is common to stores within a particular retail, 16% of the variation in prices is common across stores selling an identical product and 17% idiosyncratic to the store and product. Therefore, she finds that the shocks to chains are the most important to explain price variability.

For an emerging economy, the only study is Chaumont et al., (2011) that analyze the case of Santiago in Chile. Contrary

to Nakamura (2008), they find that shocks to individual goods and product categories are the most important factors to explain the behavior of prices. In the case of Chile, the manufacturers' shocks are more important than chain shocks to analyze price variation.

We use the three-error model to decompose price variation and include a time trend at the product category level to capture inflation. We find that variance can explain half of the variation in prices at the chain level. Therefore, the results for Uruguay are between those found for the United States and Chile. This suggests that retail prices do not vary mainly as a result of supply and demand changes. If for example, following a positive cost shock the price of one particular soft drink bottle goes up, the more likely it is that the price of substitute drinks change, so the pricing strategies are the most relevant and not the shocks of supply or demand that affect all the beverages category such as increased costs for wages, new technologies or changes in consumer tastes. This fact allows us to understand better the effect of competition on market prices and the effect of monetary policy on prices.

We perform robustness tests to correct for outliers, for product mix, period, and sales. In all of them, the estimation of the chain effect remains the same.

2. THE SUPERMARKET INDUSTRY AND INFLATION IN URUGUAY[1]

Uruguay is a middle-upper income country, with a population of 3.37 million people, in 2011. Approximately half of the population or 1.7 million people live in Montevideo, the capital city, and its metropolitan area. According to the Ministry of Economics and Finance, 60% of the supermarkets are concentrated in Montevideo. The main supermarket chains in Montevideo are Grupo Disco del Uruguay (which manages

[1] This section is based on Borraz et al. (2014).

brand names Disco, Géant, and Devoto), Tienda Inglesa, Ta-Ta (who bought Multiahorro in 2012), and Macro Mercado. 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 2000s, supermarkets accounted for a roughly stable 35% of total sales of the food retailing sector in Montevideo.[2]

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 lobbying resulted in a new set of regulations that covered the installation of large retailers in Uruguay. In 1999, a law was passed to regulate the entry of large retailers. In the early years, the only cases that were submitted to the antitrust agency were alleged predatory pricing practices from large supermarkets, mainly Géant.

The law required entrants in the food retailing sector, which plan to operate stores of $300m^2$ of sales area or more, to obtain special approval from the municipal authority. The Law No. 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.

The administrative requirement applied also to the case of expansions of establishments that would exceed the $300m^2$ threshold, as well as to the opening of new establishments (that would exceed $300m^2$) by incumbents. In 2003 the law was amended, and the threshold was decreased to $200m^2$ of sales

[2] This data is from IdRetail. The reasons for the increased supermarket participation in total sales may have varied and has not been studied in depth and are beyond the scope of this study.

area (see Law No. 17.657, "Large Commercial Area Establishments for the Sale of Food and Household Items").

Each time a new approval request is submitted, a commission assesses the effect of entry on: *1)* global supply and demand in the area defined by the local government (mainly whether there is excess demand by consumers or not, which is not being satisfied by incumbent firms); *2)* small retailer's exit; and *3)* 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 some respects.[3] 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, given that 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.

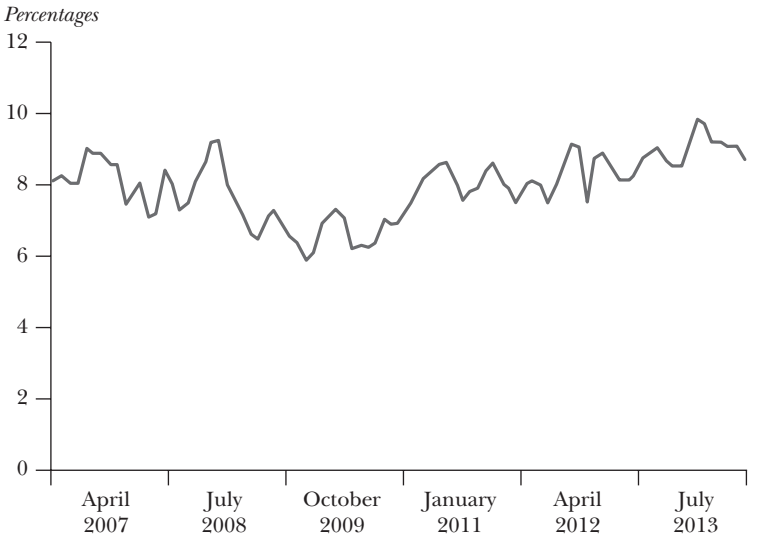
In summary, these laws restricted entry of supermarkets in Montevideo and therefore make it interesting and relevant to analyze the impact of the existing chains on price variability.

