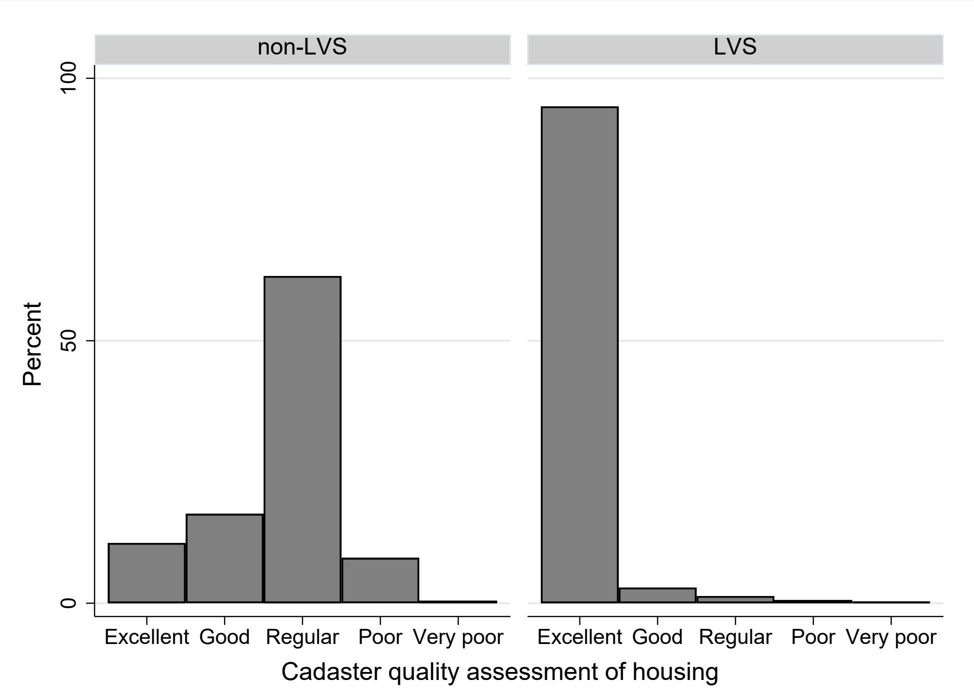
Online Appendix: Local Retail Prices, Product Variety and Neighborhood Change

by Fernando Borraz, Felipe Carozzi, Nicolás González-Pampillón and Leandro Zipitría

I. Additional Figures and Tables

I.A. Quality of LVS units

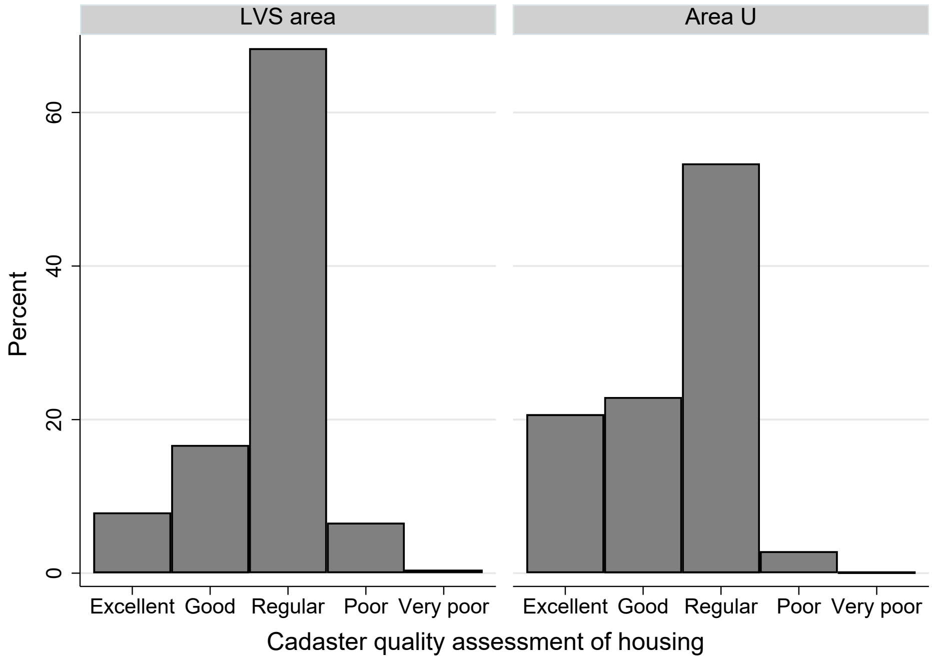
FIGURE I.1
QUALITY OF LVS UNITS



Notes: The quality scale goes from 'Very poor' to 'Excellent'. Own calculations based on data from the Cadaster Agency (Municipal Property Registry). Left-panel displays the quality histogram for all housing units in Montevideo. Right-panel displays quality histogram for units on LVS developments.

FIGURE I.2

QUALITY OF HOUSING WITHIN TWO KM OF BORDER $S - U$

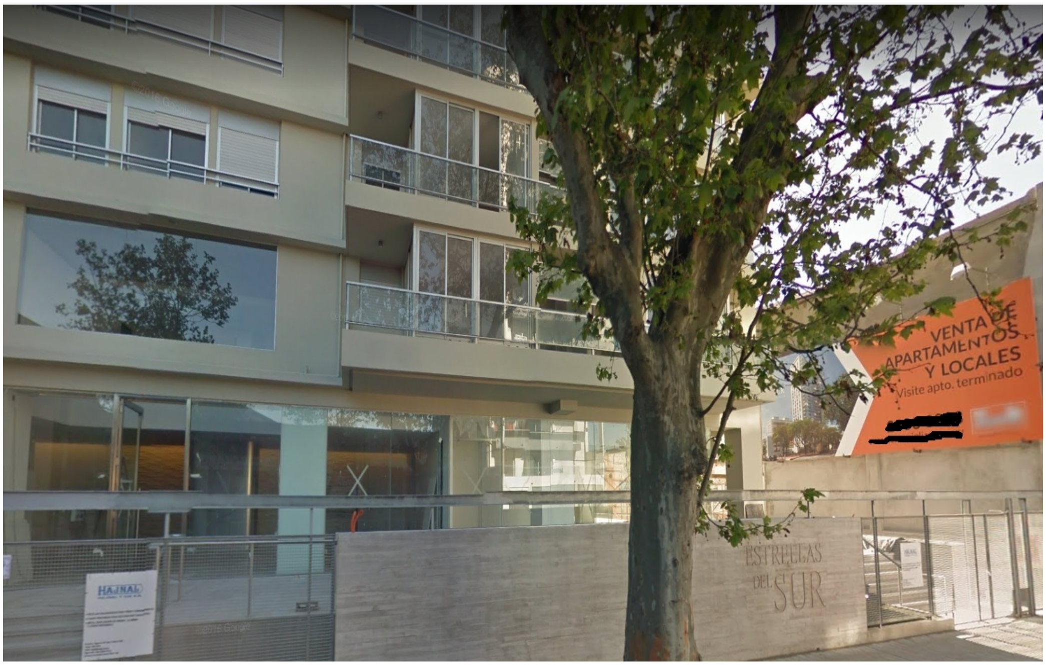


Notes: The quality scale goes from 'Very poor' to 'Excellent'. Own calculations based on data from the Cadaster Agency (Municipal Property Registry). Left-panel displays the quality histogram for all housing units in the policy area within 2km of the LVS border. Right-panel displays quality histogram for all units on the comparison region within 2km of the LVS border.

