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Measuring market power with a regional competitive fringe

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Abstract

We estimate market power in Argentina’s wholesale liquid fuels market during the deregulation period 2016–2019, applying the Berry-Levinsohn-Pakes structural demand framework to the derived demand of service stations for wholesale supply. Using a novel dataset of wholesale prices and quantities by firm, product, province, and marketing channel, we recover firm- and region-level Lerner indices across five geographically distinct regions. Market power is substantial and geographically heterogeneous: the dominant state-controlled supplier exhibits the highest markups nationally, but smaller firms operating in remote or low-density regions can sustain markups exceeding those of larger competitors, because geographic isolation deteriorates buyers’ outside options. A second-stage regression of estimated Lerner indices on regional structural characteristics shows that each additional wholesale competitor reduces markups by approximately 2.7–3.0 percentage points, while a denser proprietary outlet network raises them — confirming that local competitive conditions, rather than aggregate national concentration, are the primary determinants of market power. Our results suggest that price liberalization in a geographically heterogeneous, concentrated market does not guarantee competitive outcomes, with implications for the design of regional energy regulation.

Keywords: Liquid Fuels, Market Power, Product Differentiation, Discrete Choice, Demand Estimation

JEL Classification: C52 , L13 , L71

1 Introduction

Argentina’s wholesale liquid fuels market underwent a significant structural shift between 2016 and 2019, when Decree 962/2017 dismantled decades of price controls and allowed companies to freely adjust prices according to prevailing market conditions. This deregulation episode — accompanied by the bankruptcy of Oil Combustibles, the largest independent distributor, and the merger of SCP and DAPSA — created an unusually rich empirical setting in which to study how firms exercise market power when price-setting constraints are lifted. This paper exploits that setting to quantify market power across firms and regions in the wholesale chain, using a structural demand estimation approach that recovers firm-level Lerner indices without requiring direct observation of marginal costs.

The wholesale segment of liquid fuel markets occupies a strategically important but understudied position in the value chain: wholesale prices directly determine the cost base of retail service stations, and through them the prices paid by final consumers and transport-intensive sectors. In Argentina, where the territory’s north-south extension exceeds 3,700 kilometres and road infrastructure is concentrated around Buenos Aires, geographic isolation amplifies the market power distributors can exercise over captive station networks, making its magnitude and distribution essential for competition policy and energy regulation.

Argentina had historically relied on export tariffs, biofuel blending quotas, and YPF’s role — as dominant, majority state-owned supplier — as an implicit price anchor to influence fuel prices. Decree 962/2017 removed the last of these instruments, enabling analysis of free price-setting behaviour from January 2016 through July 2019, when a new price freeze was imposed.¹ The resulting price variation, combined with a granular dataset of wholesale prices and quantities by firm, product, province, and marketing channel, provides the identifying variation needed for structural demand estimation.

This paper makes three contributions. First, it provides the first application of the BLP structural demand framework (Berry, 1994; Berry et al, 1995) to the wholesale segment of a liquid fuel market in a developing country, recovering firm- and region-level Lerner indices without requiring direct observation of marginal costs — a particularly valuable feature given the difficulty of allocating joint refining costs across co-products (Clark, 1947). Second, it introduces a novel definition of the outside option suited to markets with unstable panel structures caused by firm entry, exit, and mergers: potential sales are defined as the maximum volume traded in the year immediately preceding and following each observation, so that the outside option is not underestimated during transition years. Third, it documents systematic regional heterogeneity in wholesale market power across five geographically distinct regions, and formally links that heterogeneity to structural market characteristics — competitive density, service station coverage, and firm presence — using a second-stage regression of estimated Lerner indices on regional observables.

The main findings are as follows. YPF consistently exhibits the highest markups, reflecting its dominant market share and state-ownership-based pricing role. However, smaller firms operating in remote or low-density regions — particularly Patagonia and the Northeast — can sustain markups exceeding those of larger competitors, because geographic isolation deteriorates gas stations’ outside option and strengthens the bargaining position of wholesale suppliers. Each additional wholesale competitor reduces the estimated Lerner index by approximately 2.7 to 3.0 percentage points,

¹Price freeze imposed by Decree 566/2019.

while a denser proprietary outlet network raises markups significantly. These results are robust across product types and estimation strategies.

The rest of the paper is organised as follows. Section 2 sets out the model, identification strategy, and estimation procedure. Section 3 contains the application to the Argentine fuel market, including data, estimation results, and the analysis of determinants of regional markup variation. Section 4 presents the conclusions and proposes lines of future work. Appendix A points to supplementary instrument diagnostics and regional demand estimates (Online Supplementary Material, Tables S1–S4), and Appendix B details data construction.

1.1 Background

The economics of fuel markets has generated a substantial body of empirical work organised around four broad themes (Yu et al, 2022). The first examines the transmission of crude oil prices to retail fuel prices. Bacon (1991) introduced the “rockets and feathers” hypothesis, documenting that firms increase prices faster than they reduce them following crude oil cost changes — a finding replicated across multiple markets (Slade, 1992; Godby et al, 2000; Bachmeier and Griffin, 2003). For Argentina specifically, Mercuri (2001) and Porto and Pizzi (2018) confirm asymmetric pass-through and document a structural decoupling of domestic and international prices between 2005 and 2016, enforced through export withholding taxes. Coloma (2002) and Coria (2005) provide further evidence of oligopolistic price formation in the Argentine fuel market, with past consumption and activity levels as the main demand predictors.

The second theme focuses on price leadership and brand effects in oligopolistic fuel markets. Wang (2008) and Lewis (2012) document price coordination under the same brand, while Byrne and De Roos (2019) provides experimental evidence of learning-to-coordinate behaviour in retail gasoline. These studies share a common finding: brand affiliation generates systematic price premiums, and dominant firms exercise leadership that constrains rivals’ pricing margins — a pattern directly relevant to the Argentine wholesale market, where YPF’s majority state ownership confers both market share leadership and an implicit price-setting role.

The third theme examines the role of price regulation (Taylor and Fischer, 2003; Brown et al, 2008; Carranza et al, 2015). These studies find that price ceilings are only partially effective: regulated firms tend to price near the ceiling, while independent stations face stronger competitive pressure. The Argentine deregulation of 2017 (Decree 962/2017) provides a natural setting in this vein, enabling the analysis of free price-setting behaviour during the 2016–2019 period under study.

