Gentrifying Neighborhoods, Retail Prices and Varieties

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January 31, 2020

Abstract

We study the effect of a demand shock due to neighbourhood change in local housing markets on retail prices and varieties. In our empirical strategy, we use an exogenous shock to the availability of new build properties induced by a major housing policy in the city of Montevideo. This policy provided a substantial tax exemption for the construction of newly built dwellings and modified the spatial distribution of construction activity in the city. We provide differences-in-differences estimates showing that grocery stores and supermarkets in areas where the new units were built experienced a relative decrease in the price of retail goods and an increase in the varieties offered. This change is mainly driven by an increase in competition in the area.

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1 Introduction

The availability of local retail options such as grocery stores or supermarkets is not homogeneous within cities. An important difference between neighbourhoods in most cities lies in the retail access opportunities they provide. This heterogeneity affects the varieties and, crucially, the prices households face when buying locally. Changes in the retail options in a given location may have different implications for different types of households. Importantly, this may be a channel through which other sources of neighbourhood change affect residents.

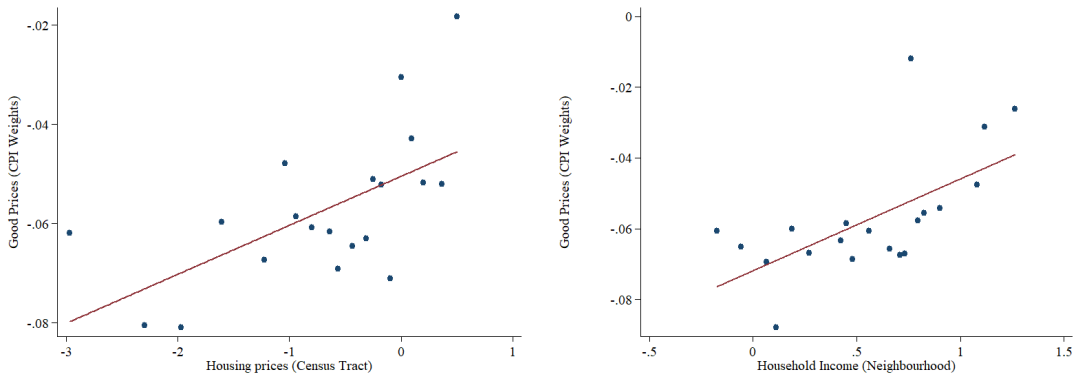
The introduction or replacement of new housing stock can change neighbourhoods and can affect retail prices through its effect on the consumer base at each location. Studies have shown that the age of the housing stock can partly explain the dynamic of neighbourhoods' economic status (Rosenthal, 2008; Brueckner and Rosenthal, 2009). Newly built housing generally attracts high-income residents (Brueckner, 2011) who may have higher willingness to pay to live in this type of stock. In these revitalized areas, the demand for goods and its varieties may increase. Local retailers may respond to the increase in demand as well as to the inflow of less price-sensitive households by increasing prices. As a result, ongoing residents may pay higher prices whenever buying goods in local grocery stores.

On the other side, the increase in demand may also induce entry by new retailers. This new supply, if strong enough, could result in decreased prices even taking into account the increase in demand. This is the result found in the paper. Using a detailed database of retail prices and varieties in Montevideo, the capital city of Uruguay, we exploit an exogenous shock on housing stock and found a 2% decrease in prices and a nearly 10% increase in varieties in the treated neighbourhoods.

As a motivation for the results, we provide descriptive cross-sectional evidence documenting that there are clear differences in comparable retail prices between neighbourhoods using detailed retail price data for over 180 stores in the city of Montevideo, Uruguay. A sample of this evidence is reported in figure 1. On the left panel, we show the relationship between housing prices, in the horizontal axis, and a measure of the price of a basket of goods, built with the weights used for the national consumer-price index. The scatter plot represents bin averages. We can observe a clear positive relationship, with higher retail prices being associated to higher local housing prices. A similar pattern is observed in the

right panel, in which we represent neighbourhood household income in the horizontal axis.[1] This pattern suggests retailers adapt their pricing to local neighbourhood characteristics.

Figure 1: Retail Prices, Housing Price and Neighbourhood Composition



Notes: In both panels, **vertical axis** measures the normalized retail price for a bundle of goods. CPI weights from INE used to aggregate prices. In the **left-panel**, the horizontal measures normalized housing transaction prices in the stores' census area. In the **right-panel**, the horizontal axis measures household income in the store's neighbourhood, as recorded in the Household Survey. Binned scatter-plot based on 184 stores.

While the descriptive patterns are striking, they do not say much regarding the evolution of neighbourhoods over time, or the direction of causality. Our empirical strategy to analyze these questions is based on a major housing policy that induced gentrification of certain neighbourhoods in Montevideo as a result of large investments in residential stock. The policy provides tax benefits to developers to build housing among a pre-defined middle-income area of the city. Total investments through this program stood at a remarkable 1.5% of the GDP in the first three years of the policy. The built units were affordable for mid-high/high income households. The program led to substantial spillovers on house prices locally and household income among these neighbourhoods increased as documented in González-Pampillón (2019). The institutional features of this housing policy make the analysis suitable to estimate the effect of neighbourhood renewal on local retail prices. Specifically, this policy has a place-based structure which determines the specific area where housing projects that involve new construction are eligible for the tax benefits.

Using the policy as an arguably exogenous driver of the spatial distribution of residential construction, we test whether the introduction of new stock had an influence on local retail prices. For this purpose we follow a differences-in-difference strategy. We propose two

[1] Details regarding on this descriptive analysis and other results are provided in section 4.

reduced-form specifications, using different policy-derived intensity measures. We also implement an instrumental variable strategy based on a continuous difference-in-differences specification where the spatial structure of the subsidy is used as an instrument for i) age of the housing stock and ii) housing prices. We further analyze whether the number of establishments, and in particular, whether the number of grocery stores has changed to document for changes in the composition of supply. The policy may also affect local costs of grocery stores through increasing local rental prices or land values. On the other hand, firms may react to an increase in the local demand by increasing mark-ups. We attempt to shed light on which of these two compelling factor explain the change in local retail prices.

We find evidence that the introduction of new stock resulted in a significant decrease in grocery prices at the local level. This is confirmed across specifications, using different adjustments to ensure comparability of the different goods sold in each store. Prices decrease by 2% in the areas affected by the housing policy relative to the control areas. This effect is mainly driven by the increase in competition due to entry of new stores.

We perform the analysis using a detailed good-level database of daily posted prices compiled by The General Directorate of Commerce (DGC, by its Spanish acronym), a branch of the Ministry of Economy and Finance in Uruguay, which comprises detailed information from grocery stores all over the country. We also use official data from the National Housing Agency (*Agencia Nacional de Vivienda*) regarding subsidized new construction projects, which contains information about the exact geographical location of projects, approval date, total number of housing units produced (including commercial units and lofts), amount of taxes exempted and budget of each project, budget schedule, characteristics of the housing units built such as facilities and amenities, and projects size (large, medium and small). Preliminary results show that local retail prices increase in stores close to the new, policy induced properties.