Figure 1 shows the 12-month inflation rate in Uruguay between 2007 and 2014. The yearly average rate is 7.4%, and we observe an increase from 6% at the end of 2009 to 8% in middle 2014. Our methodology will consider the fact that inflation in Uruguay is high in an international comparison. Also, we estimate the model for a subperiod with low inflation because of the shocks hitting the economy (September 2009 to May 2010).

[3] See Bertrand and Kramarz (2002) for entry regulation in France; Griffith and Harmgart (2008), and Haskel and Sadun (2009) for the United Kingdom.

Figure 1

URUGUAY: 12-MONTH INFLATION



Source: National Statistics Institute.

3. DATA

We use a good-level dataset of daily prices compiled by the General Directorate of Commerce (DGC) which comprises grocery stores all over the country. The DGC is the authority responsible for the enforcement of the Consumer Protection Law at the Ministry of Economy and Finance. This same dataset is used in Borraz et al. (2016), and Borraz and Zipitría (2012).

In 2006 a new tax law was passed by the Uruguayan legislature which changed the tax base and rates of the value-added tax. The Ministry of Economy and Finance was concerned about incomplete pass-through from tax reductions to consumer prices and hence decided to collect and publish a dataset of prices in different grocery stores and supermarkets across the country. The DGC issued the Resolution No. 061/006 which

mandates grocery stores and supermarkets to report its daily prices for a list of products if they meet the following two conditions: *1)* they sell more than 70% of the products listed, and *2)* either have more than four grocery stores under the same name, or have more than three cashiers in a store. The information sent by each retailer is a sworn statement, and they are subject to penalties in case of misreporting. The objective of the DGC is to ensure that posted prices reflect real posted prices by stores. In this regard, stores are free to set the prices they optimally choose, but they face a penalty only if they try to misreport them.

Map 1 shows the cities covered in the dataset. These cities represent more than 80% of the total population of Uruguay. Montevideo, the country's capital, with 45% of the population, accounts for 57% of the supermarkets in the sample. Because we have many cities with few supermarkets and the competitive conditions are different, we restrict our analysis to retailers located in the capital city of Montevideo.[4] Map 2 shows the distribution of supermarkets across Montevideo.

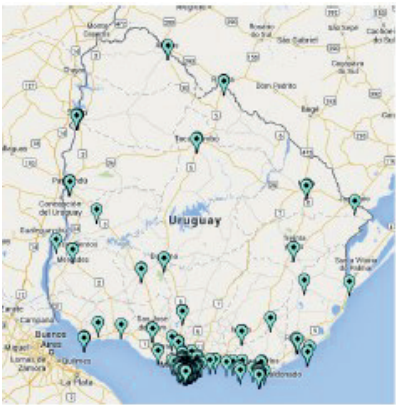
The data includes monthly prices in 137 supermarkets from April of 2007 to August of 2014 for 150 items corresponding to 50 product categories, where each item is defined by its universal product code (UPC).[5] The total number of observations is 984,485. The three highest-selling brands are reported for each product category. Most items had to be homogenized in order to be comparable, and each supermarket must always report the same item. Whenever prices are 50% greater (or less) than the average price, the retailer is contacted to confirm whether the submitted price is correct. The data is then used in a public web site that allows consumers to check prices

[4] We include two big supermarkets (Géant and Macro Mercado) that are located in the outskirt of Montevideo.

[5] The only exceptions are meat, eggs, ham, some types of cheese, and a type of bread. However, as we later show, the exclusion of these goods which could potentially be affected by an imperfect matching, does not modify the results.

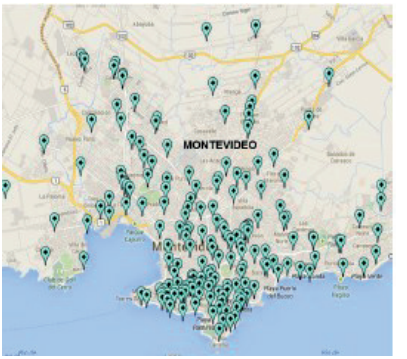
Map 1

CITIES WITH SUPERMARKETS IN URUGUAY



Map 2

SUPERMARKETS IN MONTEVIDEO



in different stores or cities and to compute the cost of different baskets of goods across locations.[6] Therefore, the products in our dataset are identical across supermarkets.