The fourth theme, most closely related to our paper, addresses the structural measurement of market power in fuel markets. Pinkse et al (2002) apply a semi-parametric estimator to US wholesale gasoline data and find that competition is highly localised. Hastings (2004) uses contract changes in Southern California to show that vertical integration raises retail prices, with gas stations’ demand for wholesale supply as the key margin of competitive interaction — the same margin our paper models. Her reduced-form difference-in-differences design delivers clean causal estimates of a specific ownership-change effect but does not recover structural demand parameters or firm-level Lerner indices. For the retail segment, Villas-Boas (2007) applies the BLP framework to final consumer demand for gasoline in Brazil, and Houde (2012) extends the structural approach to account for spatial differentiation in Canadian retail gasoline. Reduced-form spatial models (Pennerstorfer, 2009; Yu et al, 2022) complement this literature by documenting localised price interdependence across stations using spatial autoregressive techniques.

The present paper occupies a distinct position within this fourth strand: we apply the BLP structural framework (Berry, 1994; Berry et al, 1995) to the *wholesale* segment of a developing-country fuel market, modelling the derived demand of gas stations for wholesale supply rather than final consumer demand at the pump. Our structural estimation recovers firm- and region-level Lerner indices directly usable by policymakers, identifying markups from demand parameters using instruments that exploit price variation across marketing channels and regions, without relying on a single ownership-change event as in Hastings (2004). To our knowledge, this is the first BLP application to a wholesale fuel market in a developing country, and the first to document systematic regional heterogeneity in wholesale market power across five geographically distinct regions.

A cost-side validation of the estimated markups faces a fundamental obstacle: crude oil is a joint input that yields multiple co-products, making any imputation of marginal cost to a specific product arbitrary (Clark, 1947). In the Argentine context, these difficulties are amplified by basin heterogeneity and differential refinery complexity across operators. The demand-side strategy adopted here circumvents this problem entirely. The instruments used follow Nevo (2000) and the random coefficients estimator follows Swamy (1970).

2 Model, Identification and Estimation

We adopt the discrete choice demand framework of Berry (1994) and Berry et al (1995), extended to allow for regional heterogeneity in consumer preferences. This section describes the model and the two departures from the standard framework that are specific to our setting: the definition of the outside option and the treatment of derived demand under long-term contracts.

2.1 Demand

Each gas station owner (hereafter “consumer i ”) chooses among N wholesale fuel brands, indexed $j = 1, \dots, N$, plus an outside option $j = 0$. The utility of consumer i from brand j is

$$u_{ij} = x_j \beta_i - \alpha_i p_j + \xi_j + \epsilon_{ij}, \quad (1)$$

where x_j is a vector of observed product characteristics, p_j is the net-of-tax wholesale price, ξ_j captures unobserved product quality, and ϵ_{ij} is an i.i.d. taste shock. The coefficients β_i and α_i are consumer-specific, capturing heterogeneity in preferences across geographic regions.

Following Berry (1994), defining the mean utility $\delta_j \equiv x_j \beta - \alpha p_j + \xi_j$ and normalising $\delta_0 = 0$, the logit market share function yields the estimating equation

$$\ln(s_j) - \ln(s_0) = \delta_j = x_j \beta - \alpha p_j + \xi_j, \quad (2)$$

which is estimated by instrumental variables to address the endogeneity of p_j . Because the standard logit imposes implausible substitution patterns (equal cross-price elasticities for brands with equal market shares), we estimate a random coefficients model in the spirit of Berry et al (1995): we apply the IV logit separately for each of the five geographic regions (Cuyo, Patagonia, Northwest, Northeast, Pampeana) and combine the regional estimates using the precision-weighted procedure of Swamy (1970). Specifically, region-specific coefficients β_i are obtained as

$$\beta_i = (Z^T X)^{-1} Z^T Y, \quad (3)$$

where Z is the instrument matrix. The pooled estimator is $\hat{\beta} = \sum_i W_i \beta_i$, with weights W_i that penalise regions with greater coefficient variance. This specification allows price elasticities and demand responses to differ across regions, reflecting the pronounced heterogeneity in market structure, infrastructure, and competitive conditions documented in Section 3.3.

2.2 Outside option and market size

The total market size M determines the outside option share $s_0 = 1 - \sum_j s_j$. A natural definition for s_0 in fuel markets is the share of potential demand not served by any firm. We define potential sales in each province-month-channel cell as the maximum volume traded in that cell across the year immediately preceding and the year immediately following the observation. The outside good is then the difference between potential and actual sales.

This definition is particularly suited to our setting for two reasons. First, it accommodates the unstable panel structure of the data: Oil Combustibles’ bankruptcy and the SCP–DAPSA merger create entry and exit within the sample period, so a fixed-panel definition would either undercount or overcount potential demand in transition years. Second, defining s_0 as unsatisfied potential demand — rather than sales to independent brands, as in some retail gasoline applications — is appropriate for the wholesale segment, where gas stations operate under exclusivity contracts and cannot switch suppliers freely.

2.3 Supply and markup recovery

Under Nash-Bertrand competition, each firm maximises profit taking competitors’ prices as given. The first-order condition implies

$$p_j = c_j + \frac{s_j}{|\partial s_j / \partial p_j|}, \quad (4)$$

which, given the demand estimates, identifies the Lerner index $(p_j - c_j)/p_j$ without requiring direct observation of marginal costs c_j . This demand-side identification strategy is particularly valuable here because crude oil is a joint input whose marginal cost cannot be allocated across co-products without arbitrary assumptions (Clark, 1947).

A natural concern is whether Nash-Bertrand competition is consistent with supply contracts carrying a statutory minimum duration of five years under the 2015 reform of Argentina’s *Código Civil y Comercial*. We argue that it is, for three reasons: competitive interaction is concentrated at the ex-ante contracting stage, where the Nash-Bertrand equilibrium describes sustainable markups; contracts include price-adjustment clauses tied to the *precio de pizarra* and inflation indices, so within-contract price variation reflects genuine competitive updating rather than fixed prices; and even under more rigid price-setting than Nash-Bertrand assumes, demand parameters remain identified from price and quantity variation (Berry, 1994), with any such rigidity causing our Lerner indices to understate — not overstate — true market power (MacLeod and Malcomson, 1989).