Figure I.3
Example of a LVS project

(a) Before

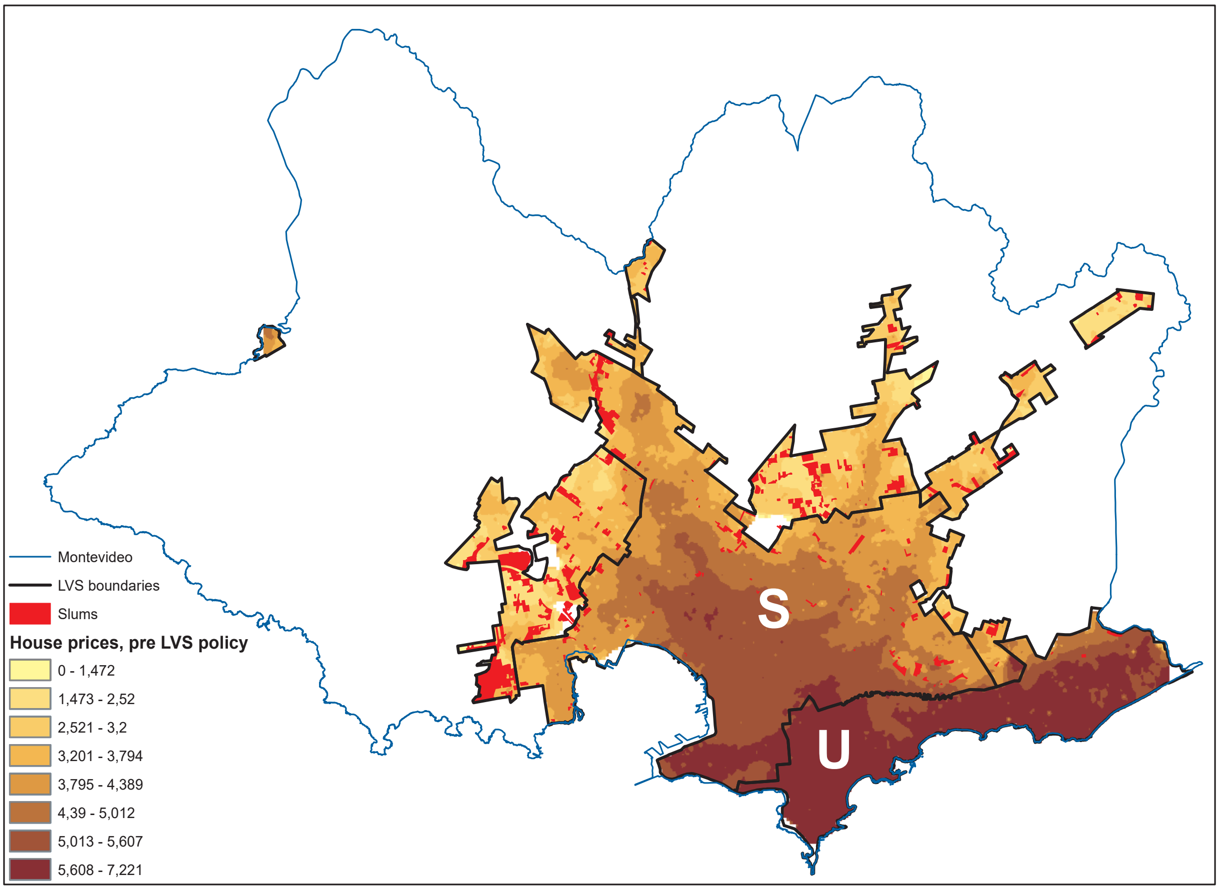
(b) After



Source: Panel B image obtained from Google Street View.

FIGURE I.4

MAP OF HOUSE PRICES (IN M^2, PRE LVS POLICY)



Notes: Map shows an inverse distance interpolation of the log of house prices (in m2) for the period 2004-2010, using grids of 100 $\times$ 100 metres and fixed search radius of 500 metres. Higher prices are represented with darker tones.

Table I.1
List of Products

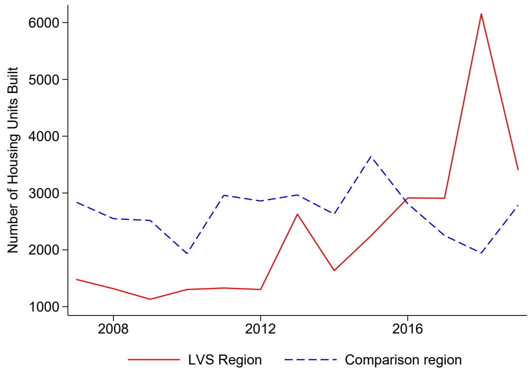
Product / Market	Brand	Specification*	UPC	% Share in CPI	Owner (/merger)	Sample Start (merge)
Beer	Patricia	0.96 L	7730452000435	0,36	FNC	2007/04
Beer	Pilsen	0.96 L	77302502	0,36	FNC	2007/04
Beer	Zillertal	1 L	7730452001319	0,36	FNC	2010/11
Wine	Faisán	1 L	7730540000187	0,80	Grupo Traversa	2007/04
Wine	Santa Teresa Clasico	1 L	7730135000035	0,80	Santa Teresa SA	2007/04
Wine	Tango	1 L	7730135000318	0,80	Almena	2007/04
Cola	Coca Cola	1.5 L	7730197232962	1,21	Coca Cola	2007/04
Cola	Nix	1.5 L	7730289000530	1,21	Milotur (CCU)	2007/04
Cola	Pepsi	1.5 L	7734284114087	1,21	Pepsi	2010/11
Cola	Coca Cola	2.25 L	7730197112967	1,21	Coca Cola	2010/11
Quince jelly	Los Nietitos	0.4 Kg	7730124020501	n/i	Los Nietitos	2009/01
Sparkling water	Matutina	2 L	7730922250070	0.81	Salus	2007/04
Sparkling water	Nativa	2 L	7730130000153	0.81	Milotur (CCU)	2007/04
Sparkling water	Salus	2.25 L	7730400000388	0.81	Salus	2007/04
Bread Loaf	Los Sorchantes	0.33 Kg	7730117000015	0,10	Bimbo / Los Sorchantes	2010/11
Bread Loaf	Bimbo	0.33 Kg	7730117001210	0,10	Bimbo	2010/11
Bread Loaf	Pan Catalán	0.33 Kg	7730230000336	0,10	Bimbo	2010/11
Brown eggs	Super Huevo	1/2 dozen	7730653000012	0,37	Super Huevo	2010/11
Brown eggs	El Jefe	1/2 dozen	7730637000045	0,37	El Jefe	2010/12
Brown eggs	Prodhin	1/2 dozen	7730239001211	0,37	Prodhin	2007/07
Butter	Calcar	0.2 Kg	7730901250176	0,22	Calcar	2007/04
Butter	Conaprole sin sal	0.2 Kg	77306197	0,22	Conaprole	2007/04
Butter	Kasdorf	0.2 Kg	7730105006357	0,22	Conaprole	2010/11
Cacao	Copacabana	0.5 Kg	7730109032154	0,07	Nestlé	2007/04
Cacao	Vascolet	0.5 Kg	7730109001686	0,07	Nestlé	2007/06
Coffee	Aguila	0.25 Kg	7730109012521	0,09	Nestlé	2007/04
Coffee	Chana	0.25 Kg	7730109012323	0,09	Nestlé	2007/04
Coffee	Saint	0.25 Kg	7730908360106	0,09	Saint Hnos	2010/11
Corn Oil	Delicia	0.9 L	7730132001196	n/i	Cousa	2010/11
Corn Oil	Río de la Plata	0.9 L	7730205040053	n/i	Soldo	2010/11
Corn Oil	Salad	0.9 L	7891080805738	n/i	Nidera	2010/11
Dulce de leche	Conaprole	1 Kg	7730105005091	0,13	Conaprole	2007/04
Dulce de leche	Los Nietitos	1 Kg	7730124384009	0,13	Los Nietitos	2007/04
Dulce de leche	Manjar	1 Kg	7730105005435	0,13	Manjar	2007/04
Flour (corn)	Gourmet	0.4 Kg	7730306000987	n/i	Deambrosi	2010/11
Flour (corn)	Presto Pronta Arcor	0.5 Kg	7790580660000	n/i	Arcor	2010/11
Flour (corn)	Puritas	0.45 Kg	7730354002322	n/i	Molino Puritas	2010/11
Flour 000 (wheat)	Cañuelas	1 Kg	7730376000085	0,16	Molino Cañuelas	2010/11
Flour 000 (wheat)	Cololó	1 Kg	7730213000506	0,16	Distribuidora San José	2010/11
Flour 0000 (wheat)	Cañuelas	1 Kg	7730376000061	0,16	Molino Cañuelas	2007/04
Flour 0000 (wheat)	Cololó	1 Kg	7730213000117	0,16	Distribuidora San José	2007/04
Flour 0000 (wheat)	Primor	1 Kg	7730133000105	0,16	Molino San José	2010/11
Grated cheese	Conaprole	0.08 Kg	7730105008832	0,14	Conaprole	2007/04
Grated cheese	Artesano	0.08 Kg	7730379000051	0,14	Artesano	2010/11
Grated cheese	Milky	0.08 Kg	7730153000185	0,14	Milky	2007/04
Deodorant	Axe Musk	0.105 Kg	7791293022130	0,27	Unilever	2010/11
Deodorant	Dove Original	0.113 Kg	7791293008141	0,27	Unilever	2010/11
Deodorant	Rexona Active Emotion	0.100 Kg	7791293004310	0,27	Unilever	2010/11
Hamburger	Burgy	0.2 Kg	7730138000575	n/i	Schneck	2010/11
Hamburger	Paty	0.2 Kg	7730901381146	n/i	Sadia Uruguay	2010/11
Hamburger	Schneck	0.2 Kg	7730138000599	n/i	Schneck	2010/11
Ice Cream	Conaprole	1 Kg	7730105912	0,24	Conaprole	2010/11
Ice Cream	Crufi	1 Kg	7730916580	0,24	Crufi	2010/11
Ice Cream	Gebetto	1 Kg	7730105980	0,24	Conaprole	2010/11
Margarine	Flor	0.2 Kg	7730132000571	n/i	Cousa	2010/11
Margarine	Doriana nueva	0.25 Kg	7805000300746	n/i	Unilever	2007/04
Margarine	Primor	0.25 Kg	7730132000533	n/i	Cousa	2007/04
Mayonnaise	Fanacoa	0.5 Kg	7790450086107	0,19	Unilever	2007/04
Mayonnaise	Hellmans	0.5 Kg	7794000401389	0,19	Unilever	2007/04
Mayonnaise	Uruguay	0.5 Kg	7730132000779	0,19	Unilever	2007/04
Noodles	Cololo	0.5 Kg	773021300	0,31	Distribuidora San José	2007/07
Noodles	Adria	0.5 Kg	773010330	0,31	La Nueva Cerro	2007/07
Noodles	Las Acacias	0.5 Kg	7730430000	0,31	Alimentos Las Acacias	2007/07