This paper is related to the growing literature on the effect of gentrification on local neighbourhood outcomes. To our knowledge, none of these previous studies analyse local retail prices. Various papers analyse residential mobility patterns in gentrifying tracts with a strong focus on displacement, finding mixed results. A group of studies that use more descriptive techniques find no (or mild) evidence on higher out migration of original (and more vulnerable) residents while showing income gains among this neighbourhoods (Vigdor, 2002; Freeman, 2005; McKinnish et al., 2010; Ellen and O'Regan, 2011a,b;

Ding and Hwang, 2016) On the other hand, three recent studies (Aron-Dine and Bunten, 2019; Waights, 2018; Brummet and Reed, 2019) find that gentrification indeed lead to out-migration and displacement, while other study (Freeman et al., 2015) does not find evidence of higher mobility rates in gentrifying neighbourhoods. Brummet and Reed (2019) also show that original residents who stay after the neighbourhood gentrifies, benefits from higher house values (whenever stayers are home-owners), and increased employment levels in the neighbourhood. Vigdor (2010) empirically test if the willingness-to-pay to live in revitalised neighbourhoods of existing residents exceeds the change in local rental prices (which captures changes in neighbourhood quality). Autor et al. (2017) estimate the causal effect of gentrification induced by a rent deregulation policy on crime rates, finding a substantial reduction among crime rates.

Naturally, this paper is also related to the growing literature on urban consumption following the work in Glaeser et al. (2001). Some strands of this literature focused on studying how local amenities itself can be linked to neighbourhood composition (Diamond, 2016; Guerrieri et al., 2013). Perhaps closer to the question here, recent work in Couture et al. (2018), provides a model in which increasing inequality can interact with local consumption amenities and spatial sorting to make the poor worse off. Our paper looks at consumption options explicitly, measuring both price and product availability using store data. The results in our paper suggest an analogous decline in welfare for low-income households could result from change in local retail prices.

Finally, this paper is also related to previous work that estimates the effect of changes in (local) house prices on local retail prices. Stroebel and Vavra (2019) estimates how changes in house prices affect local retail prices through housing booms and busts. They argue that their estimates are not driven by changes in demographic or gentrification patterns, pointing to changes in the behaviour of existing home-owner residents due to changes in their housing wealth given by changes in house prices and which lead firms to increase mark-ups in response. We instead estimate the effect of a policy which fuelled a gentrification process among certain neighbourhoods by means of producing newly built housing just affordable for middle-high/high income households on local retail prices.

This paper is organized as follows. The next section (section 2) briefly describes the institutional setting. Section 3 presents the data while section 4 shows a descriptive analysis. Section 5 describes the empirical method, while section 6 shows the main results of the pa-

per. Section 7 concludes.

2 Institutional setting

In August 2011, the Uruguayan government introduced tax benefits for private investments in housing by law (Law nbr. 18,975). This policy aims at promoting the construction sector and improving the stock of housing to be sold or rented in the whole country by means of tax benefits that apply for new construction.[2] The produced buildings include a maximum of 100 new units by land lot as required by law. However, there were exceptions made for projects performed in large vacant lots or in parcels with disused factories or abandoned houses. Regarding unit size restrictions, it depended on the number of bedrooms (i.e. between $>32m^2$ and $<50m^2$ if one bedroom, increasing with each additional bedroom up to four). The tax benefits only operated in urban areas with the exception of those with a high proportion of secondary dwellings.

Under this policy developers and private investors are exempted to pay the corporate tax (25%) over sold units, while rents are partially exempted from personal income and corporate taxes (until nine years).[3] 437 new construction projects were promoted from December 2011 until December 2017, involving around 14K new units. The total amount invested was 790MUSD, which is around 1.5% of the 2011-2017 average GDP in USD. The city of Montevideo concentrates more than 70% of the total projects. The empirical analysis is focused on 98 subsidized new construction projects in Montevideo promoted and executed between 2011 and 2013. The average projects' schedule is 1.8 years.

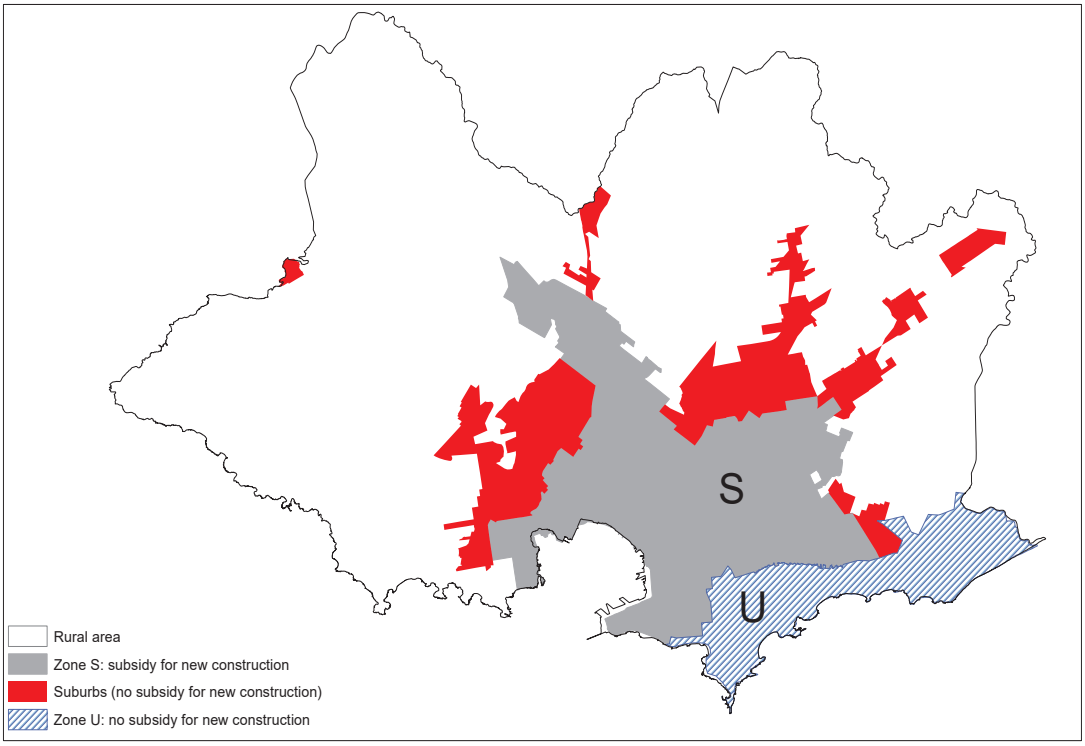
The subsidy has a place-based structure for new construction as observed in Figure 2, where the tax benefit only apply in the area labeled as S. This area represents 52% of the total urbanized area, and it is composed of both central and peripheral neighbourhoods. It is highly heterogeneous in income, with a coefficient of variation of 30% using per capita disposable household income. The non-subsidized area labeled as U (in Figure 2) is the densest, and it is also the richest part of the city with an average real per capita income that

[2]The subsidy also applies for rehabilitation projects that consisted of upgrading and also increasing the total number of housing units. However, around one fifth of the total comprises rehabilitation projects, having budgets substantially lower than the new construction ones.

[3]Other minor fiscal advantages include the exemption of the wealth tax over land and improvements during construction, as well as, over produced and subsequently rented units until nine years. They are also exempted to pay the transfer tax in case of buying unsold units. Finally, the law establishes tax credits for value-added tax on national and imported inputs.

doubles and triples the one in area *S* and the suburbs (unlabeled), respectively. This pattern is also observed for housing prices. As showed in González-Pampillón (2019), the house price gradient varies continuously around the border. The boundaries of the subsidized area were defined by the Ministry of Housing together with the Ministry of Economics and Finance and the Local Government of Montevideo. Overall, it follows a number of natural city divisions provided by its main avenues and streets.