Table 1 provides the summary statistics of the data and Table A.1 in the Annex provides a detailed list of the products, its share in the CPI and the total number of observations for each item. Moreover, the goods in the sample represent 40% of the food, beverages and personal item categories in the consumer price index (CPI) and 14% of the CPI.

One concern is the possibility of error in the data report. We consider two datasets separately to account for outliers that may have a greater impact on the variance decomposition. A baseline case with the complete sample, and a second case in which we exclude those prices higher than three times (or less than a third) of the median daily price. However, deleted prices only account for a small 0.013% of the whole database.

Table 1

PRODUCT, TIME AND REGIONAL COVERAGE IN THE DATA

	All stores
Retailers	11
Stores	137
Products	150
Categories	50
Country	Uruguay
Cities	Montevideo
Departments	Montevideo
Period	April 2007 to August 2014
Months	89
Observations	984,485

Note: Summary statistics of the data compiled by the General Directorate of Commerce.

[6] See <www.precios.uy/servicios/ciudadanos.html>.

Another concern is the definition of chain. Because in the data there are some small supermarkets with few branches we define a chain if there are five or more branches under the same name. Table 2 shows the numbers of branches per chain in our final sample.

Table 2

BRANCHES BY CHAIN IN THE SAMPLE

Chain	*Number of branches*
Multi Ahorro	38
Grupo Casino Disco-Géant	22
Grupo Casino - Devoto	17
Ta-Ta	12
Red Market	10
El Clon	8
Frigo	7
Tienda Inglesa	7
La Colonial	6
Micro Macro	5
Macromercado Mayorista	5
Total	*137*

4. EMPIRICAL METHODOLOGY

In order to decompose price variability in retailer and manufacturer shocks, we use the three-error correction model (Baltagi, 2005). Following Nakamura (2008), this model decomposes price variation in two classes: *1)* variation common to all UPCs within a product category; and *2)* variation that is idiosyncratic to a particular UPC. Within each of these classes, we decompose price variation in *1)* variation in prices common across

stores selling an identical product, *2)* price variation common to stores within a particular retail chain, and *3)* price variation idiosyncratic to the store and product.

Formally, the equation to be estimated, for each product category separately, is:

$$Ln(P_{isct}) - Ln(\bar{P}_{isc}) = \mu + \delta t + \eta_t + \alpha_{it} + \beta_{ct} + \gamma_{ict} + \phi_{cst} + \varepsilon_{i}$$

where i is UPC, s is supermarket, c is chain, and t is time. $\propto$ and δt are mean and time trend fixed effects, while the other terms are random effects: η_t is a product category effect, α_{it} is an individual UPC effect, β_{ct} is a chain effect, γ_{ict} is a chain-UPC effect, ϕ_{cst} is a supermarket-product category effect and ε_{ist} is an idiosyncratic UPC and supermarket shock. Each random effect is assumed to be identically and independently normally distributed.

The multilevel model is estimated using maximum likelihood (ML) and restricted or residual maximum likelihood (REML). The REML estimator is a twostep estimator. The first step is to remove the fixed effect and the second step estimates the variance decomposition of the residual. Contrary to ANOVA, the ML and the REML estimators provide non-negative estimates (Marchenko, 2006).

One concern in the estimation of the previous equation is the high inflation in the period April 2007 to August 2014 (74% or 7.4% the yearly average) that can drive our results. Because of that, we include a time trend in prices for each product category, and we estimate the equation separately every two years. Also, as a robustness check, we estimate the equation: excluding meat and bread; without outliers; aggregating product categories; for the nine months period with the lowest inflation in our sample; excluding sales; and to different composition of chains (accounting for mergers between chains).

5. RESULTS AND ROBUSTNESS CHECKS

Table 3 shows the results of the variance decomposition by time. We report the average weighted by the product's importance in CPI. The chain effect is approximately 50%. This result highlights the importance of chains in the price formation process. The other 50% of the variation is common across all stores, and the rest is idiosyncratic to the store-product. The effect of shocks to all stores is below 40%, and the effect of idiosyncratic shocks is of an order of magnitude lower (15%). These results are similar across periods and estimation method (ML or REML).