Table I.2
List of products (continued)

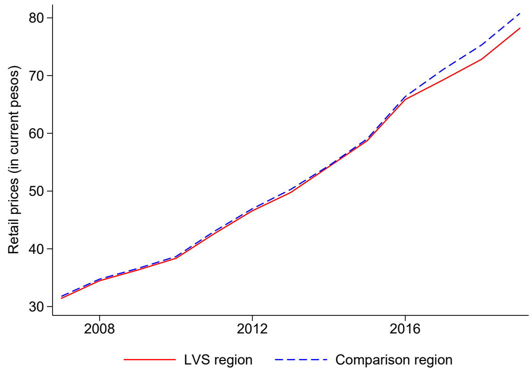
Product / Market	Brand	Specification*	UPC	% Share in CPI	Owner (/merger)	Sample Start (merge)
Peach jam	Dulciora	0.5 Kg	7790580508104	n/i	Arcor	2007/04
Peach jam	El Hogar	0.5 Kg	7730180086831	n/i	Lifibel SA	2010/11
Peach jam	Los Nietitos	0.5 Kg	7730124010304	n/i	Los Nietitos	2007/04
Peas	Campero	0.3 Kg	7730905130047	0,08	Regional Sur	2010/11
Peas	Cololó	0.3 Kg	7730213000018	0,08	Distribuidora San José	2010/11
Peas	Nidemar	0.3 Kg	7730332000975	0,08	Nidera	2010/11
Rice	Aruba tipo Patna	1 Kg	7730115170109	0,27	Saman	2007/04
Rice	Blue Patna	1 Kg	7730114000117	0,27	Coopar	2007/04
Rice	Green Chef	1 Kg	7730114400016	0,27	Coopar	2007/04
Rice	Pony	1 Kg	7730115020107	0,27	Saman	2010/11
Rice	Vidarroz	1 Kg	7730114000728	0,27	Coopar	2008/05
Rice	Saman Blanco	1 Kg	7730115040105	0,27	Saman	2010/11
Crackers	Famosa	0.14 Kg	7622300226480	0,25	Mondelez	2007/04
Crackers	Maestro Cubano	0.12 Kg	7730154000986	0,25	Bimbo	2007/04
Salt	Sek	0.5 Kg	77300607	0,08	Deambrosi	2007/04
Salt	Torrevieja	0.5 Kg	7730901390063	0,08	Torrevieja	2007/04
Salt	Urusal	0.5 Kg	7730214000062	0,08	UruSal	2007/04
Semolina pasta	Adria	0.5 Kg	77301030	0,31	La Nueva Cerro	2007/07
Semolina pasta	Las Acacias	0.5 Kg	7730430001	0,31	Alimentos Las Acacias	2007/07
Semolina pasta	Puritas	0.5 Kg	7730354001158	0,31	Molino Puritas	2010/11
Soybean oil	Condesa	0.9 L	7730132000434	0,09	Cousa	2008/05
Soybean oil	Río de la Plata	0.9 L	7730205067593	0,09	Soldo	2010/11
Soybean oil	Salad	0.9 L	7891080801693	0,09	Nidera	2010/11
Sugar	Azucarlito	1 Kg	7730251000018	0,24	Azucarlito	2007/04
Sugar	Bella Union	1 Kg	7730106005113	0,24	Bella Unión	2007/04
Sunflower oil	Optimo	0.9 L	7730132001165	0,29	Cousa	2007/04
Sunflower oil	Uruguay	0.9 L	7730132000441	0,29	Cousa	2007/04
Sunflower oil	Río de la Plata	0.9 L	7730205067661	0,29	Soldo	2010/11
Tea	Hornimans	Box (10 units)	7730261000046	0,08	José Aldao	2007/04
Tea	La Virginia	Box (10 units)	7790150572290	0,08	La Virginia	2007/04
Tea	President	Box (10 units)	7730220030527	0,08	Carrau	2010/11
Tomato paste	Conaprole	1 L	7730105015403	0,16	Conaprole	2007/04
Tomato paste	De Ley	1 L	7730306000604	0,16	Deambrosi	2007/04
Tomato paste	Gourmet	1 L	7730306000017	0,16	Deambrosi	2010/11
Yerba	Canarias	1 Kg	7730241003654	0,46	Canarias	2007/04
Yerba	Del Cebador	1 Kg	7730354000519	0,46	Molino Puritas	2007/06
Yerba	Baldo	1 Kg	7730241003920	0,46	Canarias	2010/11
Yogurt	Conaprole	0.5 Kg	7730105032820	0,13	Conaprole	2010/11
Yogurt	Parmalat (Skim)	0.5 Kg	7730112088520	0,13	Parmalat	2010/11
Yogurt	Calcar (Skim)	0.5 Kg	7730901250565	0,13	Calcar	2010/11
Bleach	Agua Jane	1 L	7731024003038	0,13	Electroquímica	2007/04
Bleach	Sello Rojo	1 L	7730494001001	0,13	Electroquímica	2007/04
Bleach	Solucion Cristal	1 L	7730377066028	0,13	Vessena SA	2007/04
Dishwashing detergent	Deterjane	1.25 L	7731024008118	0,11	Clorox Company	2007/04
Dishwashing detergent	Hurra Nevex Limon	1.25 L	7730165317424	0,11	Unilever	2007/04
Dishwashing detergent	Protergente	1.25 L	7730329024014	0,11	Electroquímica	2010/11
Laundry soap	Drive	0.8 Kg	779129078	0,35	Unilever	2007/04
Laundry soap	Nevex	0.8 Kg	779129020	0,35	Unilever	2007/04
Laundry soap	Skip, Paquete azul	0.8 Kg	77912902034	0,35	Unilever	2007/04
Laundry soap, in bar	Bull Dog	0.3 Kg (1 unit)	7791290677951	n/i	Unilever	2007/04
Laundry soap, in bar	Nevex	0.2 Kg (1 unit)	7791290677944	n/i	Unilever	2007/04
Laundry soap, in bar	Primor	0.2 Kg (1 unit)	7730205066	n/i	Soldo	2010/11
Shampoo	Fructis	0.35 L	78049600	0,31	Garnier	2007/04
Shampoo	Sedal	0.35 L	779129301	0,31	Unilever	2007/04
Shampoo	Suave	0.93 L	77912930083XX	0,31	Unilever	2007/04
Soap	Astral	0.125 Kg	7891024176771	0,14	Colgate	2010/11
Soap	Palmolive	0.125 Kg	7891024177XXX	0,14	Colgate	2007/04
Soap	Rexona	0.125 Kg	779129352XXXX	0,14	Unilever	2012/12
Toilet paper	Higienol Export	4 units (25 M each)	7730219001101	0,23	Ipusa	2007/04
Toilet paper	Elite	4 units (25 M each)	7790250021438	0,23	Ipusa	2010/11
Toilet paper	Sin Fin	4 units (25 M each)	7730219000494	0,23	Ipusa	2007/04
Toothpaste	Pico Jenner	0.09 Kg	7730366000170	0,17	Abarly / Colgate	2010/11
Toothpaste	Colgate Herbal	0.09 Kg	7891024133668	0,17	Colgate	2010/11
Toothpaste	Kolynos	0.09 Kg	7793100120121	0,17	Colgate	2010/11