Figure 2: Place-based scheme for new construction projects in Montevideo (Uruguay)



Notes: The policy was introduced in August of 2011. The subsidy for new construction projects only applies in the grey-area *S*.

3 Data

We perform the analysis using a detailed good-level database of daily posted prices compiled by The General Directorate of Commerce (DGC, by its Spanish acronym), a branch of the Ministry of Economy and Finance in Uruguay, which comprises information about grocery stores all over the country.[4]. Moreover, the DGC is the authority responsible for the enforcement of the Consumer Protection Law. The DGC requires retailers to report their daily prices once a month using an electronic survey.

[4]This is an updated database from Borraz et al. (2014) and Borraz et al. (2016).

The database has its origins in a tax law passed by the Uruguayan legislature in 2006, which changed the tax base and rates of the value added tax (VAT). 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 the prices in different grocery stores and supermarkets across the country. The DGC issued Resolution Number 061/006, which mandates that grocery stores and supermarkets report their daily prices for a list of products if they meet the following two conditions: i) they sell more than 70% of the products listed, and ii) they either have more than four grocery stores under the same brand name or have more than three cashiers in a store. The information sent by each retailer is a sworn statement, and there are penalties for misreporting. The objective of the DGC is to ensure that prices posted on the DGC website reflect the real posted prices in the stores. In this regard, stores are free to set the prices they optimally choose, but they face a penalty if they try to misreport them to the DGC.

The data includes daily prices from April 1st of 2007 to December 31st of 2019 for 154 products, most of them defined by Universal Product Code (UPC). This detailed information allows us to track the exact same good in stores across the country, avoiding measurement problems resulting from different products being compared (see the discussion in Atkin and Donaldson (2015a)). The markets for the goods included in the sample represent 15.6% of the CPI basket. Most items have been homogenized to make them comparable, and each supermarket must always report the same item. For example, the soft drink of the international brand Coca Cola is reported in its 1.5 liter variety by all stores. If this specific variety is not available at a store, then no price is reported. The data are then used on a public web site that allows consumers to check prices in different stores or cities and to compute the cost of different baskets of goods across locations.[5]

The three best-selling brands are reported for each market, disregarding the supermarket's own brands.[6] Products were selected after a survey to some of the largest supermarket chains in the year 2006. In November 2011, the list of products was updated, including some markets and reviewing the top selling brands for others. The price information for the goods that were discarded was deleted from the database, so we lose part of the information in some markets. The 154 products in the database represent more than 60 markets defined

[5]See http://www.precios.uy/servicios/ciudadanos.html and Borraz et al. (2014) for a detailed description of the database.

[6]Exceptions are sugar, crackers, and cocoa, that has only two brands; and rice, that has up to six brands.

at the product category level (e.g., sunflower oil and corn oil and wheat flour 000 and wheat flour 0000 are different markets in our analysis). For some of them, the information does not allow the identification of the goods at the UPC level; in the meat and bread markets, products do not have brands. The detailed list of goods and their share in the Consumer Price Index (CPI) can be found in Appendix B.

For each supermarket we have detailed information about the exact location given by its Universal Transverse Mercator (UTM) as well as about whether it belongs to a chain. The database has information for up to 474 supermarkets—i.e., a non-balanced panel—across all nineteen political states, comprising 54 cities. Montevideo, the capital city of Uruguay, is also the country's largest city, with nearly forty percent of the Uruguay population has 312 supermarkets in the sample.[7] See Borraz et al. (2014) for a completed description of the supermarket industry in Montevideo.

Of the 154 products we identify 125 products that could be exactly matched. We delete products that are not sold packaged (e.g., ham, meat, and chicken). We also eliminated all the supermarkets that entered the database after October 2010 (for these supermarkets we do not have prices before the change of policy). Our final database has 75 products corresponding to 25 markets/categories in 312 supermarkets in the city of Montevideo. We then calculate the mode monthly price (see Eichenbaum et al. (2011)) for each product. Our final database for the city of Montevideo is composed by 1,436,982 observations.

Using the database we also computed the number of varieties in each product market. The definition of variety is borrowed from the trade literature, in particular from models based on monopolistic competition (see Dixit and Stiglitz (1977), Eaton and Kortum (2002), and Melitz (2003)). Within a given market or product category there are goods that offer similar characteristics to the consumer. A variety will be such collection of similar goods: i.e., in the beer market, there is varieties Bud Light, Budweiser, or Coors Light. In empirical papers of trade the narrow category for defining a market for substitute goods is usually referred to as product category (see Gopinath et al. (2011), Hong and Li (2017), or Atkin and Donaldson (2015b)). We will refer to a specific product as variety—interchangeably—, and the market to which belong as market or product category—interchangeably—. For calculating the number of varieties in a market we simply count the number of products—less one—in each triple market/store/month.

[7] More information is available at http://www.ine.gub.uy/uruguay-en-cifras

4 Descriptive Analysis

We start the empirical analysis by showing how cross-sectional patterns in local retail prices relate to neighbourhood composition. While the hypothetical link between local retail prices is natural, we are not aware of other work displaying it succinctly. To provide a simple measure of retail prices we can define a reference bundle of products and a series of weights (usually based on consumption shares). We use these weights to calculate the price of a bundle of goods for each store, after filtering aggregate time variation in prices.

Alternatively, we can decompose prices as follows:

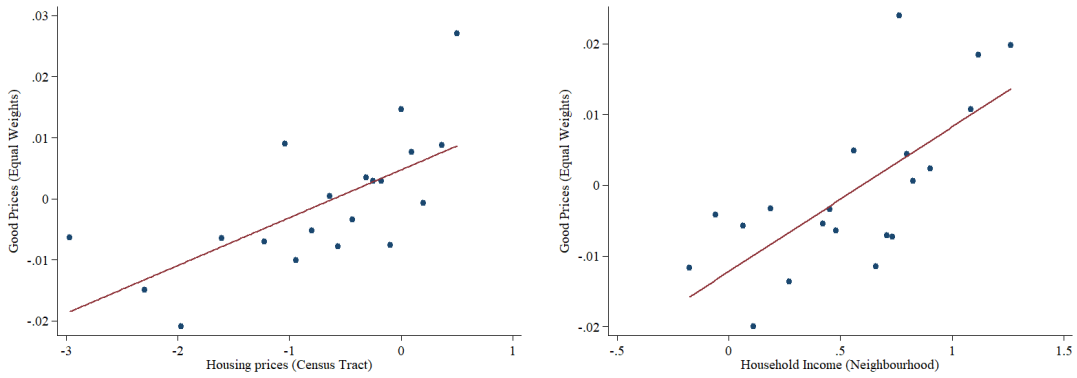
$$ln(p_{ist}) = \alpha_s + \delta_{it} + \varepsilon_{ist}$$

Where $ln(p_{ist})$ is the natural log of product i in month t and store s. α_s represent store-specific effects. These are likely to be time varying in general, but are specified here as fixed for the purpose of this cross sectional comparison. δ_{it} captures all time-product variation and can be filtered out using time dummies. If certain products are found in different stores, then the inclusion of δ_{it} means α_s will describe the proportional differences in prices between stores of a bundle of equally-weighted goods. Differences in price levels between goods (e.g. between half a kilo of salt and a bottle of shampoo) are dealt with by the product specific time effects.

We use both of these methods to obtain a normalized, store specific measure of housing prices. We also compute average price per square meter of properties sold in the census blocks around each store. Finally, we obtain average household income per capita at the neighbourhood level from the *Encuesta de Hogares*, a household-level survey. Therefore we have grocery retail prices, local housing prices and income levels. The patterns for the store average prices using the CPI weights were provided in figure 1 in the introduction. The correlation of retail prices with household income and housing prices is 30% and 26%, respectively.