Although the BLP framework was originally developed for final consumer demand (Berry, 1994; Berry et al, 1995), the “consumers” in our setting are gas station owners choosing among wholesale fuel suppliers — a derived demand whose ultimate driver is retail consumption. The interpretation of mean utility δ_j as the average valuation that buyers assign to brand j remains valid here: the contractual structure of the

Argentine wholesale market, in which supply and consignment agreements carry a statutory minimum duration of five years under the 2015 reform of the *Código Civil y Comercial*, implies that the bulk of observed market shares reflects stable supplier commitments rather than spot transactions, supporting the use of a discrete choice framework with well-defined choice sets.²

3 Application: Fuel Market in Argentina

Fuel prices are a sensitive variable in a country whose north-south extension is approximately 3,779 kilometers, with road infrastructure unevenly concentrated around the Autonomous City of Buenos Aires (CABA) and Greater Buenos Aires, generating different cost structures depending on geographical location. The fuel value chain ranges from extraction to refining, distribution, wholesale, and retail; some actors participate in a single link, while YPF S.A. is fully integrated across all stages.

From the wholesale side, the sale of liquid fuels can be conceived as an oligopolistic market of differentiated products, characterised as an oligopoly with a competitive fringe (a dominant player and a fringe of small firms, [Montero and Guzman \(2010\)](#)). Entry costs are high — logistics, product handling, and the investment required to meet retail operators’ supply-contract demands — and differentiation is both vertical (product quality) and horizontal, with brands distinguished by loyalty cards, bank-partnership discounts, and geographic coverage. Firms with the greatest national presence tend to be those combining web applications, loyalty cards, and targeted discounts, and the extension of a brand’s network across markets is itself a source of customer loyalty.

3.1 Market Concentration

Total sales in Argentina over 2016–2019 show a high degree of concentration for both gasoline and diesel, in regular and premium versions alike. A value above 2,500 is already considered indicative of high concentration; Table 1 reports the Herfindahl-Hirschman Index (HHI) both nationally and by region, and the index greatly exceeds this threshold throughout. Nationally, concentration is highest for common diesel, followed by premium diesel and premium gasoline, with common gasoline — the highest-volume market — the most competitive of the four. Concentration rises further at the regional level, since not all firms are present in every region; Pampeana is consistently the least concentrated region, consistent with its larger number of active competitors. Company-level market shares confirm that the largest firms (YPF, Shell, Axion) hold systematically higher shares nationally, though smaller firms can attain high local shares in regions with thin competitor presence.

Table 1 Herfindahl-Hirschman Index, nationally and by region, for the period 2016-2019.

Product	National	Cuyo	Northeast	Northwest	Pampeana	Patagonia
Diesel	7203.83	4333.65	4623.84	4853.57	2088.53	5124.78
Gasoline	4790.50	4907.25	4030.16	4032.15	2821.80	4856.23
P. Diesel	6839.65	5503.52	4628.28	5412.34	2879.89	5373.07
P. Gasoline	5818.80	6422.61	5061.47	5871.43	3629.33	6080.96

Source: Own elaboration based on database.

²Two sources of unmodelled heterogeneity deserve acknowledgement: possible contract renewal/renegotiation within the sample window, and the unobserved contractual modality (supply vs. consignment), which would require contractual-level data not available in the public database and is left for future research.

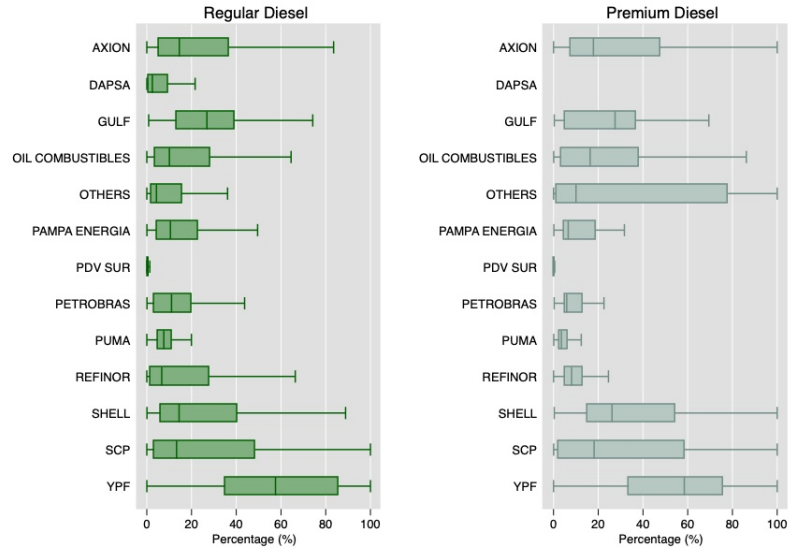


Fig. 1 Distribution of market shares by company, for regular and premium diesel.

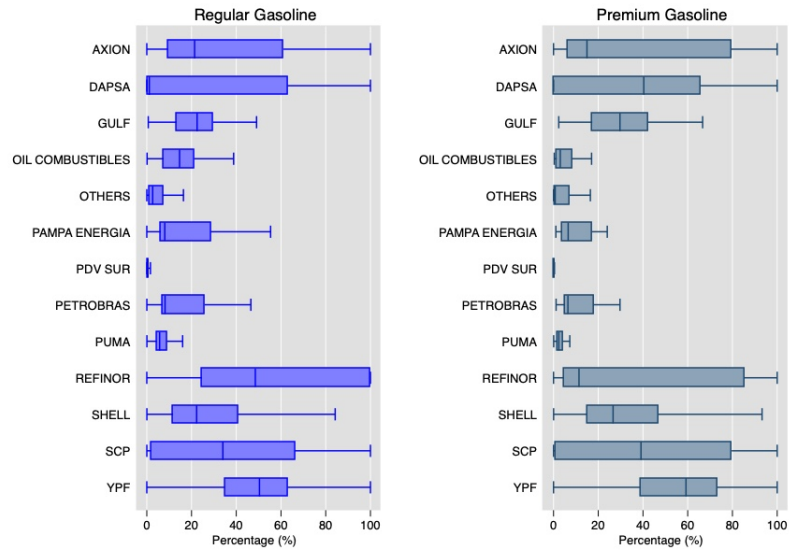


Fig. 2 Distribution of market shares by company, for regular and premium gasoline.

Figures 1 and 2 show the distribution of firms' market shares. The largest companies (YPF, Shell, Axion) generally have higher average market shares than the rest, though smaller firms can attain high local shares in geographic markets with little competitor presence. The interquartile range (box length) reflects the variability in each firm's market share across markets.