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

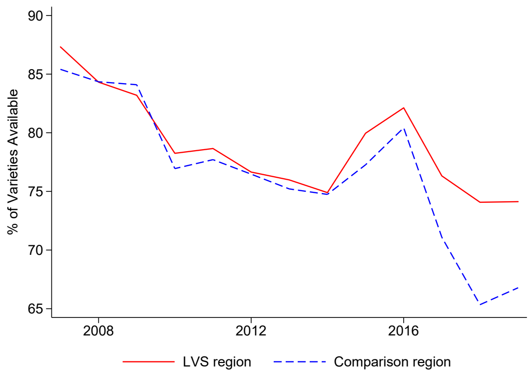
FIGURE I.5
DESCRIPTIVES FOR OUTCOMES OF INTEREST



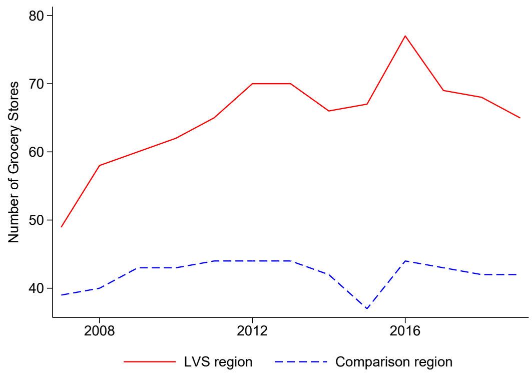
(A) NEWLY BUILT UNITS BY YEAR



(B) AVERAGE GOOD PRICES



(C) AVERAGE SHARE OF VARIETIES AVAILABLE



(D) NUMBER OF GROCERY STORES

Note: Descriptive patterns for all outcomes of interest, calculated separated by LVS and comparison regions within 2km of the LVS boundary. In **Panel A**, the vertical axis is the yearly count of newly built units in each area. In **Panel B**, the vertical axis is the average of current prices taken over goods and stores in our grocery price dataset. In **Panel C**, the vertical axis is the average store-level share of varieties available. In **Panel D**, the vertical axis is the number of stores present in a region. In all panels, the horizontal axis is the year in which the vertical axis variable is measures. Solid lines correspond to the path of the quantity of interest in the LVS or policy region. Dashed lines correspond to the path of the quantity of interest in the unsubsidized or comparison region.

Table I.3
Neighborhood Change & Access to Stores

	(1) Log(Stores within 1km)	(2) Log(Dist. Weighted Access)
Policy × Post	0.109	0.023
	(0.056)	(0.015)
Obs.	852	854

Notes: Estimates obtained from a census tract panel covering years 2010 and 2019. In column 1, the outcome is the logarithm of the number of stores within 1km of a census tract. In column 2, the outcome is the logarithm of the inverse-distance weighted average of access to grocery stores. Standard errors are clustered at the level of $0.01^o \times 0.01^o$ grid cells.

Table I.4
Price Effects in Continuing Stores

	(1)	(2)	(3)
Policy × Post	-0.019	-0.016	-0.021
	(0.008)	(0.007)	(0.008)
CPI Weights	No	Store	Global
Obs.	107374	107374	107374

Notes: Estimation based on product-store-time level observations. Sample restricted to continuing stores present in both 2010 and 2019. In all specifications the dependent variable is the logarithm of the product price. Estimate in column 1 is obtained without using product weights. Estimate in column 2 is obtained using store-level product weights. Estimate in column 3 is obtained using global product weights. Standard errors are clustered at the store level.

Table I.5
Variety Effects in Continuing Stores

	(1)	(2)
Policy × Post	0.072	0.078
	(0.035)	(0.035)
Sample of Goods	Consistent Sample	Full Sample
Obs.	170	170

Notes: Estimation based on store-year observations. Sample restricted to continuing stores present in both 2010 and 2019. The dependent variable is the share of available varieties offered in the store, measured in percentahe points Standard errors are clustered at the store level.

Table I.6

Price Differences between Stores in 2019

	(1)	(2)	(3)	(4)	(5)	(6)
New Entrant	0.054	0.046	0.043	0.050	0.035	0.036
	(0.009)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
Policy	-0.038	-0.030	-0.030	-0.039	-0.033	-0.032
	(0.007)	(0.006)	(0.006)	(0.009)	(0.007)	(0.007)
Policy $\times$ New Entrant				0.006	0.017	0.010
				(0.014)	(0.010)	(0.011)
CPI Weights	No	Store	Global	No	Store	Global
Obs.	101343	101343	101343	101343	101343	101343

Notes: Estimation based on product-store-month level observations using data for 2019. In all specifications, the outcome is the logarithm of the product price. Estimates in columns 1 and 4 are obtained without using product weights. Estimates in columns 2 and 5 are obtained using store-level product weights based on CPI weights. Estimates in columns 3 and 6 are obtained using global product weights based on CPI weights. Standard errors clustered at the store level.

Table I.7

Variety Differences between Stores in 2019

	(1)	(2)
New Entrant	-0.034	0.010
	(0.025)	(0.041)
Policy	0.063	0.076
	(0.033)	(0.040)
Policy $\times$ New Entrant		-0.067
		(0.051)
Obs.	107	107

Notes: Estimation based on store level observations using data for 2019. The dependent variable is the share of available varieties offered in the store, measured in percentage points. Set of available varieties corresponds to the full sample of goods. Column 2 includes the interaction term as indicated. Standard errors clustered at the store level.

Table I.8

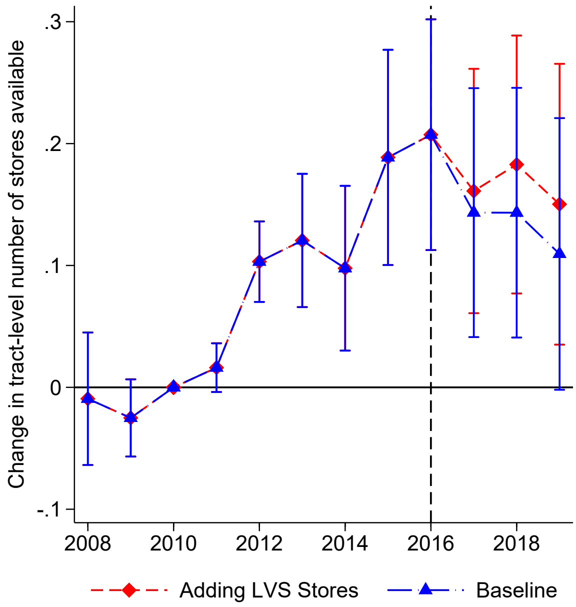
Variety Effects – Controlling for Addition of Commercial Space

	(1)	(2)
Policy $\times$ Post	0.095	0.104
	(0.035)	(0.035)
Commercial LVS $\times$ Post	-0.061	-0.067
	(0.037)	(0.037)
Sample of Goods	Consistent Sample	Full Sample
Obs.	212	212

Notes: Estimates obtained from store-level specifications. The outcome variable in both specifications is the share of available varieties at the store level, measured in percentage points. Standard errors are clustered at the store level.

Figure I.6

Access to Stores incorporating LVS Project Stores



Notes: Event-study graphs for changes in access to stores with and without considering the 4 grocery stores identified in LVS projects, open before 2019 and not included in the DGC sample. Access to stores measured as the (logarithm) number of stores within 1km of census tract as the dependent variable. Round markers indicate estimated coefficients from a census tract level regression of grocery shop access on interaction terms between $Policy_c$ and year dummies featuring census tracts and time effects (see equation 4). Vertical segments correspond to 95% confidence bands. The dashed line corresponds to 2016, the year after which a large share of LVS units were sold in the housing market.