Figure provides analogous diagrams using the regression-based measure of price levels for each store. In this case, the correlation of retail prices with household income and housing prices is 33% and 29%, respectively.

Figure 3: Cross-sectional characteristics and Retail Prices: Equal Weights



Notes: In both panels, the **vertical axis** measures the normalized retail price for a bundle of goods at the store level, as measured by the equal-weight regression-based coefficient discussed in the text. In the **left-panel**, the horizontal axis measures normalized housing transaction prices in the stores' census area. In the **right-panel**, the horizontal axis measures household income in the store's neighbourhood, as recorded in the Household Survey. Binned scatter-plot based on 184 stores.

5 Empirical Strategy

The primary aim of this paper is to estimate the effect of a policy that spurs gentrification on local retail prices. This policy leads house prices to increase mostly in areas with large housing investments. While subsidized projects were highly concentrated close to the border of the subsidized area with respect to the non-subsidized one, there were parts with no investments. We construct a measure that captures the exposure of each grocery store s to subsidized investments. This variable is computed as the sum of the budgets of all projects (98 in total) multiplied by an exponential decay factor. Similar to Autor et al. (2016), we adopted an exponential decay function that places larger weights on nearby subsidized projects. This measure is formally defined as follows,

$$\text{Intense}_s = \sum_{j=1}^{98} BT_j \times e^{-\lambda d_{sj}} \tag{1}$$

where BT_j is the budget of project j, d_{sj} is the distance (in km) from the grocery store i to project j, and $\lambda(<0)$ is the parameter that rules the decaying rate of weights. Then, Intense_s measures the level of investment which each grocery store s is exposed to. As λ increases, the level of exposure declines at faster rates with respect to distance. Then, the variable Intense_s is used as a continuous-treatment variable to estimate the following continuous difference-in-difference estimator,

$$
\begin{aligned}
ln(x_{isbt}) &= \alpha ln(\text{Intense}_s) + \beta ln(\text{Intense}_i) \times post_{2012-2019} \\
&+ X_s^{'}\theta + \delta_t + \nu_b + \delta_t \times \nu_b + \epsilon_{isbt} \qquad (2)
\end{aligned}
$$

where $ln(x_{isbt})$ is either the log of the price or the number of varieties of product i, in grocery store s, and at time t, and $ln(\text{Intense}_s)$ is the log of the intensity of the treatment for a given value of the parameter λ. The twelve kilometers length border comprises neighbourhoods with different socio-economic characteristics. We create six border-segments b (each around two kilometers long) based on census tract divisions, therefore, using within border variation to estimate the coefficient of interest β. We explore the sensitivity of the results to different values of λ. The intensity measure is likely to be endogenous due to the fact that developers are likely to choose among the areas with better growth prospects. We use the place-based structure of the subsidy as an instrument for the investment intensity measure. The instrument is defined as a binary variable that takes a value of one for grocery stores located in the non-subsidized area and zero if located in the subsidized area.

6 Results

6.1 Policy effects on neighbourhood change

We first provide evidence that the housing policy has reshape neighbourhoods which were highly targeted by developers. We focus on two measures: p/c household income and house prices. Regarding the first, we should expect to observe changes in household income among neighbourhood that experienced large investments as higher-income dwellers demand newer housing stock. The other measure we use is house prices which capture the willingness to pay to live in a given neighbourhood with given level of amenities. According to basic hedonic models, the willingness to pay to live in a given location increase as the level of amenities in a neighbourhood increase, implying that higher income dwellers are likely to move into neighbourhoods affected by the policy and thus, driving up house prices.

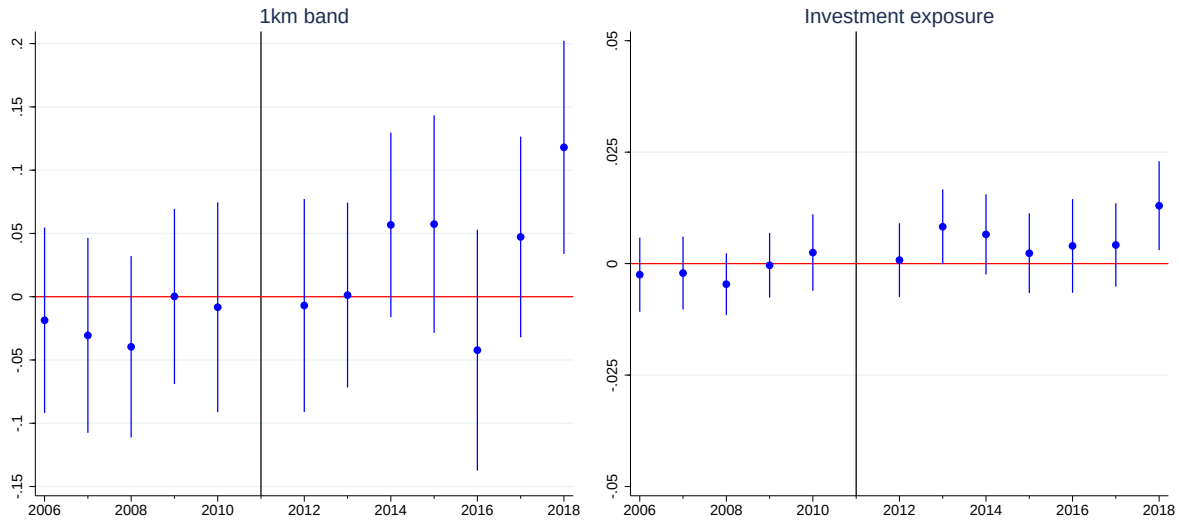
Figure 4 present event study graphs that measures the policy effect, before, and after its introduction. We follow two different empirical strategies. The first strategy focus on the effect of the policy on a 1km band in the subsidized area, starting from the shared border with the non-subsidized area (basically the rich coastal area of the city). As for the comparison

group, we consider the 1km band in the non-subsidized area. In the second strategy, we use an investment intensity measure that captures how expose a unit sold/household is to the policy. This measure is constructed as a weighted sum of all project budgets in the city using an exponential weighting scheme that assign higher weights to close by projects. Focusing on Panel a, which uses household income as a measure of neighbourhood change, we observe that both strategies show a similar picture. Both graphs show that before the policy was introduce in 2011, there is no effect on household income thus providing supportive evidence to our empirical strategies. After the introduction of the policy, we observe that the household income start increasing in case of the dwelling located in the 1km band, as well as, in dwelling located in areas that received large housing investments through the policy. A similar result is observed when using house prices. In Panel b, we observe that there is an increase in house prices after the law come into force in 2011. The new housing stock improved neighbourhood amenities, thus leading to a house price appreciation.

Table 1 presents the average effects for the period 2012-2017/2018. In panel A, we present results using the 1km band strategy while in Panel B we use the continuous treatment variable (labeled as intense). Regarding Panel A, we observe that household income increase by around 4% in case of neighbourhoods located in the 1km band, and house prices increase by around 7%. Point estimates do not differ substantially to the inclusion of control variables. Panel B present the results from using the investment exposure measure (in logs). In this case, point estimates represent elasticities. We observe an elasticity of .025 of household income with respect to the investment intensity, which decrease considerably when adding control variables. Different from the empirical strategy that uses the 1km band, this strategy involves using observations among the entire city. Then adding census tract controls (and its interactions with year dummies) reduces the point estimates since there is more variation in observables across the city. Regarding house prices, the elasticity is .011 with respect to the investment intensity, and it increases to .017 when adding controls. In sum, we provide evidence that the policy fueled a gentrification process among communities with large housing investments. Next, we test whether this change in the socio-economic status of neighbourhoods affect local retail prices.