Table 3

VARIANCE DECOMPOSITION OF PRICES BY PERIOD

Maximum likelihood (ML)
and restricted maximum likelihood estimation (REML)

	All stores		*Chain*		*Individual store*	
	ML	*REML*	*ML*	*REML*	*ML*	*REML*
April 2007-2008	40.3	39.5	48.5	50.4	11.2	10.0
2009-2010	39.1	50.0	46.5	37.1	14.4	12.8
2011-2012	35.6	36.3	48.8	48.3	15.7	15.5
2013-August 2014	31.4	32.0	51.6	51.2	17.0	16.8
2007-2014 averages	36.5	39.5	48.4	46.6	15.0	13.8

Note: Number of observations, 984,485. The estimation includes product categories and time trend to allow trend inflation. The table shows the arithmetic average, weighted by the product's importance on CPI.

These findings indicate that retail prices do not mainly vary because of supply and demand changes. If for example, following a positive cost shock the price of one particular soft drink goes up, the more likely it is that the price of substitute drinks change, so the pricing strategies are the most relevant and not

the shocks of supply or demand that affect all the beverages category such as increased costs for wages, new technologies or changes in consumer tastes. This fact allows us to understand better the effect of competition on market prices and the effect of monetary policy on prices.

Table 4 shows the estimation results by product category. We report the mean, median and weighted average by the product's importance in CPI. We observe significant variability across product categories. The results show that the chain estimation ranges from 15.6% for the brown eggs category to 86.7% for the ham category. As expected, the importance of variation common across stores is the highest for highly concentrated industries (beer and cola for example). Also, the importance of the individual store is below 33% for all products. This result highlights the preponderance of shock common to all product and chain shocks.

Table 4

VARIANCE DECOMPOSITION BY PRODUCT CATEGORY

	All stores	*Chain*	*Individual store*
Beans	11.4	71.6	17.0
Beef (aguja)	15.6	66.7	17.7
Beef (nalga)	4.7	74.9	20.4
Beef (paleta)	29.6	52.1	18.2
Beer	56.9	28.4	14.7
Bleach	28.3	59.2	12.5
Bread	39.8	43.5	16.7
Brown eggs	78.8	15.6	5.7
Butter	44.8	42.8	12.4
Cacao	7.7	76.3	15.9
Chicken	57.2	35.3	7.5
Coffee	48.7	36.8	14.5
Cola	72.7	20.5	6.7

Table 4 (cont.)

	All stores	*Chain*	*Individual store*
Corn oil	12.2	67.4	20.3
Crackers	57.5	31.0	11.5
Deodorant	11.3	74.8	14.0
Dishwashing detergent	18.4	68.0	13.6
Dulce de leche	34.1	41.9	24.0
Frankfurters	42.5	45.4	12.1
Grated cheese	26.6	60.9	12.4
Ground beef	16.9	53.6	29.6
Ham	1.5	86.7	11.8
Ham (leonesa)	26.0	56.4	17.6
Hamburger	24.8	47.6	27.6
Ice cream	27.5	64.1	8.4
Laundry soap	18.5	66.0	15.5
Laundry soap, in bar	27.4	53.3	19.3
Maize flour	58.6	25.9	15.5
Margarine	29.7	57.3	13.0
Mayonnaise	16.0	67.4	16.6
Noodles	18.0	63.6	18.4
Peach jam	43.7	41.9	14.4
Rice	44.4	48.8	6.8
Salt	24.4	63.6	12.1
Sausage	17.6	67.6	14.7
Semolina noodles	20.0	66.4	13.6
Shampoo	25.7	46.0	28.3
Soap	39.2	52.4	8.4
Soybean oil	34.1	54.9	11.0
Sparkling water	24.8	59.9	15.3
Sugar	36.0	45.4	18.6
Sunflower oil	46.9	37.1	15.9
Tea	22.0	45.4	32.6
Toilet paper	32.1	55.0	12.9
Tomato paste	50.0	41.5	8.6

Table 4 (cont.)

	All stores	*Chain*	*Individual store*
Tooth paste	21.0	58.8	20.3
Wheat flour	42.6	48.3	9.0
Wine	53.9	33.1	13.0
Yerba	46.3	29.9	23.8
Yogurt	41.9	45.2	12.9
Median	29.0	52.9	14.6
Average	32.6	51.9	15.5
Weighted average	36.5	48.4	15.0

Notes: Maximum likelihood estimation. Number of observations, 984,485. The estimation includes product categories and time trend to allow trend inflation.