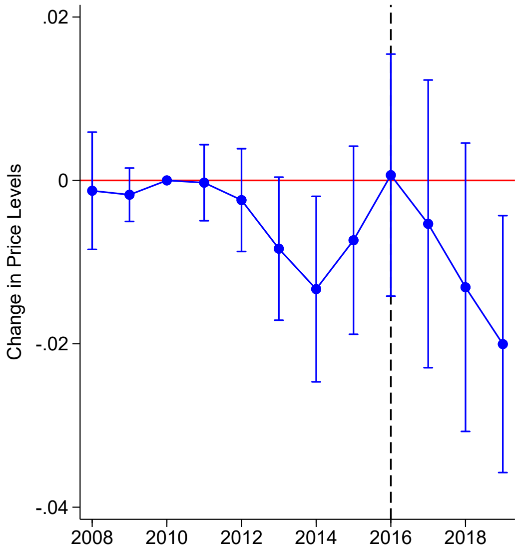
Table I.9

Robustness Checks – Product Varieties

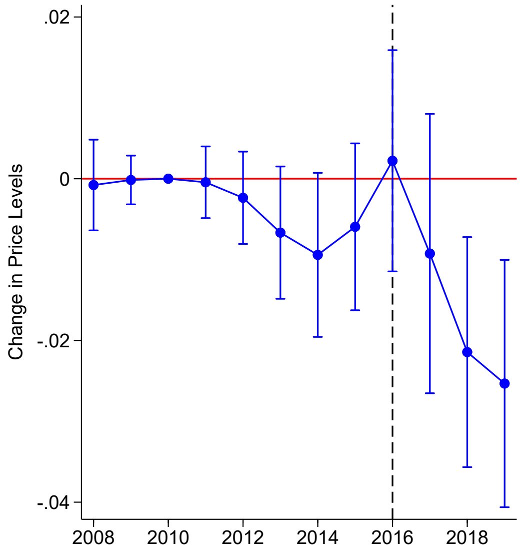
	Baseline Year: 2008	Baseline Year: 2012
A. Alternative Baseline Year		
Policy × Post	6.525	6.992
	(3.183)	(3.463)
Obs.	205	221
	1.5km Band	2.5km Band
B. Bandwidth Around Boundary		
Policy × Post	7.654	6.888
	(3.367)	(3.059)
Obs.	176	228

Notes: Estimates obtained from store-level specifications. The outcome variable in both specifications is the share of available varieties at the store level, measured in percentage points. Panel A represents estimates obtained using 2008 as the baseline year (column 1) and 2012 as the baseline year (column 2). Panel B presents results using different bands around the LVS border to define the sample. Standard errors are clustered at the store level.

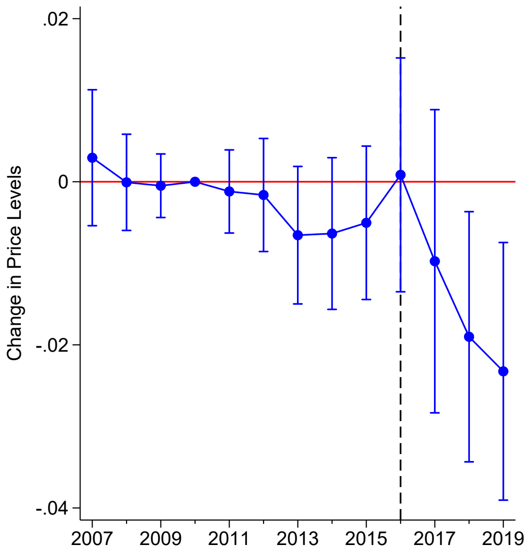
Figure I.7
Event-Study Graph: Prices



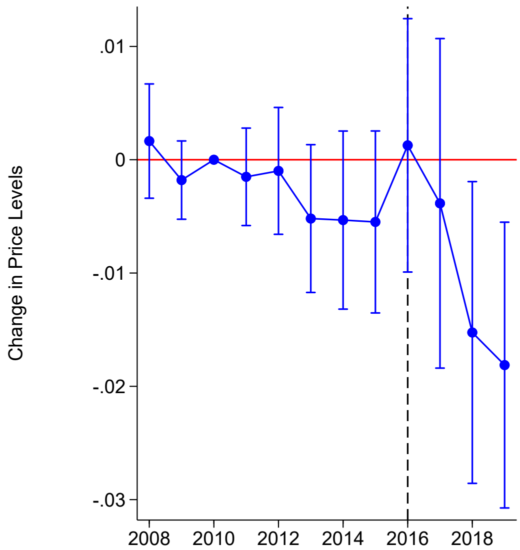
(A) Using store-level product weights



(B) Using global product weights



(C) Including 2007



(D) Product-brand fixed effects

Note: All panels represent event-study coefficient sequences obtained using specification 2. In all cases, the dependent variable is the logarithm of product prices. **Panel A** represents estimates obtained using store-level product weights. **Panel B** represents estimates obtained using store-level product weights. **Panel C** represents estimates obtained after extending the sample from 2007 (incomplete year). **Panel D** represents estimates obtained in a specification featuring product-brand specific time effects instead of product group-time effects. Round markers indicate estimates for the sequence of coefficients in equation 2. Vertical bars correspond to 95% confidence intervals. Effects are relative to 2010, the omitted year. Vertical segments correspond to 95% confidence bands. While the LVS program began in 2011, dashed vertical lines correspond to 2016, the year after which a large share of LVS units were sold in the housing market.

Table I.10
Robustness Checks – Store Access

	Baseline Year: 2008		Baseline Year: 2012	
	<1km	1/d	<1km	1/d
A. Alternative Baseline Year				
Policy × Post	0.119	0.029	0.006	-0.011
	(0.065)	(0.017)	(0.054)	(0.015)
Obs.	852	854	852	854
	1.5km Band		2.5km Band	
	<1km	1/d	<1km	1/d
B. Bandwidth Around Boundary				
Policy × Post	0.116	0.027	0.105	0.023
	(0.053)	(0.014)	(0.056)	(0.016)
Obs.	690	692	934	938

Notes: Estimates obtained from a census-tract level panel. The outcome is either the logarithm of the number of stores within 1km of a census tract or the logarithm of the inverse-distance weighted average of access to grocery stores, as indicated in each column. Panel A represents estimates obtained using 2008 (columns 1 and 2) or 2012 (columns 3 and 4) as the baseline year. Panel B presents results using different bands around the LVS border to define the sample. Standard errors are clustered at the level of $0.01^o \times 0.01^o$ grid cells.

Table I.11
Price Effects – Heterogeneity by Product Segment

	High-price brand		Low-price brand	
Policy × Post	-0.023	-0.021	-0.023	-0.021
	(0.007)	(0.006)	(0.008)	(0.008)
CPI Weights	N	Y	N	Y
Obs.	74699	74699	106447	106447

Notes: Estimates from product-store-month regressions using years 2010 and 2019. The outcome variable in all specifications is the logarithm of the price of a good. Sub-samples of high-price (top priced) and low-price (other) goods for each product category as described in the main text. CPI weights in columns 2 and 4 correspond to product-store weights. Standard errors are clustered at the store level.

Table I.12
Price Effects – Including Pharmacies

	(1)	(2)	(3)
Policy × Post	-0.029	-0.028	-0.036
	(0.008)	(0.008)	(0.008)
CPI Weights	No	Store	Global
Obs.	147312	147312	147312

Notes: Estimates from product-store-month regressions using years 2010 and 2019. Sample expansed to include prices of products sold by pharmacy chains featured in the DGC dataset. The dependent variable is the logarithm of product price and we use the consistent sample of goods in all specifications. Standard errors are clustered at the store level.