Figure 4: Policy effects on neighourhood change

(a) Household income



(b) House prices

Notes: Left panels show results from estimating the policy effects on 1km band in the subsidized area. Right panels show results from using an investment exposure measure captures the level of investment intensity to which each unit sold/household i is exposed. It is built as the weighted sum of all project budgets using weights that follow an exponential decay scheme. Here, the decay rate $\lambda = -9$. Confidence intervals are constructed using clustered standard errors.

Table 1: Estimates on the policy effects on household income and house prices

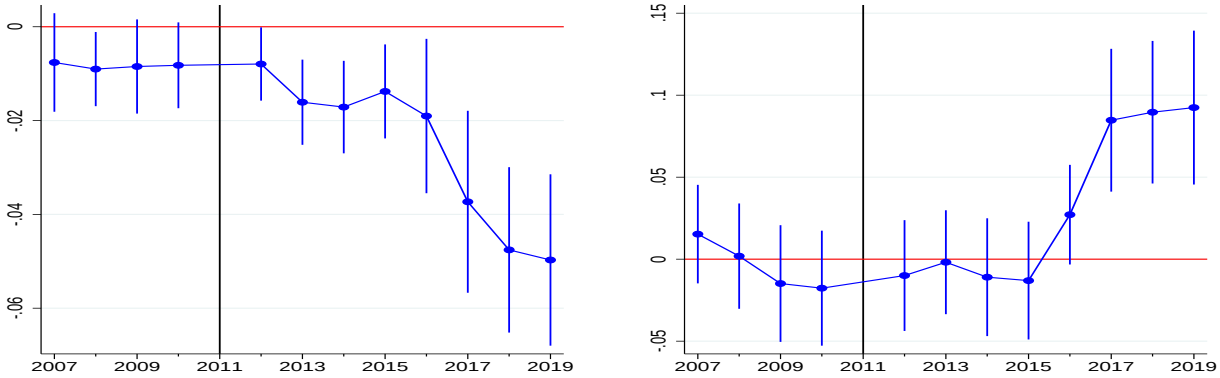
Panel A: 1km band				
	Household income		House prices	
	(i)	(ii)	(iii)	(iv)
1km band x Post	0.039***	0.044***	0.074***	0.069***
	(0.014)	(0.013)	(0.027)	(0.026)
Obs	62,901	62,901	92,447	92,447
Adj. R-squared	0.134	0.187	0.441	0.461
Controls	No	Yes	No	Yes
Panel B: investment exposure (intense)				
	Household income		House prices	
	(i)	(ii)	(iii)	(iv)
Intense x Post	0.025***	0.006***	0.011***	0.017***
	(0.003)	(0.002)	(0.004)	(0.003)
Obs	182,079	182,079	246,059	246,059
F-Statistic	43.715	122.249	72.325	94.204
Controls	No	Yes	No	Yes

Notes: Clustered standard error at the product level in parentheses. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

6.2 Measuring the effects of neighbourhood change on local retail prices and varieties

We now analyses the effect of the increase in demand on prices and varieties. Figure 5 below show for prices—left—and varieties—right—the point estimate of the effect for each year before and after the law come into force in 2011 for supermarkets located within two kilometers from the border of the subsidized area with respect to the non-subsidized area. In both graphs, the point estimate results from interacting the continuous treatment measure with year dummies using 2011 as the base category. Results show that the effect is close to zero before the policy, showing a gradual decrease in prices after 2011. After the law, the price drop is less than 2% until 2016 and thereafter it decreases significantly exceeding 4%. On the other hand, the number of varieties remains relatively constant until 2017 when it rises and remain constant at a level of almost 10% higher. Therefore, after the law we observe a significant decrease in prices and a rise in the number of varieties offered by stores.

Figure 5: Event study graph - local retail prices and varieties on the investment exposure measure - 2 kilometres distance



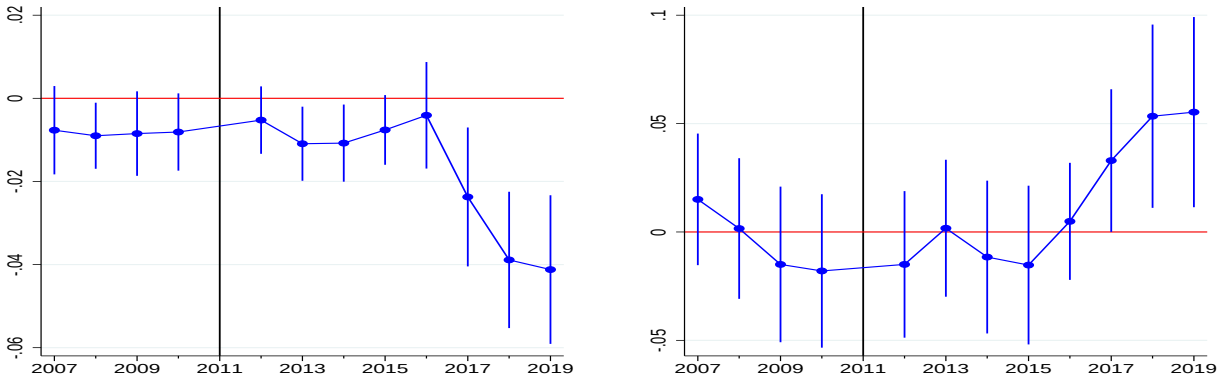
(a) Effect on prices

(b) Effect on varieties

Previous results could be explained by supermarket's entry that increase competition in local markets. To take this into account we estimate the model restricting the sample only to those supermarkets that were active before the law. Figure 6 (left) below shows that for the restricted sample of supermarkets the decrease in prices is only observed six years after the application of the law. This result shed evidence of a competitive reaction to entry of new stores in the treated zone.

In a similar way as for the entire sample, the number of varieties increases after 2017 (see Figure 6 (right)). However, for the supermarkets that were in business before the law the rice in varieties is approximately half than for the whole sample. Again, the change in varieties seems to be explained by the stores that enter the market before the law was passed. Also, the smaller increase in varieties for stores already in the markets suggest again of an increase in competition.

Figure 6: Event study graph - Effect on local retail prices and varieties on the investment exposure measure - 2 kilometers distance - Restricted sample.