We test the robustness of our estimates to changes in the subsample of product mix, excluding outliers, with a more aggregate definition of categories, in a low inflation period, excluding sales and to different periods and to different composition of chains (accounting for mergers between chains). In all cases we find that the results are quantitatively similar.

First, we eliminate products in which the matching across stores is not perfect. In particular, we exclude meat and bread. Table 5, Panel A, shows that the results are similar with respect to the whole sample.

Second, we use all products but eliminate the outliers, defined here as those whose price is above three times (or a third below) the median price. This approach is more conservative than the one typically used in the literature. For example, Gopinath and Rigobón (2008) and Klenow and Kryvtsov (2008) eliminate prices that are more than 10 times higher or less than a tenth of the median price. Still, our rule only excludes less than 0.013% of the observations. Once again, the patterns are almost identical to the ones obtained using the complete number of observations (see Table 5, Panel B).

Third, we also perform the variance decomposition with a more aggregate definition of the product categories. Instead of using 50 categories we define 26 more aggregate categories (see Table A.2 for a full description of them). Table 5, Panel C, shows that our estimation results are qualitatively similar.

Fourth, one concern in the estimation is the possibility that inflation in the period under analysis could bias our results. In order to alleviate the impact of inflation, we estimate the regression separately for the nine months period of lowest inflation in our sample between September 2009 and May 2010.[7] Table 5, Panel D, shows that the chain effect in this period explains a little more than 50% of the price variation.

Fifth, a part of the price variation can be explained by short-term movements of prices like sales. Therefore, in Table 5, Panel E, we decompose the variance of regular prices excluding sales. We define a sale as a price that decreases, and in a 30-days windows, the price returns to the initial level. The variance decomposition of regular prices is very similar to that of posted prices (Table 5, Panel E).

Finally, we estimate the equation without the time trend and considering the different composition of chains (to account for mergers between chains). In these scenarios, the results are similar.[8]

Table 6 compares our results with those of previous studies. Nakamura (2008) finds that the chain effect is 65% in USA and Chaumont et al. (2011) estimates it in 32% in Chile. We estimate that chain effect is 50%. Our results show that the importance of chains in price variation in Uruguay is halfway between that of USA and Chile. Therefore, in an emerging economy the importance of price strategies of retailers to explain price variation is not so much different from that in USA as previously thought (Chaumont et al., 2011).

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[7] In this period the inflation rate was 3.6 percent.

[8] Results available upon request.

Table 5

VARIANCE DECOMPOSITION OF PRICES: ROBUSTNESS CHECKS

	All stores	*Chain*	*Individual store*
Panel A. Product quality			
All goods	36.5	48.4	15.0
Excluding meat and bread	40.4	45.5	14.1
Panel B. Excluding outliers			
All goods	36.4	49.4	14.2
Excluding meat and bread	40.1	46.6	13.2
Panel C. Aggregate product categories			
All goods	45.8	42.2	12.1
Excluding meat and bread	48.2	40.2	11.6
Panel D. Low inflation period (Sept. 2009 to May 2010)			
All goods	28.8	55.4	15.8
Excluding meat and bread	31.5	54.6	13.9
Panel E. Regular prices (excluding sales)			
All goods	36.5	48.4	15.0
Without sales	33.9	53.0	13.1

Notes: Maximum likelihood estimation. Number of observations, 984,485. The estimations include product categories and time trend to allow trend inflation. The table shows the arithmetic average, weighted by the product's importance on CPI.

Table 6

VARIANCE DECOMPOSITION OF PRICES FOR URUGUAY, CHILE AND UNITED STATES

	All stores	*Chain*	*Individual store*
Uruguay 2007 - 2014 averages	36.5	48.4	15.0
Chile	59.0	32.1	11.2
United States	16.5	64.8	18.7

Note: The results for Chile are from Chaumont et al. (2011), and for the United States are from Nakamura (2008).

6. CONCLUDING REMARKS

We estimate the three-error model with one million prices of Uruguayan supermarkets to find that chain shocks explain half of the total price variation. The remaining variability is explained by common shocks to all stores and idiosyncratic store-product shocks. This result highlights the relevance of chain's price strategies in the analysis of price dynamics. The price variation of prices can be explained by supply and demand shocks but mainly by chain shocks. Therefore, in an emerging economy like Uruguay, the importance of retailer' price strategies is not much different from that in the United States to explain price setting.