3.2 Data description

The main source of information enabling this study is the wholesale sales database published by the National Energy Secretariat. The database contains information about volume and price for every product, firm, and sale points by month and year. The sample covers the period January 2016–July 2019, restricted to observations with positive mean utility ($\delta_j > 0$), wholesale channels excluding own-outlet sales (*EESS propias*), and with a valid instrument for price; full descriptive statistics of the estimation sample by product and region are reported in Table 2 (for sample-construction details see Appendix B).

Table 2 Descriptive statistics of the estimation sample by product and region (January 2016–July 2019).

Region	N	Mean price	SD price	Mean vol. (m ³)	Mean s_j (%)	Mean s_0 (%)
<i>Regular diesel</i>						
Cuyo	1,009	37.46	3.86	539	49.4	3.0
Patagonia	1,532	38.04	4.41	1,011	53.7	2.8
Northeast	1,339	37.70	3.91	479	54.5	2.6
Northwest	1,709	37.67	4.79	676	51.1	2.1
Pampeana	4,076	35.48	4.73	2,716	36.7	1.8
<i>Premium diesel</i>						
Cuyo	604	44.20	4.53	336	59.3	2.3
Patagonia	942	42.90	6.50	580	53.5	2.0
Northeast	936	45.28	4.15	315	55.0	2.4
Northwest	1,195	44.37	3.95	294	47.8	1.7
Pampeana	2,448	42.44	4.98	1,021	42.2	1.8
<i>Regular gasoline</i>						
Cuyo	485	37.44	3.58	1,012	55.0	3.3
Patagonia	755	37.05	5.11	1,732	48.7	2.5
Northeast	728	39.52	3.80	1,256	48.2	2.6
Northwest	1,349	40.32	4.90	806	44.6	1.6
Pampeana	2,192	37.40	5.01	2,645	40.1	1.9
<i>Premium gasoline</i>						
Cuyo	449	42.65	4.33	450	59.9	3.6
Patagonia	674	43.14	4.56	677	49.8	2.6
Northeast	698	44.70	4.74	470	50.7	2.6
Northwest	1,063	44.58	5.59	278	42.6	2.4
Pampeana	1,940	42.85	5.50	1,141	45.6	2.2

Notes: Prices per liter in constant pesos (deflated by the Internal Wholesale Price Index, base December 2020). Volume in cubic metres. Market share s_j and outside option share s_0 expressed as percentages. Sample restricted to: `identificador==1`, $\delta_j = \ln(s_j) - \ln(s_0) > 0$, wholesale channels excluding own-outlet sales (*EESS propias*), and valid instrument ($p1 > 0$ for diesel, $p2 > 0$ for gasoline). Period: January 2016–July 2019.

Three patterns stand out. First, Pampeana dominates in observation count and transaction volume (mean common-diesel volume of 2,716 m³, more than five times the Cuyo average), reflecting its concentration of economic activity. Second, prices per liter are systematically lower in Pampeana for all four products (e.g. \$35.48 for common diesel, versus \$37.46 in Cuyo and \$38.04 in Patagonia), consistent with greater competitive pressure there, while the Northwest shows the highest gasoline prices, consistent with its higher observed markups. Third, the outside option share s_0 is consistently larger for gasoline than diesel across regions and is smallest in Pampeana for diesel (1.8%), consistent with high market coverage where competition is most intense.

3.3 Regional Characteristics

The Argentine territory exhibits pronounced heterogeneity across its five regions in population, infrastructure, vehicle ownership, and market structure, jointly shaping the demand conditions and strategic environment faced by fuel companies (Table 3). Pampeana dominates along every dimension — population, vehicle fleet, road network, service station density — and is the most competitive market, consistent with its lower average markups. Patagonia combines high urbanisation with a sparse population (2.1 million) served by only 283 active service stations, the lowest among all regions, consistent with the higher gasoline markups obtained there; the Northwest and Northeast have the lowest vehicle ownership and urbanisation rates, while Cuyo offers an intermediate, more homogeneous profile.

Table 3 Regional characteristics: vehicle fleet, road network, population, urbanization rate, and active service stations.

Indicator	Cuyo	Northeast	Northwest	Pampeana	Patagonia
Motor vehicle fleet (provincial avg., 2015–2020)	354,855	188,264	164,092	1,696,608	203,374
Freight vehicle fleet (provincial avg., 2015–2020)	17,371	13,718	9,915	76,316	10,377
Population (regional total, Census 2010)	2,852,294	3,679,609	4,911,412	26,573,593	2,100,188
Urbanisation rate (regional avg., %)	85.8	72.0	78.3	89.5	90.1
Road network, national+provincial (regional total, km)	20,350	21,170	31,400	82,016	38,410
Active service stations (regional total, avg. 2016–2019)	294.0	339.2	404.2	3,369.5	283.2

Sources and notes: Vehicle fleet: DNRPA, 2015–2020 (passenger, light utility, freight and buses; anomalous 2020 Buenos Aires figure excluded). Population/urbanisation: INDEC Census 2010 (urbanisation = share in localities of 2,000+ inhabitants), the closest available census to the study period. Road network: DNV, Anuario Estadístico Vial 2021 (paved and unpaved). Service stations: Secretaría de Energía, SIH, 2016–2019 (CABA not a separate jurisdiction in this source). Provincial-level breakdowns underlying each regional total are available from the authors upon request.

3.4 Estimates for Gasoline and Diesel Demand

Results below apply OLS, instrumental-variables (IV), and random-coefficients-by-region (RC) estimation to the logit model of [Berry \(1994\)](#); the OLS-versus-IV comparison illustrates the importance of instrumenting price, which is plausibly correlated with the error term.

3.4.1 Instruments used

Instruments were constructed from database characteristics, following in part [Nevo \(2000\)](#) and considering product, province, month, year, and marketing channel.

After evaluating available alternatives on endogeneity and relevance F -tests, diesel prices are instrumented with the maximum price of competitors in the marketing channel within the region, and gasoline prices with the average price of the flag in other marketing channels in the province and an indicator for the existence of a refinery in the province; both instruments were verified at the aggregate and regional levels, and the overidentification test was additionally checked for gasoline, where two instruments are used.