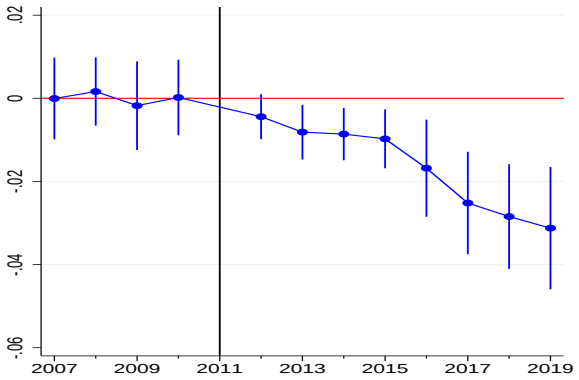


(a) Effect on prices

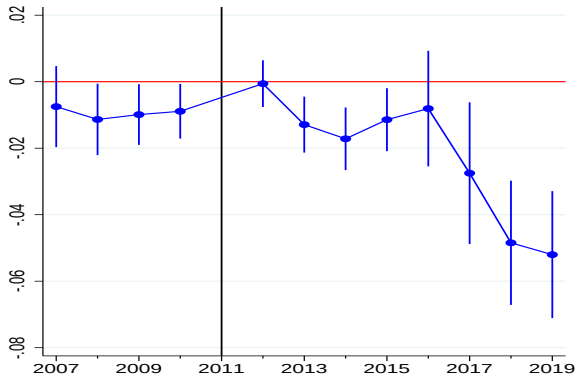
(b) Effect on varieties

Next we analyze if the price decrease found after the law was passed is a observed for all products. In particular, we analyze if our results could be driven by the decrease in low price products. To do this we divide the sample of products in two: leaders and non leaders. We define a product to be a leader when it consistently shows the highest price within its category. As an example, for carbonated soft drinks category we obtain Coca Cola as the leader and Nix—a local brand—as the non leader product. Figure 7 (a) and (b) for the whole sample show that the price drop is observed for both leading and non-leading products. When we analyze the sample of supermarkets that were in business before the law was passed, we observe a decrease in price only in the last three years of the sample (see Figure 7 (c) and (d)).

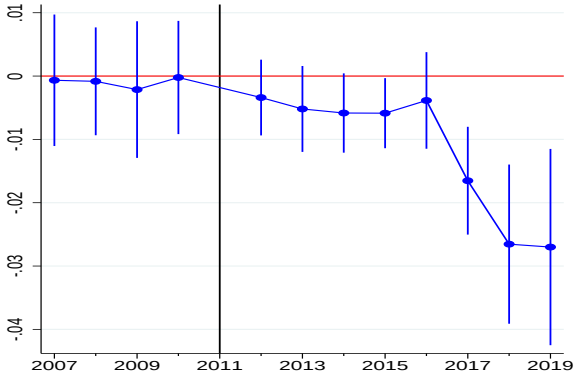
Figure 7: Event study graph - retail prices on the investment exposure measure by leader and non-leader products - 2 kilometers distance.



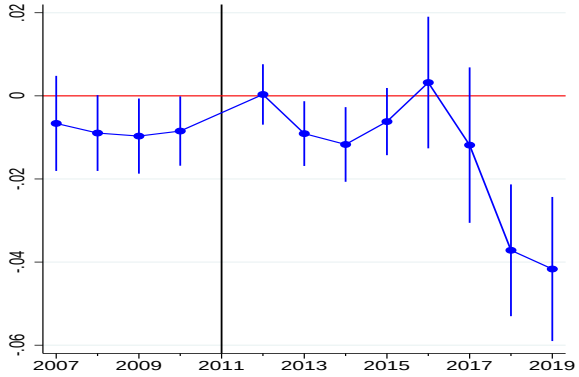
(a) All sample: leader product



(b) All sample: non-leader products



(c) Restricted sample: leader products



(d) Restricted sample: non-leader products

All our previous estimations were based on the analysis of the supermarkets located within two kilometers from the border of the subsidized area. As a robustness check we re-estimate our models but considering a one-kilometer band instead of two in order to control better for local market condition. Results are quite similar of those previously found, and are shown in Appendix A.

7 Conclusions

We analyze how local retail prices and varieties are shaped by neighbourhood change using a rich dataset on local housing prices, store-level selling prices for a large set of grocery products and neighbourhood characteristics. The qualitative prediction suggested by looking at retail prices in the cross-section appears to be confirmed when using exogenously induced

changes in housing stock at the local level. The increase in location value induced by upgrading of residential dwellings leads to lower retail prices and higher varieties. In this case, the competitive effect prevails over the demand effect on prices.

Our results show that local retail prices decrease in neighbourhoods that were highly exposed to subsidized units. This has clear implications for similar policies attempting to promote development or re-development in certain areas.[8] Perhaps more importantly, our findings suggest there may be an additional channel through which gentrification can affect local residents beyond its well studied effects on rents.

[8] See Carozzi (2018) for a review of re-development policy.

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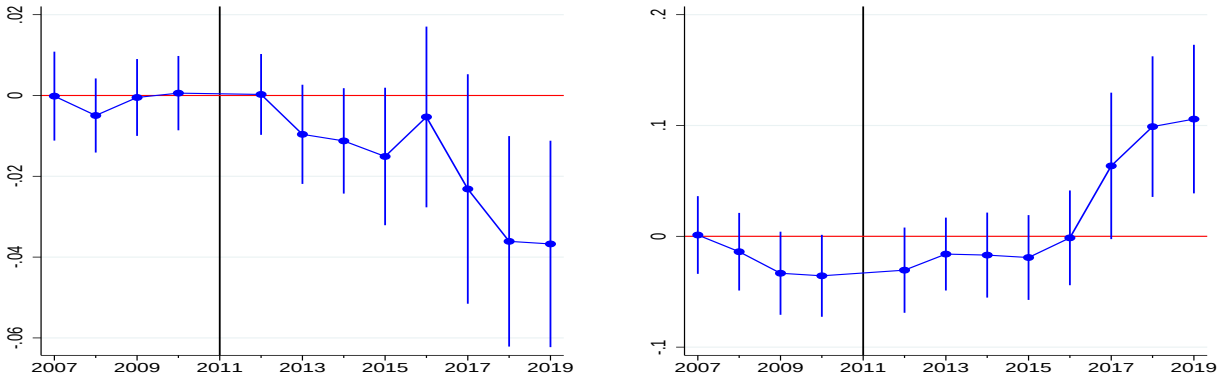
Appendix A Results for one kilometer

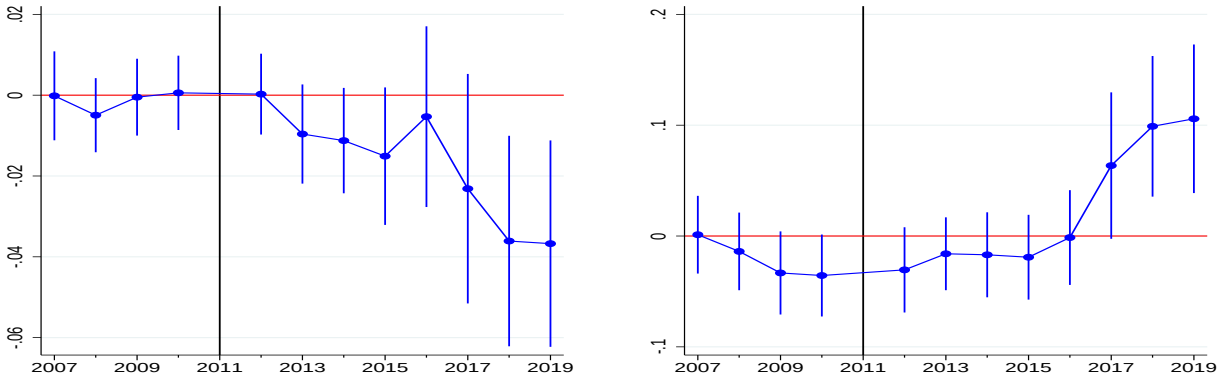
Figure 8: Event study graph - local retail prices and varieties on the investment exposure measure - 1 kilometer distance



(a) Effect on prices

(b) Effect on varieties

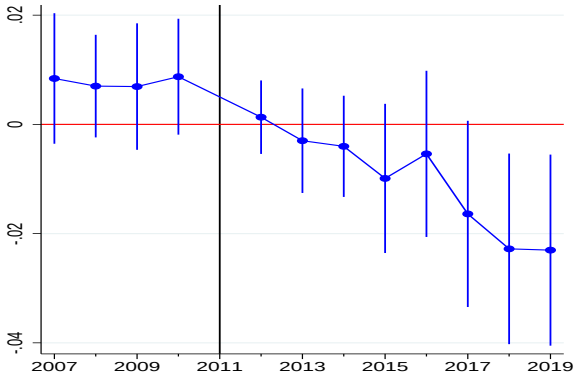
Figure 9: Event study graph - Effect on local retail prices and varieties on the investment exposure measure - 1 kilometer distance - Restricted sample.