ANNEX

Table A.1

DETAILED PRODUCT LIST AND SHARE IN CPI

Category	*Brand*	*Specification*	*Share in CPI (%)*	*Number of observations*
Beans	Campero	0.3 kg	0.0864	304
Beans	Cololó	0.3 kg	0.0864	3,292
Beans	Nidemar	0.38 kg	0.0864	1,239
Beef (aguja)	Boneless, no brand	1 kg	0.2319	5,861
Beef (aguja)	With bone, no brand	2 kg	0.2319	7,250
Beef (nalga)	With bone, no brand	1 kg	0.3154	4,764
Beef (nalga)	Boneless, no brand	1 kg	0.3154	7,119
Beef (paleta)	With bone, no brand	1 kg	0.1962	6,526
Beef (paleta)	Boneless, no brand	1 kg	0.1962	5,343
Beer	Patricia	0.96l	0.3774	10,873
Beer	Pilsen	0.96l	0.3774	10,804

Table A.1 (cont.)

Category	*Brand*	*Specification*	*Share in CPI (%)*	*Number of observations*
Beer	Zillertal	1 l	0.3774	5,590
Bleach	Agua Jane	1 l	0.1623	10,815
Bleach	Sello Rojo	1 l	0.1623	9,553
Bleach	Solución Cristal	1 l	0.1623	4,793
Bread	Los Sorchantes	0.33 kg	0.0583	5,509
Bread	Bimbo	0.33 kg	0.0583	5,270
Bread	Pan Catalán	0.33 kg	0.0583	3,205
Bread	No brand	Aprox. 0.125 kg - 1 unit	0.0583	8,478
Brown eggs	El Jefe	1/2 dozen	0.4555	2,207
Brown eggs	Prodhin	1/2 dozen	0.4555	7,154
Brown eggs	Super Huevo	1/2 dozen	0.4555	3,186
Butter	Calcar	0.2 kg	0.2322	8,080
Butter	Conraprole	0.2 kg	0.2322	10,562
Butter	Kasdorf	0.2 kg	0.2322	4,537
Cacao	Copacabana	0.5 kg	0.0837	10,294
Cacao	Vascolet	0.5 kg	0.0837	10,409
Chicken	Tenent	1 kg	0.8266	6,837
Chicken	Avícola del Oeste	1 kg	0.8266	4,936
Chicken	Tres Arroyos	1 kg	0.8266	1,328
Coffee	Chaná	0.25 kg	0.0878	10,835
Coffee	Saint	0.25 kg	0.0878	1,231
Coffee	Águila	0.25 kg	0.0878	10,000
Cola	Coca Cola	1.5 l	1.2313	10,822
Cola	Coca Cola	2.25 l	1.2313	5,782
Cola	Nix	1.5 l	1.2313	1,393
Cola	Pepsi	1.5 l	1.2313	5,398
Cola	Pepsi	2 l	1.2313	10,453
Corn oil	Delicia	0.9 l	NI	5,797
Corn oil	Río de la Plata	0.9 l	NI	5,316
Corn oil	Salad	0.9 l	NI	906
Crackers	Famosa	0.14 kg	0.2783	8,881
Crackers	Maestro Cubano	0.12 kg	0.2783	5,790

Table A.1 (cont.)