TABLE I.13

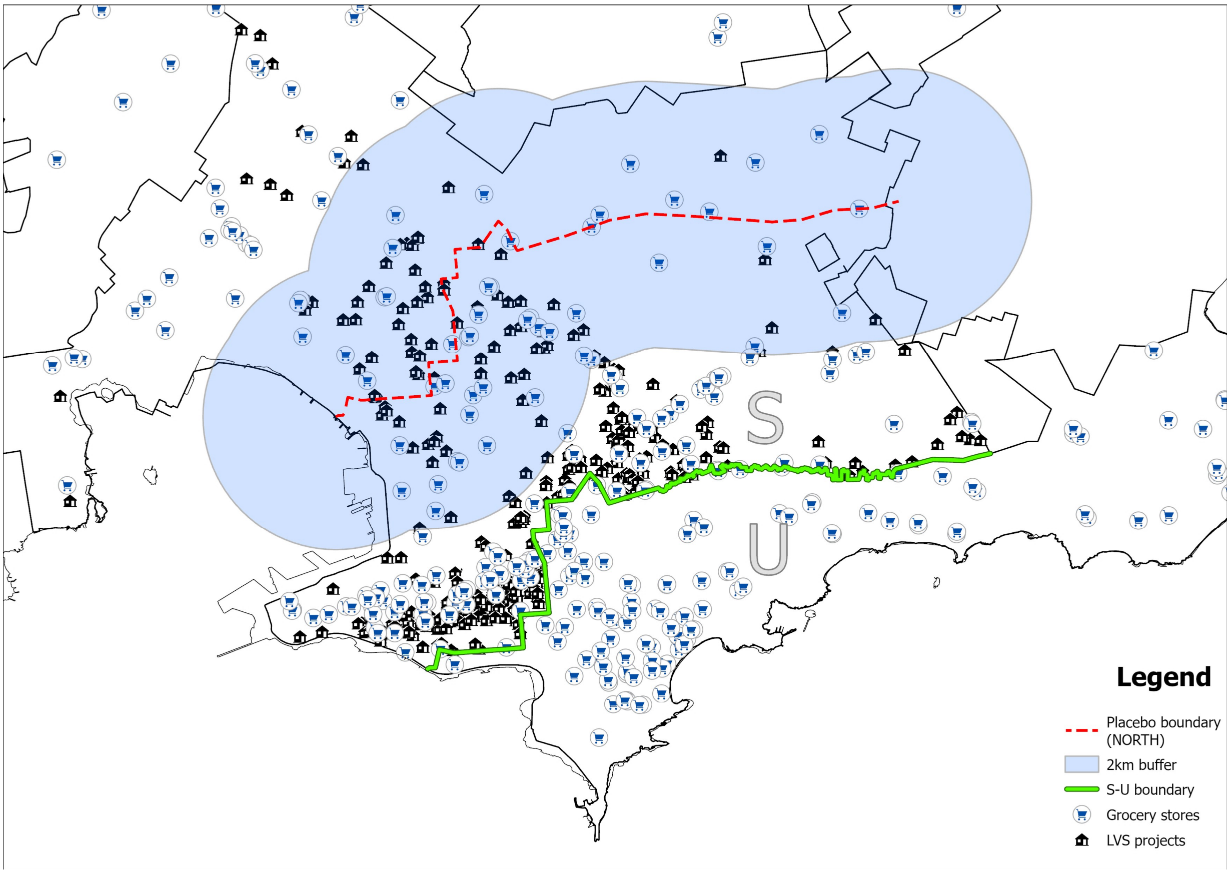
VARIETY EFFECTS – INCLUDING PHARMACIES

	(1)	(2)
Policy × Post	0.117	0.116
	(0.037)	(0.037)
Sample of Goods	Consistent Sample	Full Sample
Obs.	277	277

Notes: Estimates based on store-year regressions using years 2010 and 2019. Sample expanded to include pharmacies featured in the original DGC dataset. The outcome variable in both columns is the share of available varieties at the store level, measured in percentage points. In column 1 the outcome is built using the consistent sample of good. In column 2 the outcome is built all identifiable goods in the DGC database. Standard errors are clustered at the store level.

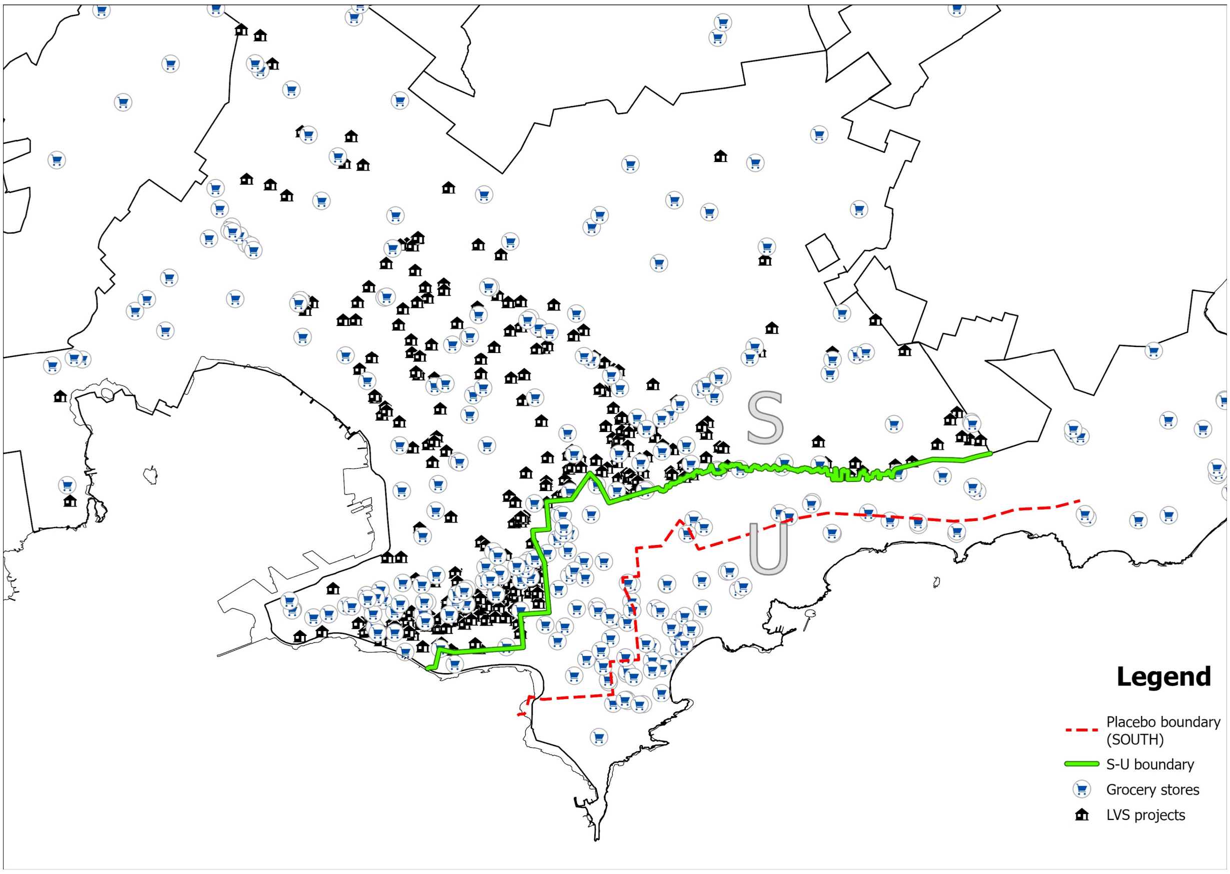
FIGURE I.8

PLACEBO EXERCISE NORTH



Notes: The placebo boundary resulted from shifting the LVS border ($S-U$ border if Figure 1) to cross the centroid of the LVS region.

Figure I.9
Placebo exercise SOUTH



Notes: Illustration of the placebo boundary resulting from shifting the LVS border ($S-U$ border) to the mid-point of the unsubsidized area.

Table I.14
Placebo - Varieties

	(1) Varieties Share (%)	(2) Varieties Share (%)
Post × Placebo	-4.563	3.386
	(4.498)	(4.535)
Placebo	South	North
Obs.	1093	769

Notes: Estimates based on store-year regressions using years 2010 and 2019. The outcome variable in both columns is the share of available varieties at the store level, measured in percentage points. Column 1 corresponds to estimates obtained when using the sample resulting from shifting the LVS border into the LVS region. Column 2 corresponds to estimates obtained using the sample resulting from shifting the LVS border into the unsubsidized area. Standard errors are clustered at the store level.

II. Instrumental Variable Estimates

In this appendix, we present the results obtained when using an instrumental variable approach to estimate the effect of measures of new development on our outcomes of interest. This strategy consists of using the policy as an instrument for new development – i.e., the first-stage – to estimate the elasticity of new development with respect to our three outcomes of interest (retail prices, store varieties, and store access) – i.e., the second-stage. Table II.1 shows the first stage estimates – the effect of the policy on new development – for different levels of aggregation of our dataset on stores and our census tract panel. Estimates using data for 2010 (the year before the introduction of the LVS) and 2019 (the final year in our sample, when a substantial amount of LVS units have been incorporated into the housing market). Panel A shows first-stage estimates when using monthly-product data at the store level. Panel B shows the first-stage results for yearly store-level data. Panel C presents results for yearly tract-level data. We further describe results from each panel as well as the second-stage estimates for each of our three outcomes in the following subsections.

TABLE II.1
EFFECT OF THE LVS POLICY ON NEW RESIDENTIAL DEVELOPMENT

	(1) Log(New Units)	(2) Log(New Area)
A. Product × month × store level		
Post × Treat	0.532	0.638
	(0.131)	(0.139)
F-stat	16	22
Obs.	131493	131493
B. Store × Year level		
Post × Treat	0.573	0.695
	(0.132)	(0.145)
F-stat	18	22
Obs.	212	212
C. Census Tract × Year level		
Policy × Post	0.728	0.846
	(0.130)	(0.119)
F-stat	32	50
Obs.	738	738

Notes: Panel A presents estimates from product-store-month regressions. Panel B presents estimates from store-year regressions. Panel C presents estimates from a census-tract year panel. In all cases, estimates are obtained using data for 2010 and 2019. In column 1, the outcome is the logarithm of the number of new units built within 1km of a store (panels A and B) or a census tract (panel C). In column 2, the outcome is the logarithm of the floor area of new units built within 1km of a store (panels A and B) or a census tract (panel C). F-statistics for a significance test of the interaction term reported in the foot of each panel. In Panels A and B, standard errors are clustered at the store level. In panel C standard errors are clustered at the level of $0.01^o \times 0.01^o$ grid cells.