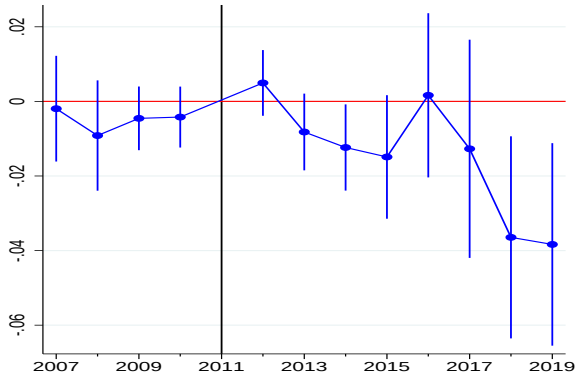
(a) Effect on prices

(b) Effect on varieties

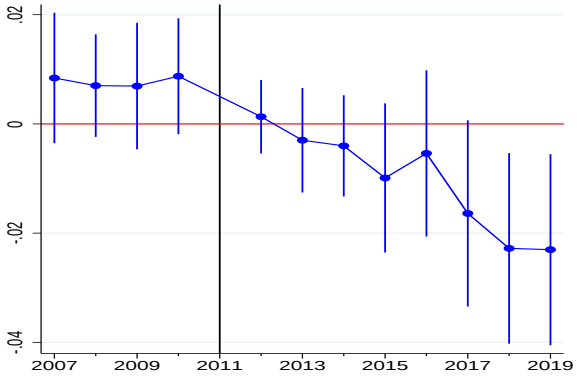
Figure 10: Event study graph - retail prices on the investment exposure measure by leader and non-leader products - 1 kilometer distance.



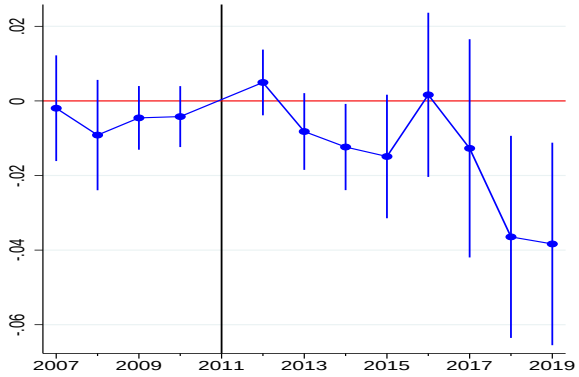
(a) All sample: leader product



(b) All sample: non-leader products



(c) Restricted sample: leader products



(d) Restricted sample: non-leader products

Appendix B Product Characteristics

Product / Market	Brand	Specification*	% Share in CPI	Owner (/merger)	Sample Start (merge)
Beer	Patricia	0.96 L	0.38	FNC	2007/04
Beer	Pilsen	0.96 L	0.38	FNC	2007/04
Beer	Zillertal	1 L	0.38	FNC	2010/11
Wine	Faisán	1 L	0.80	Grupo Traversa	2007/04
Wine	Santa Teresa Clasico	1 L	0.80	Santa Teresa SA	2007/04
Wine	Tango	1 L	0.80	Almena	2007/04
Cola	Coca Cola	1.5 L	1.12	Coca Cola	2007/04
Cola	Nix	1.5 L	1.12	Milotur (CCU)	2007/04
Cola	Pepsi	1.5 L	1.12	Pepsi	2010/11
Sparkling water	Matutina	2 L	0.81	Salus	2007/04
Sparkling water	Nativa	2 L	0.81	Milotur (CCU)	2007/04
Sparkling water	Salus	2.25 L	0.81	Salus	2007/04
Bread Loaf	Los Sorchantes	0.33 Kg	0.06	Bimbo / Los Sorchantes	2010/11 (2011/04)
Bread Loaf	Bimbo	0.33 Kg	0.06	Bimbo	2010/11
Bread Loaf	Pan Catalán	0.33 Kg	0.06	Bimbo	2010/11
Brown eggs	Super Huevo	1/2 dozen	0.46	Super Huevo	2010/11
Brown eggs	El Jefe	1/2 dozen	0.46	El Jefe	2010/12
Brown eggs	Prodhin	1/2 dozen	0.46	Prodhin	2007/07
Butter	Calcar	0.2 Kg	0.23	Calcar	2007/04
Butter	Conaprole sin sal	0.2 Kg	0.23	Conaprole	2007/04
Butter	Kasdorf	0.2 Kg	0.23	Conaprole	2010/11
Cacao	Copacabana	0.5 Kg	0.08	Nestlé	2007/04
Cacao	Vascolet	0.5 Kg	0.08	Nestlé	2007/06
Coffee	Aguila	0.25 Kg	0.14	Nestlé	2007/04
Coffee	Chana	0.25 Kg	0.14	Nestlé	2007/04
Coffee	Saint	0.25 Kg	0.14	Saint Hnos	2010/11
Corn Oil	Delicia	1 L	n/i	Cousa	2010/11

* Kg = kilograms; L = liters; M = meters. n/i - No information.

Product / Market	Brand	Specification*	% Share in CPI	Owner (/merger)	Sample Start (merge)
Corn Oil	Río de la Plata	1 L	n/i	Soldo	2010/11
Corn Oil	Salad	1 L	n/i	Nidera	2010/11
Dulce de leche	Conaprole	1 Kg	0.14	Conaprole	2007/04
Dulce de leche	Los Nietitos	1 Kg	0.14	Los Nietitos	2007/04
Dulce de leche	Manjar	1 Kg	0.14	Manjar	2007/04
Flour (corn)	Gourmet	0.4 Kg	n/i	Deambrosi	2010/11
Flour (corn)	Presto Pronta Arcor	0.5 Kg	n/i	Arcor	2010/11
Flour (corn)	Puritas	0.45 Kg	n/i	Molino Puritas	2010/11
Flour 000 (wheat)	Cañuelas	1 Kg	0.21	Molino Cañuelas	2010/11
Flour 000 (wheat)	Cololó	1 Kg	0.21	Distribuidora San José	2010/11
Flour 0000 (wheat)	Cañuelas	1 Kg	0.21	Molino Cañuelas	2007/04
Flour 0000 (wheat)	Cololó	1 Kg	0.21	Distribuidora San José	2007/04
Flour 0000 (wheat)	Primor	1 Kg	0.21	Molino San José	2010/11
Grated cheese	Conaprole	0.08 Kg	0.16	Conaprole	2007/04
Grated cheese	Artesano	0.08 Kg	0.16	Artesano	2010/11
Grated cheese	Milky	0.08 Kg	0.16	Milky	2007/04
Deodorant	Axe Musk	0.105 Kg	0.34	Unilever	2010/11
Deodorant	Dove Original	0.113 Kg	0.34	Unilever	2010/11
Deodorant	Rexona Active Emotion	0.100 Kg	0.34	Unilever	2010/11
Hamburger	Burgy	0.2 Kg	n/i	Schneck	2010/11
Hamburger	Paty	0.2 Kg	n/i	Sadia Uruguay	2010/11
Hamburger	Schneck	0.2 Kg	n/i	Schneck	2010/11
Ice Cream	Conaprole	1 Kg	0.22	Conaprole	2010/11
Ice Cream	Crufi	1 Kg	0.22	Crufi	2010/11
Ice Cream	Gebetto	1 Kg	0.22	Conaprole	2010/11
Margarine	Flor	0.2 Kg	n/i	Cousa	2010/11
Margarine	Doriana nueva	0.25 Kg	n/i	Unilever	2007/04
Margarine	Primor	0.25 Kg	n/i	Cousa	2007/04
Mayonnaise	Fanacoa	0.5 Kg	0.21	Unilever	2007/04
Mayonnaise	Hellmans	0.5 Kg	0.21	Unilever	2007/04
Mayonnaise	Uruguay	0.5 Kg	0.21	Unilever	2007/04