The regional estimates, however, revealed heterogeneity in the validity of the refinery instrument across regions. In regions without local refining capacity, the refinery indicator operates as a cost shifter that affects the wholesale fuel price without a direct channel to station-level utility, satisfying the exclusion restriction. In the Pampean region, by contrast, the geographic concentration of refineries may generate local distribution economies of scale or preferential access conditions that directly affect station profitability, violating the exclusion restriction in that region. This theoretical

expectation is confirmed by the Hansen J overidentification test, which fails to reject instrument validity in all regions except Pampeana ($p = 0.000$). A comparison of IV estimates for Pampeana using both instruments versus the refinery-excluded specification reveals a 39% difference in the price coefficient (-0.044 vs. -0.061), consistent with upward attenuation bias induced by the endogenous instrument.³ Accordingly, the Pampean regional estimate uses only the average flag price in other marketing channels as the excluded instrument, achieving exact identification. For the combined overidentification test across regions where the Hansen J is applicable — that is, excluding Pampeana, where exact identification is imposed, and the Northeast region, where the refinery indicator exhibits no within-region variation — the sum of regional J statistics follows a $\chi^2(3)$ distribution under the null hypothesis of instrument validity and cross-regional error independence. Full first-stage F -statistics and overidentification test results, both at the aggregate and regional levels, are reported in Tables S1 and S2 of the Online Supplementary Material.

3.4.2 Fuel demand estimation

Three specifications are estimated for each product: OLS (no price instrument), IV (price instrumented), and the random coefficients model by region. The following variables are included: price (net of taxes, constant currency, volume-weighted), premium (quality indicator), reward card, number of wholesale competitors, flagged outlets (percentage by province and company), urbanisation rate, and log vehicle registrations.

3.4.3 Diesel

Table 4 reports the estimates for diesel. Instrumenting the price triples the absolute value of its coefficient and substantially raises the quality (premium) coefficient, confirming the expected endogeneity bias. Both the number of wholesale competitors and the share of flagged outlets are significant with the expected signs across specifications, while urbanisation and vehicle fleet are not significant. The random-coefficients and region-fixed-effects models yield similar results overall, but the Swamy (1970) coefficient-homogeneity test ($T_1 = 1,110.14 \sim \chi^2(32)$, $p < 0.001$) strongly rejects homogeneous slopes across regions, supporting the random-coefficients specification. Region-level estimates (Table S3, Online Supplementary Material) show a higher price elasticity in Pampeana and a more attenuated competitor effect there relative to the rest of the country.

³The -0.061 value is the pure IV coefficient for Pampeana alone (single instrument `promedio_otros_canales`); the -0.11 coefficient in Table S4 is the Swamy (1970) precision-weighted estimate, which shrinks it toward the cross-regional average, as expected of that estimator.

Table 4 Estimates corresponding to equation (2) using different methods of estimation, for the period January 2016 – July 2019, for diesel products.

	(1) OLS	(2) IV	(3) RC
Price	-0.033*** (0.003)	-0.116*** (0.009)	-0.113*** (0.015)
Premium	0.298*** (0.027)	0.835*** (0.061)	0.875*** (0.092)
Reward card	0.144*** (0.030)	0.161*** (0.032)	-0.266 (0.210)
Wholesale comp.	-0.351*** (0.008)	-0.397*** (0.010)	-0.526*** (0.053)
Flagged outlets	1.890*** (0.060)	1.849*** (0.063)	2.307*** (0.274)
Urbanization	-0.579* (0.239)	-1.076*** (0.251)	-1.910 (1.865)
Vehicle fleet	0.054*** (0.015)	0.015 (0.016)	-0.114 (0.075)
Constant	4.115*** (0.244)	8.220*** (0.488)	10.932*** (1.962)
Observations	16,218	16,218	16,218
R ²	0.224	0.155	0.256

Notes: Region controls: Cuyo, Pampeana, Patagonia, NOA and NEA in (1) and (2). Standard errors in parentheses. RC = Random Coefficients [Swamy (1970) estimator]. RC R^2 computed as $1 - \text{RSS}/\text{TSS}$ using Swamy region-specific fitted values. The Swamy (1970) coefficient-homogeneity test rejects H_0 at any conventional level ($T_1 = 1,110.14$, $\chi^2(32)$, $p < 0.001$), supporting the random-coefficients specification over a common-slope fixed-effects model. A formal Hausman test was not feasible because `ivregress gmm` with `vce(robust)` is incompatible with Stata’s `hausman` command (`rc=198`). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.4.4 Gasoline

Table 5 reports the estimates for gasoline. As with diesel, instrumenting price is critical: the coefficient moves from null and insignificant to significant and negative. Unlike diesel, the loyalty-card indicator is significant and substantially raises purchase likelihood, and the competitor effect on market share is of larger magnitude; urbanisation is significant and negative, while vehicle fleet remains irrelevant. The random-coefficients and fixed-effects models again agree closely, and the Swamy (1970) test ($T_2 = 911.12 \sim \chi^2(32)$, $p < 0.001$) strongly rejects homogeneous slopes across regions. Region-level estimates (Table S4, Online Supplementary Material) show higher price elasticity in Cuyo and Northwest, an insignificant loyalty-card effect in Patagonia only, and an attenuated competitor effect in Pampeana.

Table 5 Estimates corresponding to equation (2) using different methods of estimation, for the period January 2016 – July 2019, for Gasoline products.

	(1) OLS	(2) IV	(3) RC
Price	-0.001 (0.003)	-0.173*** (0.013)	-0.180*** (0.049)
Premium	-0.150*** (0.028)	0.683*** (0.069)	0.772*** (0.217)
Reward card	0.307*** (0.037)	0.594*** (0.047)	0.767** (0.268)
Wholesale comp.	-0.387*** (0.009)	-0.634*** (0.021)	-0.837*** (0.131)
Flagged outlets	1.803*** (0.083)	1.473*** (0.096)	1.270* (0.589)
Urbanization	-1.754*** (0.296)	-3.245*** (0.354)	-6.150* (2.827)
Vehicle fleet	0.138*** (0.019)	0.094*** (0.021)	-0.068 (0.156)
Constant	2.887*** (0.299)	11.367*** (0.697)	16.819** (5.884)
Observations	10,333	10,333	10,333
R ²	0.217	n/a ^a	0.236