II.A. The Elasticity of Retail Prices to New Development

We first focus on estimating the elasticity of prices to new development. To do so, we use the spatial and time variation in eligibility for the LVS tax exemption as an instrument for housing construction activity. New construction activity New Area$_{st}$ is measured as the sum of the floor area (in m^2) of new units within 1km of supermarket s.[1] The variable is constructed using the accumulated stock of new units within six years of t (i.e., between $t-6$ and t).[2] As discussed in the text, we use the accumulated change over this period in an effort to measure changes to the density and vintage of the local housing *stock* rather than simply the *flow* change in construction in one given year. This variable measures the exposure of each supermarket s to new residential construction and, therefore, to changes in local demand for its goods. We estimate the effect of New Area on local retail prices by estimating the parameter of interest η_P via two-stage least squares (2SLS) where the two stages are given by:

$$Log(\text{New Area}_{ist}) = \pi Policy_s \times post_t + \eta Policy_s + \omega_{it} + u_{ist} \quad \text{(II.1)}$$

$$Log(P_{ist}) = \eta_P Log(\text{New Area}_{st}) + \delta_{it} + \alpha Policy_s + \epsilon_{ist} \quad \text{(II.2)}$$

where equation II.1 is the first-stage and II.2 is the second-stage. Most variables in these equations are defined as in the main text except for ω_{it}, representing the product-time effects in the first stage. As with our reduced-form estimates, estimation is carried out using only the sample of stores within two kilometers of the LVS boundary and data for 2010 and 2019. Our first-stage estimates reported in panel A of Table II.1 indicate supermarkets in the policy region experienced an around 60% increase in the area of new stock within 1km of their location relative to stores located in the comparison region. The instrument is reasonably strong, with an F-statistic of 16 and 22 when measuring new development using units and floor area, respectively. Instrumental variable estimates of the elasticity of grocery prices to new residential development are reported in columns 1 to 3 of Table II.2. Estimates in columns 2 and 3 were obtained using store-level and global CPI based weights. The estimated elasticity of retail prices with respect to new housing area ranges from -3% to -3.9%.

II.B. Elasticity of Product Variety to New Development

Here we focus on estimating the elasticity of new development on the varieties available to consumers locally. We use the same empirical strategy to estimate the elasticity with respect to prices, i.e., we rely on exogenous variation induced by the shift in construction activity within the city induced by the LVS. As explained in the main text, we measure varieties at the supermarket level - Variety share$_{st}$ -, by calculating the percentage of reported products included in our price database offered at supermarket s and month t. We estimate the effect

[1] We can also measure new development using the *number* of new units built around each store. We use this alternative as a robustness check, and the estimated elasticities remain largely unchanged. Results are available upon request.

[2] We chose six years because the first new units built under the aegis of the LVS were sold in 2013, six years before 2019.

TABLE II.2
IV ESTIMATES: PRICE ELASTICITY OF NEW DEVELOPMENT

	(1)	(2)	(3)
Log(New Area)	-0.036	-0.030	-0.039
	(0.016)	(0.015)	(0.016)
CPI Weights	No	Store	Global
1st Stage F-stat	21	21	21
Obs.	131493	131493	131493

Notes: Instrumental variable estimates from product-store-month specifications. In all columns the outcome variable is the logarithm of the product price. Estimate in column 1 obtained without using product weights. Estimate in column 2 obtained using store-level product weights. Estimate in column 3 obtained using global product weights based. Standard errors are clustered at the store level. First-stage F-statistic indicated in the table foot.

of New Area$_{st}$ on available varieties by estimating the parameter of interest η_V via two-stage least squares (2SLS) where the two stages are given by:

$$Log(\text{New Area}_{st}) = \pi Policy_s \times post_t + \eta Policy_s + u_{st} \tag{II.3}$$

$$\text{Variety share}_{st} = \eta_V Log(\text{New Area}_{st}) + \delta_t + \alpha Policy_s + \epsilon_{st} \tag{II.4}$$

where equation II.3 is the first-stage and II.4 is the second-stage. The estimation is carried out using only the sample of stores within 2 kilometers of the LVS boundary and data for 2010 and 2019. Our first-stage estimates reported in panel B of Table II.1 indicate supermarkets in the policy region experienced a sharp increase in the area of new stock within 1km of their location relative to stores located in the comparison region. These estimates correspond to those illustrated in Figure 3 of the main text. The instrument is reasonably strong, with an F-statistic of 18 and 22 when measuring new development using units and floor area, respectively. Table II.3 reports IV estimates of the elasticity of the share of varieties available to new residential development. Estimates in columns 1 and 2 were obtained using the consistent sample of goods and the full sample of goods, respectively.[3] Results indicate that a one percent increase in newly built residential area within 1km of a store increases varieties available by around 0.10 percent (note that the outcome is measured in percentage points).

II.C. Effects on Store Access

Finally, we report IV estimates of the effect of new residential development on grocery store access measured at the census tract level. New residential development is measured as the logarithm of the floor area of newly built stock in census tract c in the six years before

[3]As explained in the main text, the *consistent sample of goods* includes the 73 unique grocery products consistently present from 2007 to 2019, and the *full sample of goods* includes the 127 unique grocery products even those included in the price database in 2010.

TABLE II.3
IV ESTIMATES: PRODUCT VARIETY & NEW DEVELOPMENT

	(1)	(2)
Log(New Area)	9.406	10.299
	(5.242)	(5.414)
First-stage F-stat	22	22
Sample	Consistent Sample	Full Sample
Obs.	212	212

Notes: Instrumental variable estimates from store-year specifications. The outcome variable in both columns is the share of available varieties at the store level, measured in percentage points. In column 1 the outcome is built using the consistent sample of good. In column 2 the outcome is built all identifiable goods in the DGC database. First-stage F-statistics indicated in the table foot. Standard errors are clustered at the store level.

year t.[4] We consider two tract-level outcomes that measure grocery access. The first is defined as the log of the number of stores within 1km. The second is defined as the log of the inverse distance weighted access to grocery stores. Then, we estimate the effect of New Area$_{ct}$ on these two measures of grocery access - Grocer Access$_{ct}$ - by estimating the parameter of interest η_A via two-stage least squares (2SLS) where the two stages are given by:

$$Log(\text{New Area}_{ct}) = \pi Policy_c \times post_t + \eta Policy_c + u_{ct} \quad \text{(II.5)}$$

$$\text{Grocer Access}_{ct} = \eta_A Log(\text{New Area}_{ct}) + \delta_t + \alpha Policy_c + \epsilon_{ct} \quad \text{(II.6)}$$

where equation II.5 is the first-stage and II.6 is the second-stage. The estimation is carried out using census tracts within two kilometers of the LVS boundary and data for 2010 and 2019. Our first-stage estimates reported in panel C of Table II.1 indicate supermarkets in the policy region experienced a substantial increase in new developments in tract located in the LVS area relative to tract in the comparison region. The instrument is reasonably strong, with an F-statistic of 32 and 50 when measuring new development using units and floor area, respectively. Table II.4 reports IV estimates of the elasticity of grocery access to new residential development.[5] Estimates in columns 1 and 2 were obtained using the number of stores within 1km, and inverse distance weighted access, respectively. Similar to our reduced-form estimates, results indicate positive but somewhat imprecisely estimated effects of new development on store access. They do allow us to confidently reject with some confidence substantial negative effects of new development on store access.

[4] Census tracts are relatively small geographies, with a total of 969 areas in the Montevideo, and over 450 areas within 2km of the LVS region boundary.

[5] In order to accommodate for the role of spatial dependence when conducting inference, we cluster at the level of $0.01^o \times 0.01^o$ cells. This leaves us with 60 spatial clusters in the sample of census tracts within 2km of the LVS boundary.

Table II.4

IV Estimates: Store Access & New Development

	(1) Log(Stores within 1km)	(2) Log(Dist. Weighted Access)
Log(New Area)	0.123	0.029
	(0.065)	(0.018)
1st Stage F-stat	51	51
Obs.	736	738

Notes: Instrumental variable Estimates obtained from a census tract panel covering years 2010 and 2019. In column 1, the outcome is the logarithm of the number of stores within 1km of a census tract. In column 2, the outcome is the logarithm of the inverse-distance weighted average of access to grocery stores. First-stage F-statistics reported in the table foot. Standard errors are clustered at the level of $0.01^o \times 0.01^o$ grid cells.