* Kg = kilograms; L = liters; M = meters. n/i - No information.

Product / Market	Brand	Specification*	% Share in CPI	Owner (/merger)	Sample Start (merge)
Noodles	Cololo	0.5 Kg	0.43	Distribuidora San José	2007/07
Noodles	Adria	0.5 Kg	0.43	La Nueva Cerro	2007/07
Noodles	Las Acacias	0.5 Kg	0.43	Alimentos Las Acacias	2007/07
Peach jam	Dulciora	0.5 Kg	n/i	Arcor	2007/04
Peach jam	El Hogar	0.5 Kg	n/i	Lifibel SA	2010/11
Peach jam	Los Nietitos	0.5 Kg	n/i	Los Nietitos	2007/04
Peas	Campero	0.3 Kg	0.09	Regional Sur	2010/11
Peas	Cololó	0.3 Kg	0.09	Distribuidora San José	2010/11
Peas	Nidemar	0.3 Kg	0.09	Nidera	2010/11
Rice	Aruba tipo Patna	1 Kg	0.38	Saman	2007/04
Rice	Blue Patna	1 Kg	0.38	Coopar	2007/04
Rice	Green Chef	1 Kg	0.38	Coopar	2007/04
Rice	Pony	1 Kg	0.38	Saman	2010/11
Rice	Vidarroz	1 Kg	0.38	Coopar	2008/05
Rice	Saman Blanco	1 Kg	0.38	Saman	2010/11
Crackers	Famosa	0.14 Kg	0.28	Mondelez	2007/04
Crackers	Maestro Cubano	0.12 Kg	0.28	Bimbo	2007/04
Salt	Sek	0.5 Kg	0.09	Deambrosi	2007/04
Salt	Torrevieja	0.5 Kg	0.09	Torrevieja	2007/04
Salt	Urusal	0.5 Kg	0.09	UruSal	2007/04
Semolina pasta	Adria	0.5 Kg	0.43	La Nueva Cerro	2007/07
Semolina pasta	Las Acacias	0.5 Kg	0.43	Alimentos Las Acacias	2007/07
Semolina pasta	Puritas	0.5 Kg	0.43	Molino Puritas	2010/11
Soybean oil	Condesa	0.9 L	0.11	Cousa	2008/05
Soybean oil	Río de la Plata	0.9 L	0.11	Soldo	2010/11
Soybean oil	Salad	0.9 L	0.11	Nidera	2010/11
Sugar	Azucarlito	1 Kg	0.35	Azucarlito	2007/04
Sugar	Bella Union	1 Kg	0.35	Bella Unión	2007/04
Sunflower oil	Optimo	0.9 L	0.37	Cousa	2007/04
Sunflower oil	Uruguay	0.9 L	0.37	Cousa	2007/04
Sunflower oil	Río de la Plata	0.9 L	0.37	Soldo	2010/11

* Kg = kilograms; L = liters; M = meters. n/i - No information.

Product / Market	Brand	Specification*	% Share in CPI	Owner (/merger)	Sample Start (merge)
Tea	Hornimans	Box (10 units)	0.08	José Aldao	2007/04
Tea	La Virginia	Box (10 units)	0.08	La Virginia	2007/04
Tea	President	Box (10 units)	0.08	Carrau	2010/11
Tomato paste	Conaprole	1 L	0.16	Conaprole	2007/04
Tomato paste	De Ley	1 L	0.16	Deambrosi	2007/04
Tomato paste	Gourmet	1 L	0.16	Deambrosi	2010/11
Yerba	Canarias	1 Kg	0.64	Canarias	2007/04
Yerba	Del Cebador	1 Kg	0.64	Molino Puritas	2007/06
Yerba	Baldo	1 Kg	0.64	Canarias	2010/11
Yogurt	Conaprole	0.5 Kg	0.13	Conaprole	2010/11
Yogurt	Parmalat (Skim)	0.5 Kg	0.13	Parmalat	2010/11
Yogurt	Calcar (Skim)	0.5 Kg	0.13	Calcar	2010/11
Bleach	Agua Jane	1 L	0.16	Electroquímica	2007/04
Bleach	Sello Rojo	1 L	0.16	Electroquímica	2007/04
Bleach	Solucion Cristal	1 L	0.16	Vessena SA	2007/04
Dishwashing detergent	Deterjane	1.25 L	0.13	Clorox Company	2007/04
Dishwashing detergent	Hurra Nevex Limon	1.25 L	0.13	Unilever	2007/04
Dishwashing detergent	Protergente	1.25 L	0.13	Electroquímica	2010/11
Laundry soap	Drive	0.8 Kg	0.45	Unilever	2007/04
Laundry soap	Nevex	0.8 Kg	0.45	Unilever	2007/04
Laundry soap	Skip, Paquete azul	0.8 Kg	0.45	Unilever	2007/04
Laundry soap, in bar	Bull Dog	0.3 Kg (1 unit)	n/i	Unilever	2007/04
Laundry soap, in bar	Nevex	0.2 Kg (1 unit)	n/i	Unilever	2007/04
Laundry soap, in bar	Primor	0.2 Kg (1 unit)	n/i	Soldo	2010/11
Shampoo	Fructis	0.35 L	0.36	Garnier	2007/04
Shampoo	Sedal	0.35 L	0.36	Unilever	2007/04
Shampoo	Suave	0.98 L	0.36	Unilever	2007/04
Soap	Astral	0.125 Kg	0.16	Colgate	2010/11
Soap	Palmolive	0.125 Kg	0.16	Colgate	2007/04
Soap	Rexona	0.125 Kg	0.16	Unilever	2012/12
Toilet paper	Higienol Export	4 units (25 M each)	0.24	Ipusa	2007/04

* Kg = kilograms; L = liters; M = meters. n/i - No information.

Product / Market	Brand	Specification*	% Share in CPI	Owner (/merger)	Sample Start (merge)
Toilet paper	Elite	4 units (25 M each)	0.24	Ipusa	2010/11
Toilet paper	Sin Fin	4 units (25 M each)	0.24	Ipusa	2007/04
Toothpaste	Pico Jenner	0.09 Kg	0.19	Abarly / Colgate	2010/11
2010/11Toothpaste	Colgate Herbal	0.09 Kg	0.19	Colgate	2010/11
Toothpaste	Kolynos	0.09 Kg	0.19	Colgate	2010/11

* Kg = kilograms; L = liters; M = meters. n/i - No information.