Notes: Region controls: Cuyo, Pampeana, Patagonia, NOA and NEA in (1) and (2). Standard errors in parentheses. RC = Random Coefficients [Swamy (1970) estimator]. ^a IV R^2 not computed: mixed instrument structure (2 instruments regions 1–4, 1 instrument Pampeana) yields $e(r2) = .$ in Stata. RC R^2 computed as $1 - \text{RSS}/\text{TSS}$ using Swamy region-specific fitted values. The Swamy (1970) coefficient-homogeneity test rejects H_0 at any conventional level ($T_2 = 911.12$, $\chi^2(32)$, $p < 0.001$), supporting the random-coefficients specification over a common-slope fixed-effects model. A formal Hausman test was not feasible because `ivregress gmm` with `vce(robust)` is incompatible with Stata’s `hausman` command (`rc=198`). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

3.5 Predicted Markups

Using the estimates given by the random coefficients model and the specification given by equation (4), we can recover the markup measure or Lerner index, given by

$$\frac{p_{jt} - c_{jt}}{p_{jt}} = \frac{s_{jt}/p_{jt}}{|\partial s_{jt}/\partial p_{jt}|}.$$

Table 6 reports average Lerner indices by company and product nationally. Under the random coefficients model, common diesel shows greater average market power than premium diesel, intuitive given that premium varieties have an immediate, lower-cost substitute; gasoline shows the opposite pattern for most large firms. Among the top three firms by volume (YPF, Shell, Axion), gasoline markups are broadly similar between regular and premium varieties, but Refinor — the fourth-largest gasoline participant, partly owned by YPF — is a notable exception: its national regular-gasoline markup (8.23) more than doubles its premium markup (3.68), a divergence particularly sharp in Pampeana (34.50 vs. 18.99) and consistent with differential pricing strategies enabled by its ownership structure and geographic positioning.

YPF shows the highest markups of any flag for every product, consistent with its leading market share, while Oil Combustibles, Axion, SCP, and Refinor also rank among the highest depending on product, and PDV Sur, Puma, Petrobras, and Pampa Energía rank lowest.⁴

⁴ Among companies whose operations are not marginal on an individual basis. Values are period averages, so a firm’s ranking can vary within the 2016–2019 window.

Table 6 Average markups by company and product, total country, period January 2016–July 2019.

	Diesel	Premium Diesel	Gasoline	Premium Gasoline
Axion	5.25	7.05	5.33	5.00
Dapsa	3.61	.	4.08	4.40
Gulf	4.21	4.19	1.99	2.42
Oil Comb.	8.56	5.07	3.77	1.88
Pampa Energía	2.84	2.73	1.67	0.94
PDV Sur	0.10	0.03	0.08	0.02
Petrobras	3.00	1.71	1.75	1.00
Puma	2.82	2.40	1.74	0.78
Refinor	4.03	3.34	8.23	3.68
Shell	3.46	5.64	3.08	3.11
SCP	5.96	5.00	5.92	5.31
YPF	16.18	13.90	8.97	9.07

Notes: Results from the estimations of the random coefficients model. Average markups weighted by sales volume per company. Empty cells indicate insufficient data for estimation.

3.6 Determinants of estimated markups

Table 7 reports OLS regressions of the monthly Lerner index on market concentration (log HHI), the number of wholesale competitors, and firm-level controls, with SE clustered at the firm level (13 clusters): column (1) includes only market structure variables, (2) adds firm-level controls and product/year FE, and (3) adds firm and region FE.

Table 7 Determinants of estimated Lerner indices.

	(1)	(2)	(3)
Log HHI	−1.439 (0.681)	−2.125* (1.052)	1.793** (0.563)
N competitors (wholesale)	−3.043*** (0.219)	−2.720*** (0.248)	−2.684*** (0.327)
Flagged outlets (%)		17.358*** (1.226)	8.717*** (1.649)
Loyalty card (dummy)		−1.142 (1.209)	−4.365*** (0.281)
Urbanization			1.303 (6.205)
Log vehicle fleet			0.627 (0.422)
Constant	33.418** (9.733)	39.696** (13.372)	−7.198 (4.328)
Product FE	No	Yes	Yes
Year FE	No	Yes	Yes
Firm FE	No	No	Yes
Region FE	No	No	Yes
Observations	26,701	26,701	26,701
R ²	0.324	0.484	0.555
Clusters (firms)	13	13	13

Notes: Dependent variable: monthly Lerner index. Unit of observation is the wholesale firm $\times$ region $\times$ product $\times$ month. OLS with SE clustered at the firm level to account for within-firm correlation across regions and periods. HHI in conventional units (0–10,000). Spec. (3): log HHI loses identification when region FE absorb cross-regional variation; sign reversal is expected and the preferred specification is (2). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results document two robust findings. First, the number of wholesale competitors has a negative and highly significant effect on markups across all specifications — each additional competitor reduces the Lerner index by approximately 2.7 to 3.0 percentage points, holding other factors constant — confirming that local competitive pressure, not aggregate national market share, is the primary determinant of market power. Second, the share of flagged outlets operated by a firm in the province raises

markups significantly (column 2: 17.4 percentage points per unit increase), consistent with [Pinkse et al \(2002\)](#): a denser proprietary distribution network reduces the effective alternatives available to buyers.

The coefficient on log HHI is negative and marginally significant in column (2) ($p = 0.066$), suggesting a market-discipline effect of dominant-firm pricing conditional on the number of competitors; in column (3) the sign reverses because region fixed effects absorb the cross-regional variation needed to identify it, so that coefficient should not be read causally. Column (2) is the preferred specification, preserving cross-regional identifying variation while controlling for firm characteristics and temporal trends.

Substantial regional differences also emerge within products. Table 8 reports average Lerner indices by region for each product; Tables 9–12 below report the full company-by-region detail underlying these regional averages. For diesel, markups are lowest in Pampeana — the most competitive region — for almost every company, with YPF and Oil Combustibles consistently above the national average and Puma consistently below it. Gasoline shows the opposite regional ordering: Cuyo and Northwest have the lowest average margins, while Patagonia is highest, consistent with its sparse service-station network (Table 3); Refinor — partly owned by YPF, which may influence its pricing — posts the highest regional gasoline markups outside Cuyo. The 2018 Oil Combustibles bankruptcy and the subsequent SCP–DAPSA merger are also visible at the regional level: SCP’s post-merger markups exceed DAPSA’s pre-merger markups in the regions where it inherited those assets, for both diesel varieties. Within-firm dispersion across regions is itself substantial — YPF’s regular diesel markup ranges from 8.64 (Pampeana) to 24.03 (Cuyo), a ratio of 2.8 — reinforcing that geography, not firm identity alone, shapes market power.