Category	*Brand*	*Specification*	*Share in CPI (%)*	*Number of observations*
Deodorant	Axe	0.105 l	0.3410	5,854
Deodorant	Dove	0.113 l	0.3410	5,855
Deodorant	Rexona	0.1 l	0.3410	5,854
Dishwashing detergent	Deterjane limón	1.25 l	0.1335	7,511
Dishwashing detergent	Hurra Nevex limón	1.25 l	0.1335	10,892
Dishwashing detergent	Protergente limón	1.25 l	0.1335	4,021
Dulce de leche	Conaprole	1 kg	0.1372	10,390
Dulce de leche	Los Nietitos	1 kg	0.1372	10,250
Dulce de leche	Manjar	1 kg	0.1372	10,153
Frankfurters	Schneck	8 units	0.2328	8,342
Frankfurters	Centenario	8 units	0.2328	3,208
Frankfurters	Ottonello	8 units	0.2328	8,853
Grated cheese	Artesano	0.08 kg	0.1628	628
Grated cheese	Conaprole	0.08 kg	0.1628	10,106
Grated cheese	Milky	0.08 kg	0.1628	5,493
Ground beef	Up to 5 percent fat, no brand	1 kg	0.9826	7,251
Ground beef	Up to 20 percent fat, no brand	1 kg	0.9826	7,308
Ham	Cativelli	1 kg	0.4375	2,150
Ham	Ottonello	1 kg	0.4375	5,204
Ham (leonesa)	La Constancia	1 kg	0.1576	3,604
Ham (leonesa)	Ottonello	1 kg	0.1576	346
Ham (leonesa)	Schneck	1 kg	0.1576	9,934
Hamburger	Burgy	2 units	0.1735	2,973
Hamburger	Paty	2 units	0.1735	4,654
Hamburger	Schneck	3 units	0.1735	4,875

Table A.1 (cont.)

Category	*Brand*	*Specification*	*Share in CPI (%)*	*Number of observations*
Ice cream	Conraprole	1 l	0.2153	5,629
Ice cream	Crufi	1 l	0.2153	5,275
Ice cream	Gebetto	1 l	0.2153	2,057
Laundry soap	Skip	0.8 kg	0.4529	8,407
Laundry soap	Drive	0.8 kg	0.4529	10,172
Laundry soap	Nevex	0.8 kg	0.4529	10,752
Laundry soap, in bar	Bull Dog	0.3 kg - 1 unit	NI	10,878
Laundry soap, in bar	Nevex	0.2 kg - 1 unit	NI	10,758
Laundry soap, in bar	Primor	0.3 kg	NI	2,422
Maize flour	Gourmet	0.45 kg	NI	2,282
Maize flour	Presto Pronta Arcor	0.5 kg	NI	5,375
Maize flour	Puritas	0.45 kg	NI	5,794
Margarine	Doriana	0.25 kg	NI	10,651
Margarine	Flor	0.25 kg	NI	825
Margarine	Primor	0.25 kg	NI	6,453
Mayonnaise	Fanacoa	0.5 kg	0.2147	9,411
Mayonnaise	Hellmans	0.5 kg	0.2147	10,748
Mayonnaise	Uruguay	0.5 kg	0.2147	1,579
Noodles	Adria	0.5 kg	0.4328	9,661
Noodles	Cololó	0.5 kg	0.4328	5,415
Noodles	Las Acacias	0.5 kg	0.4328	9,109
Peach jam	Dulciora	0.5 kg	NI	7,692
Peach jam	El Hogar	0.5 kg	NI	4,964
Peach jam	Los Nietitos	0.5 kg	NI	10,303
Rice	Aruba	1 kg	0.3836	8,184
Rice	Blue Patna	1 kg	0.3836	8,710
Rice	Green Chef	1 kg	0.3836	8,523
Rice	Pony	1 kg	0.3836	6,405
Rice	Saman Blanco	1 kg	0.3836	5,798
Rice	Vidarroz	1 kg	0.3836	5,869

Table A.1 (cont.)

Category	*Brand*	*Specification*	*Share in CPI (%)*	*Number of observations*
Salt	Sek	0.5 kg	0.0947	6,665
Salt	Torrevieja	0.5 kg	0.0947	3,367
Salt	Urusal	0.5 kg	0.0947	6,004
Sausage	Cattivelli	1 kg	0.3698	5,108
Sausage	Centenario	1 kg	0.3698	2,903
Sausage	La Familia	1 kg	0.3698	4,644
Semolina noodles	Adria	0.5 kg	0.4328	7,791
Semolina noodles	Las Acacias	0.5 kg	0.4328	8,927
Semolina noodles	Puritas	0.5 kg	0.4328	2,156
Shampoo	Fructis	0.35 l	0.3620	8,555
Shampoo	Sedal	0.35 l	0.3620	9,356
Shampoo	Suave	0.35 l	0.3620	9,104
Soap	Astral	0.125 kg	0.1552	5,773
Soap	Palmolive	0.125 kg	0.1552	9,862
Soap	Rexona	0.125 kg	0.1552	2,029
Soybean oil	Condesa	0.9 l	0.1078	8,216
Soybean oil	Río de la Plata	0.9 l	0.1078	4,969
Soybean oil	Salad	0.9 l	0.1078	1,176
Sparkling water	Salus	2 l	0.8163	10,745
Sparkling water	Matutina	2.25 l	0.8163	10,089
Sparkling water	Nativa	2 l	0.8163	7,990
Sugar	Azucarlito	1 kg	0.3512	10,699
Sugar	Bella Unión	1 kg	0.3512	10,821
Sunflower oil	Río de la Plata	0.9 l	0.3659	3,100
Sunflower oil	Uruguay	0.9 l	0.3659	3,000
Sunflower oil	Óptimo	0.9 l	0.3659	10,841

Table A.1 (cont.)