III. Data Appendix: List of Data Sources

Store and Product Data

Data on grocery prices, product availability and stores was obtained from the Directorate General for Commerce from the Uruguayan Ministry of Economics and Finance (see Ministerio de Economía y Finanzas 2022). Data was provided directly by the Ministry to the research team. Updated and accessible versions of the price-store data can be obtained from the National Open Data Catalog (see Catálogo de Datos Abiertos 2022).

LVS Projects

Information on LVS projects, including the address of each project, the parcel it corresponds to, the number of dwellings built, the date in which approval for the LVS exemption was obtained, the number of commercial spaces made available at that location is obtained from the National Housing Agency (Agencia Nacional de Vivienda, 2022).

Digital Maps (Shapefiles)

We obtain digital maps from different sources. Maps of census tract and neighborhood polygons in Montevideo are obtained from the Uruguayan National Statistics Institute in shapefile format (Instituto Nacional de Estadistica, 2011*a*). Maps for the Montevideo department limits as well as the different regions set out in the LVS policy are obtained from the Montevideo government GIS portal (Intendencia Municipal de Montevideo, 2022). Finally, we use parcel-level shapefiles for urban areas in the country obtained from the National Open Data Catalog (Catálogo de Datos Abiertos, 2021*b*).

Other Data Sources

Census tract average incomes that were used throughout the project were obtained from the National Statistics Institute and derived from the 2011 Census (Instituto Nacional de Estadística, 2011*b*). Parcel level information on the building year of buildings in Montevideo, as well as information on dwelling quality where obtained from the Montevideo Cadaster, accessible through Catálogo de Datos Abiertos (2021*a*). For one figure in the paper (Panel C of Figure 2) and one figure of the Appendix (Figure I.4) we use proprietary data from the Property Registry.

IV. Theoretical Appendix

The Lagrangian associated to the consumer problem is given by

$$\mathcal{L} = q_0 + \alpha \sum_j q_i - \frac{1}{2}\gamma \sum_j (q_i)^2 - \frac{1}{2}\eta \left(\sum_j q_i \right)^2 + \lambda \left[y - q_0 - \sum_j p_j q_j \right]$$

From the FOCs with respect to q_0 we obtain $\lambda = 1$, while from the FOCs for variety j we obtain $\frac{\partial \mathcal{L}}{\partial q_i} = 0 = \alpha - \gamma q_i - \eta \sum_j q_i - \lambda p_i \Longrightarrow p_i = \alpha - \gamma q_i - \eta Q$.

The first order conditions for the firms' problem are given by

$$\alpha - c - \frac{\gamma q_j^m}{L} - \frac{\gamma \sum_{k=1}^{M} q_j^k}{L} - \eta \left(\frac{q_j^m + \sum_{k=1}^{M} \sum_{i=1}^{N} q_i^k}{L} \right) = 0 \tag{IV.1}$$

IV.A. *Proof of Proposition 1*

In the final stage - when choosing quantities for a fixed N - the monopolist's problem becomes:

$$\max_{\{q_j\}_{j=1}^{N}} \sum_{j=1}^{N} q_j \left[\alpha - c - \frac{\gamma q_j}{L} - \eta \frac{\sum_{i=1}^{N} q_i}{L} \right]$$

Taking first order conditions for all varieties we obtain:

$$L(\alpha - c) - 2\gamma q_j - \eta q_j - \eta \sum_{i=1}^{N} q_i = 0$$

Given that, for an optimal choice of N, no q_j is equal to zero, these FOCs hold for all js. We can therefore solve for a generic j and obtain that in the symmetric equilibrium:

$$q^* = \frac{L(\alpha - c)}{2\gamma + \eta(1+N)} \qquad p^* = \frac{\alpha(\gamma + \eta) + c(\gamma + \eta N)}{2\gamma + \eta(1+N)}$$

Substituting these in the equation for profits in the varieties choice stage we obtain profits as a function of the number of varieties.

$$\pi(N) = \frac{L(\alpha - c)^2(\gamma + \eta)N}{(2\gamma + \eta(1+N))^2} - F_N N \tag{IV.2}$$

To save on notation, we can re-write this expression as $\pi(N) = f(N) - F_N N$, where $f(N)$ is the first term in the right hand side of IV.2. It is worth noting that the derivative of $f(N)$ is strictly decreasing in N, so the problem is concave. Therefore, it suffices to define the profit maximizing number of varieties N^* as the N that satisfies the condition $\pi(N) > \max\{\pi(N+1), \pi(N-1)\}$.

We now show that the number of varieties increases with market size L. Formally, this means that with L_1 and L_2 such that $L_2 > L_1$ – then $N^*(L_2) > N^*(L_1)$ where $N^*(.)$ is the optimal N for a given value of L. Define $\Delta(N) \equiv f(N) - f(N-1)$. Note that, because $f(.)$ is continuous and its derivative is decreasing in N, the function $\Delta(N)$ is also decreasing in N.

Given these conditions we can write the following system of inequalities:

$$L_2[\Delta(N^*(L_2))] - F_N > 0 \tag{IV.3}$$

$$L_1[\Delta(N^*(L_1))] - F_N > 0 \tag{IV.4}$$

$$L_1 << L_2 \tag{IV.5}$$

Where the first and second conditions derive from the definition of $N^*(L)$ and the third is true by construction. Proceed by contradiction. Suppose that $N^*(L_1) = N^*(L_2)$. If this were the case, then – for low enough L_1 –either IV.3 or IV.4 need to be false, as the lower value of L_1 reduces the value of the positive component of IV.4. Suppose instead that $N^*(L_1) > N^*(L_2)$. The fact that $\Delta(N^*(L_1))$ means that this would result again in a contradiction as the reduction from L_2 to L_1 is coupled with a reduction in $\Delta(N^*(L_1))$. Therefore, it has to be true that $N^*(L2) \geq N^*(L1)$ for $L_2 > L_1$.

It remains to show that this increase in varieties results in a reduction in prices. This is straightforward to see in the expression on p^* above, which is decreasing in N for the parameter restrictions outlined in the main text.

■

IV.B. ***Proof of Proposition 2***

In the final stage, when choosing quantities, the first order conditions of firm m's problem can be written as:

$$L(\alpha - c) - \gamma q_j^m - \gamma \sum_{k=1}^{M} q_j^k - \eta \left(q_j^m + \sum_{k=1}^{M} \sum_{i=1}^{N} q_i^k \right) = 0$$

Define $Q_j \equiv \sum_{k=1}^{M} q_j^k$ and $Q \equiv \sum_{k=1}^{M} \sum_{i=1}^{N} q_i^k$. If we add the first-order conditions across firms first and then across varieties (js) we obtain:

$$M\left(L(\alpha - c) - \gamma Q_j - \eta Q\right) = (\gamma + \eta) Q_j$$

$$NM\left(L(\alpha - c) - \eta Q\right) = (\gamma + \eta + \gamma M) Q$$

Using these two expressions we can solve for Q, Q_j and q_j^m. Moreover, replacing the equilibrium value of q_j^m on demand we can obtain equilibrium prices. The resulting equilibrium expressions for quantities and prices are:

$$q^* = \frac{L(\alpha - c)}{\gamma + \eta + \gamma M + \eta N M} \qquad p^* = \frac{\alpha(\gamma + \eta) + c(\gamma M + \eta N M)}{\gamma + \eta + \gamma M + \eta N M}$$

Substituting these expressions in the firm's pay-off function we can obtain the expression for profits net of entry costs:

$$\Pi(M) = \frac{NL(\alpha - c)^2(\gamma + \eta)}{\gamma + \eta + \gamma M + \eta N M} - F - F_N N \tag{IV.6}$$

The equilibrium number of firms is given by $M^* : \Pi(M^*) > 0, \Pi(M^* + 1) < 0$. Note that, an increase in L (keeping N fixed) can have two outcomes: either M^* stays the same or it increases. Re-writing $\Pi(M^*(L)) = Lg(M) - F - F_N N$ we know that:

$$L_2 g(M^*(L_2) + 1) < F + F_N N$$
$$L_1 g(M^*(L_1) + 1) < F + F_N N$$

Suppose $L_2 >> L_1$. In that case, we must have that $M^*(L_2) > M^*(L_1)$, otherwise (for sufficiently large gap between L_2 and L_1, either the first or the second inequality will not be satisfied. This proves that, for a fixed number of varieties, a large enough change in market scale L will lead to a larger number of firms in equilibrium. It is straightforward to see that this will result in a lower value of p^*, as long as $\alpha > c$.

■