Table 8 Average markups by region and product, period January 2016–July 2019.

	Diesel	Premium Diesel	Gasoline	Premium Gasoline
Cuyo	8.32	9.54	1.78	1.63
Patagonia	7.12	6.36	13.94	11.73
Northeast	9.38	6.63	10.74	11.27
Northwest	6.77	6.99	4.14	4.32
Pampeana	3.18	2.91	11.22	9.72

Notes: Results from the estimations of the random coefficients model. Markups weighted by sales volume per company within region.

Table 9 Markups by company and region, for common diesel, period January 2016–July 2019.

	Cuyo	Patagonia	Northeast	Northwest	Pampeana
Axion	6.62	5.90	6.81	4.31	4.40
Dapsa	12.79	.	11.72	.	1.90
Gulf	1.37	.	1.43	.	3.94
Oil Comb.	12.86	9.72	14.18	11.48	5.47
Pampa Energía	5.06	8.47	12.16	.	1.53
PDV Sur	.	.	.	.	0.11
Petrobras	3.29	8.49	17.21	.	1.32
Puma	2.11	3.59	0.94	1.45	1.81
Refinor	.	0.62	0.45	4.08	0.82
Shell	1.70	0.89	4.79	3.02	4.32
SCP	13.35	.	14.67	.	3.85
YPF	24.03	19.25	18.84	16.30	8.64
Average	8.32	7.12	9.38	6.77	3.18

Notes: Results from the estimations of the random coefficients model. Average markups are weighted by sales volume per company. Empty cells indicate insufficient data for estimation.

Table 10 Markups by company and region, for premium diesel, period January 2016–July 2019.

	Cuyo	Patagonia	Northeast	Northwest	Pampeana
Axion	12.15	6.53	9.38	7.89	4.48
Dapsa	.	.	.	.	.
Gulf	3.22	.	5.80	.	3.00
Oil Comb.	4.86	.	6.45	12.31	2.55
Pampa Energía	.	5.75	.	.	0.74
PDV Sur	.	.	0.34	.	0.03
Petrobras	.	3.59	.	.	0.74
Puma	3.66	2.08	0.33	0.61	1.19
Refinor	.	.	.	2.79	.
Shell	8.36	2.09	6.57	3.19	5.68
SCP	10.50	.	9.50	.	3.61
YPF	24.00	18.10	14.68	15.16	7.07
Average	9.54	6.36	6.63	6.99	2.91

Notes: Results from the estimations of the random coefficients model. Average markups are weighted by sales volume per company. Empty cells indicate insufficient data for estimation.

Table 11 Markups by company and region, for gasoline, period January 2016–July 2019.

	Cuyo	Patagonia	Northeast	Northwest	Pampeana
Axion	2.00	11.11	10.11	3.60	16.32
Dapsa	2.19	.	13.37	.	10.51
Gulf	1.17	.	1.87	.	11.81
Oil Comb.	1.64	.	12.56	4.98	7.64
Pampa Energía	.	10.69	.	.	3.26
PDV Sur	.	.	.	.	0.25
Petrobras	.	10.91	.	.	3.56
Puma	0.34	6.34	1.62	0.94	4.14
Refinor	.	27.25	21.86	7.49	34.50
Shell	0.77	0.55	6.42	1.22	13.46
SCP	2.34	.	13.84	.	17.03
YPF	3.79	23.86	14.33	7.47	20.75
Average	1.78	13.94	10.74	4.14	11.22

Notes: Results from the estimations of the random coefficients model. Average markups are weighted by sales volume per company. Empty cells indicate insufficient data for estimation.

Table 12 Markups by company and region, for premium gasoline, period January 2016–July 2019.

	Cuyo	Patagonia	Northeast	Northwest	Pampeana
Axion	1.58	8.98	8.03	4.02	14.62
Dapsa	2.21	.	10.00	.	12.75
Gulf	1.90	.	21.71	.	12.00
Oil Comb.	0.55	.	4.93	3.90	3.08
Pampa Energía	.	5.56	.	.	1.82
PDV Sur	.	.	.	.	0.07
Petrobras	.	6.05	.	.	2.07
Puma	0.07	2.49	0.21	0.16	1.86
Refinor	.	27.67	11.42	3.81	18.99
Shell	0.87	1.25	5.95	1.50	13.82
SCP	2.01	.	13.82	.	17.52
YPF	3.70	23.26	14.26	8.19	20.64
Average	1.63	11.73	11.27	4.32	9.72

Notes: Results from the estimations of the random coefficients model. Average markups are weighted by sales volume per company. Empty cells indicate insufficient data for estimation.

4 Conclusions

This paper estimates market power in Argentina’s wholesale liquid fuels market during the deregulation period 2016–2019, applying the structural demand framework of [Berry \(1994\)](#) and [Berry et al \(1995\)](#) to the derived demand of service stations for wholesale supply. Three results stand out.

First, market power is substantial and heterogeneous. YPF, the dominant state-controlled supplier, consistently exhibits the highest Lerner indices across all products and regions, reflecting both its national market share leadership and its role as the implicit price anchor for the sector. However, heterogeneity is equally important: firms operating in remote or low-density regions — particularly Patagonia and the Northeast — can sustain markups exceeding those of larger competitors in the densest markets, because geographic isolation and sparse service station networks deteriorate the outside option of captive buyers.

Second, local competitive structure — not aggregate concentration — is the primary driver of markup variation. Each additional wholesale competitor reduces the Lerner index by approximately 2.7 to 3.0 percentage points, stable across specifications and dominating the HHI, while a denser proprietary outlet network raises markups by reducing buyers’ effective alternatives, consistent with the geographic differentiation literature (Pinkse et al, 2002).

Third, firm-level dynamics matter: SCP’s markups are consistently higher than DAPSA’s in the regions where it inherited assets from the Oil Combustibles bankruptcy and subsequent merger, consistent with concentration-driven market power gains, and the outside option definition introduced here — based on potential rather than observed sales — is essential for measuring market shares accurately through these transition years.

These results have direct implications for energy regulation: the 2017 deregulation was motivated by efficiency concerns, but price liberalisation in a concentrated, high-barrier, geographically heterogeneous market does not guarantee competitive outcomes. Service station owners in remote areas face a deteriorated bargaining position relative to Pampeana, passed through to final consumers, so regulatory frameworks that account for regional market structure — rather than uniform national concentration thresholds — would better capture the welfare implications of market power in this sector.