Category	*Brand*	*Specification*	*Share in CPI (%)*	*Number of observations*
Tea	Hornimans	Box 10 units	0.0748	10,889
Tea	La Virginia	Box 10 units	0.0748	9,960
Tea	President	Box 10 units	0.0748	4,890
Toilet paper	Elite	4 units	0.2377	5,337
Toilet paper	Higienol Export	5 units	0.2377	10,234
Toilet paper	Sin Fin	6 units	0.2377	10,176
Tomate paste	Conaprole	1 l	0.1624	10,569
Tomate paste	Gourmet	1 l	0.1624	4,066
Tomate paste	De Ley	1 l	0.1624	6,830
Tooth paste	Colgate Herbal Blanqueador	0.09 kg	0.1895	5,854
Tooth paste	Kolynos Triple Acción	0.09 kg	0.1895	5,581
Tooth paste	Pico Jenner Plus	0.09 kg	0.1895	4,509
Wheat flour	Cañuelas 000	1 kg	0.2070	4,085
Wheat flour	Cololó 000	1 kg	0.2070	460
Wheat flour	Cañuelas 0000	1 kg	0.2070	9,760
Wheat flour	Cololó 0000	1 kg	0.2070	5,404
Wheat flour	Primor 0000	1 kg	0.2070	1,732
Wine	Faisán	1 l	0.7917	4,852
Wine	Santa Teresa Clásico	1 l	0.7917	10,769
Wine	Tango	1 l	0.7917	9,166
Yerba	Baldo	1 kg	0.6356	5,589
Yerba	Canarias	1 kg	0.6356	10,735
Yerba	Del Cebador	1 kg	0.6356	10,372
Yogurt	Conaprole Bio Top	1 l	0.1294	5,473
Yogurt	Calcar (skim)	1 l	0.1397	3,449
Yogurt	Parmalat Bio Yogur (skim)	1 l	0.1397	5,322

Note: NI stands for not included in the CPI, kg for kilograms, and l for liters.
Number of observations, 984,485.
Source: own elaboration from data of the General Directorate of Commerce.

Table A.2

DEFINITION OF THE AGGREGATE CATEGORIES

Category	*Aggregate category*
Beer	Alcoholic beverages
Wine	Alcoholic beverages
Beans	Beans
Beef (aguja)	Beef
Beef (nalga)	Beef
Beef (paleta)	Beef
Bread	Bread
Brown eggs	Brown eggs
Cacao	Cacao
Chicken	Chicken
Coffee	Coffee
Cola	Cola
Frankfurters	Cold cuts and sausages
Ground beef	Cold cuts and sausages
Ham	Cold cuts and sausages
Ham (leonesa)	Cold cuts and sausages
Hamburger	Cold cuts and sausages
Sausage	Cold cuts and sausages
Crackers	Crackers
Butter	Dairy products
Grated cheese	Dairy products
Ice cream	Dairy products
Margarine	Dairy products
Yogurt	Dairy products
Maize flour	Flour

Table A.2 (cont.)

Category	*Aggregate category*
Wheat flour	Flour
Bleach	Cleaning supplies
Dishwashing detergent	Cleaning supplies
Laundry soap	Cleaning supplies
Laundry soap, in bar	Cleaning supplies
Mayonnaise	Mayonnaise
Noodles	Noodles
Semolina noodles	Noodles
Corn oil	Oil
Soybean oil	Oil
Sunflower oil	Oil
Deodorant	Personal care
Shampoo	Personal care
Soap	Personal care
Toilet paper	Personal care
Tooth paste	Personal care
Rice	Rice
Salt	Salt
Sparkling water	Sparkling water
Sugar	Sugar
Dulce de leche	Sweet spreads and jam
Peach jam	Sweet spreads and jam
Tea	Tea
Tomato paste	Tomato paste
Yerba	Yerba

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