This paper is, to our knowledge, the first BLP application to a wholesale fuel market in a developing country. Future work could extend the analysis in several directions: incorporating heterogeneous cost structures across firms, modelling the renegotiation of long-term supply contracts explicitly, and replicating the approach in other large Latin American markets such as Brazil, Chile, or Peru, where similar combinations of geographic heterogeneity, dominant incumbents, and periodic deregulation episodes provide comparable empirical settings.

Declarations

Data availability. Wholesale sales data were obtained from Argentina’s Secretaría de Energía (Sistema de Información de Hidrocarburos), combined with INDEC, Dirección Nacional de Vialidad, and ACARA data (Appendix B); the constructed dataset is available from the authors upon reasonable request.

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References

- Bachmeier LJ, Griffin JM (2003) New evidence on asymmetric gasoline price responses. *Review of Economics and Statistics* 85(3):772–776
- Bacon RW (1991) Rockets and feathers: The asymmetric speed of adjustment of UK retail gasoline prices to cost changes. *Energy Economics* 13(3):211–218
- Berry S (1994) Estimating discrete-choice models of product differentiation. *RAND Journal of Economics* pp 242–262
- Berry S, Levinsohn J, Pakes A (1995) Automobile prices in market equilibrium. *Econometrica* pp 841–890
- Brown J, Hastings J, Mansur ET, et al (2008) Reformulating competition? Gasoline content regulation and wholesale gasoline prices. *Journal of Environmental Economics and Management* 55(1):1–19
- Byrne DP, De Roos N (2019) Learning to coordinate: A study in retail gasoline. *American Economic Review* 109(2):591–619

- Carranza JE, Clark R, Houde JF (2015) Price controls and market structure: Evidence from gasoline retail markets. *Journal of Industrial Economics* 63(1):152–198
- Clark JM (1947) *Studies in the Economics of Overhead Costs*. University of Chicago Press, Chicago
- Coloma G (2002) The effect of the Repsol-YPF merger on the Argentine gasoline market. *Review of Industrial Organization* 21(4):399–418
- Coria MM (2005) Determinantes del consumo de combustibles líquidos en Argentina. Programa de estímulo a la investigación y aportes pedagógicos, trabajo de investigación
- Godby R, Lintner AM, Stengos T, et al (2000) Testing for asymmetric pricing in the Canadian retail gasoline market. *Energy Economics* 22(3):349–368
- Hastings JS (2004) Vertical relationships and competition in retail gasoline markets: Empirical evidence from contract changes in Southern California. *American Economic Review* 94(1):317–328
- Houde JF (2012) Spatial differentiation and vertical mergers in retail markets for gasoline. *American Economic Review* 102(5):2147–2182
- Lewis MS (2012) Price leadership and coordination in retail gasoline markets with price cycles. *International Journal of Industrial Organization* 30(4):342–351
- MacLeod WB, Malcomson JM (1989) Implicit contracts, incentive compatibility, and involuntary unemployment. *Econometrica* 57(2):447–480
- Mercuri P (2001) Asimetrías en la respuesta de los precios de los combustibles líquidos a cambios en el precio del crudo: El caso argentino, anales XXXVI Reunión Anual de la Asociación Argentina de Economía Política
- Montero JP, Guzman JI (2010) Output-expanding collusion in the presence of a competitive fringe. *The Journal of Industrial Economics* 58(1):106–126. <https://doi.org/10.1111/j.1467-6451.2010.00410.x>
- Nevo A (2000) A practitioner’s guide to estimation of random-coefficients logit models of demand. *Journal of Economics & Management Strategy* 9(4):513–548
- Pennerstorfer D (2009) Spatial price competition in retail gasoline markets: Evidence from Austria. *Annals of Regional Science* 43(1):133–158
- Pinkse J, Slade M, Brett C (2002) Spatial price competition: A semiparametric approach. *Econometrica* 70(3):1111–1153
- Porto A, Pizzi F (2018) Transmisión del precio internacional del petróleo a los precios internos del petróleo y los combustibles en la Argentina, documentos de Trabajo, Departamento de Economía, UNLP
- Slade ME (1992) Vancouver’s gasoline-price wars: An empirical exercise in uncovering supergame strategies. *Review of Economic Studies* 59(2):257–276
- Swamy PAVB (1970) Efficient inference in a random coefficient regression model. *Econometrica* 38(2):311–323
- Taylor CT, Fischer JS (2003) A review of west coast gasoline pricing and the impact of regulations. *International Journal of the Economics of Business* 10(2):225–243
- Villas-Boas SB (2007) Vertical relationships between manufacturers and retailers: Inference with limited data. *Review of Economic Studies* 74(2):625–652
- Wang Z (2008) Collusive communication and pricing coordination in a retail gasoline market. *Review of Industrial Organization* 32(1):35–52
- Yu Y, Cui J, Huang C, et al (2022) Allies or rivals? Spatial price competition in the Chinese retail gasoline market of Inner Mongolia. *Spatial Economic Analysis* <https://doi.org/10.1080/17421772.2022.2118361>

Appendix A Supplementary estimation results

Instrument validity diagnostics and regional demand estimates from the [Swamy \(1970\)](#) model, for diesel and gasoline, are reported in the Online Supplementary Material (Tables S1–S4).

Appendix B Database Considerations

The main source is the wholesale sales database published by the National Energy Secretariat (volume and price by product, firm, and sale point, monthly), combined with retail outlet counts per company, regrouped for ownership changes (notably the Petrobras→Pampa Energía→Trafigura/Puma chain and the Oil Combustibles bankruptcy); INDEC provides urbanisation levels and ACARA (Asociación de Concessionarios de autos de la República Argentina) vehicle fleet data. Prices are homogenised to December 2020 (net of taxes, INDEC’s Wholesale Price Index); market share is a company’s share of sales volume within the “province/month/marketing channel” market, per by-product, excluding own-outlet sales, over January 2016–July 2019, preceding the August 2019 freeze (Decree 566/2019). The sample is further restricted to $\delta_j > 0$ (rational participation, [Berry, 1994](#)): 16,218 diesel and 10,333 gasoline observations, with marginal exclusions (Online Supplementary Material).

Supplementary Files

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