The Welfare Effects of Nonlinear Prices in Supply Chains*

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*The views expressed are those of the authors and do not necessarily represent the views of the Central Bank of Chile or its board members.

Motivation

- Policy makers have raised concerns about rising market power and its effects on efficiency
- Renewed concerns over price discrimination harming small firms in B2B markets (FTC, 2025)
- Market power per se does not generate inefficiencies, its effects rely on **pricing conduct**
- **Linear pricing** is commonly assumed

Motivation

- Policy makers have raised concerns about rising market power and its effects on efficiency
- Renewed concerns over price discrimination harming small firms in B2B markets (FTC, 2025)
- Market power per se does not generate inefficiencies, its effects rely on **pricing conduct**
- **Linear pricing** is commonly assumed
- However, we find suggestive evidence of **nonlinear pricing prevalence** (B2B for Chile)
- B2B transactions in 2016 about 15 times B2C value on e-commerce in the US (OECD, 2019)

This Paper: What are the market power costs in nonlinear price setups?

Model

- Quantitative model of nonlinear prices in supply chains
- **Average unit price is not allocative**
- Allocations and rents distribution have **different distortions relative to linear prices**

Quantification

- Using Chilean IRS VAT data, we calibrate the model
- We find that **market power welfare costs are overestimated in linear price setups**
- Identify what distortions drive welfare differences across assumed pricing regimes

Selected Related Literature

Distorted Economies and Firm Entry

- Mankiw & Whinston 1986, Hopenhayn 1992, Baqaee & Farhi 2020, Edmond, Midrigan & Xu (2023)
- **We include distortions due to price discrimination**

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- **We include distortions due to price discrimination**

Price Discrimination

- Mussa & Rosen (1978), Borenstein (1985), Wilson (1993), Goldberg (1996), Stole (2007), Bornstein & Peter 20025, Burstein, Cravino, & Rojas (2025)
- **We focus on supply chains with two-sided price discrimination**

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Optimal Nonlinear Price: Basic Construct

- One seller with **constant marginal cost** c faces a **continuous of buyers** indexed by z
- Buyer **types Pareto distributed** with PDF and CDF ($z_{min} = 1$):

$$f(z) = \kappa z^{-\kappa-1} \qquad F(z) = 1 - z^{-\kappa}$$

- Buyers revenue functions given by:

$$R(z,q) = \frac{z^{\frac{\sigma-1}{\sigma}} q^{\frac{\sigma-1}{\sigma}}}{(\sigma-1)/\sigma}$$

- Revenue function is increasing in buyer type z

Seller profit maximization problem

- Seller knows the distribution of buyers types but doesn't know which one is which
- **charges a nonlinear price**

Mechanism design problem

- Chooses a **transfer** T **and quantities** q for each type z (N_z: total buyer Mass)

$$\max_{\{T(z)q(z)\}} \Pi = \mathbb{E}_z \left[T(z) - cq(z)\right] N_z$$

Subject to

- (IR) Buyers receive non-negative surplus: $\Pi(z, q_z) \geq 0, \quad \forall z$
- (IC) Buyers self-select into their tailored menu: $q_z \in \underset{z}{\text{argmax}}\, \Pi(z, q_z), \quad \forall z$

Optimal Nonlinear Price

The solution to the MD problem given a nonlinear pice schedule total payment $T(q)$

- Gives total payment $T(q)$ for total quantity q
- $p(q) = T'(q)$ interpreted as the price for the q^{th} unit
- Buyer z chooses q to maximize:

$$\underbrace{\frac{z^{\frac{\sigma-1}{\sigma}} q^{\frac{\sigma-1}{\sigma}}}{(\sigma-1)/\sigma}}_{R(z,q)} - P(q)$$

- FOC will yield the **Demand for the q^{th} unit**

$$z^{\frac{\sigma-1}{\sigma}} q^{-\frac{1}{\sigma}} = T'(q) = p(q) \tag{1}$$

Optimal Nonlinear Price Result: Two-Part Tariff

- We solve the mechanism design using the revelation principle ▸ Details
- Two-part tariff (Total Payments $T(q) = p(q) \cdot q(z)$):

$$T(q) = \mathbf{F_{z_0}} + \mathbf{p}\, q_z, \quad \forall z$$

- **Flat fee:** Extract surplus of lowest type $F_{z_0} = \Pi_{z_0}$
- **Linear allocative price**: $p = \frac{\rho}{\rho - 1} c, \quad \rho = \frac{\sigma\kappa}{\sigma - 1}, \quad \rho > \sigma$ (Result from Pareto distribution)

Is price deviation profitable for any $z > z_a$?

- Heuristic argument (Wilson 1993) to derive the optimal price $p(q)$
- Define marginal buyer $z(q,p)$ by inverting demand for the q^{th} unit (equation 1)

$$z(q,p) = q^{\frac{1}{\sigma-1}} p^{\frac{\sigma}{\sigma-1}}$$

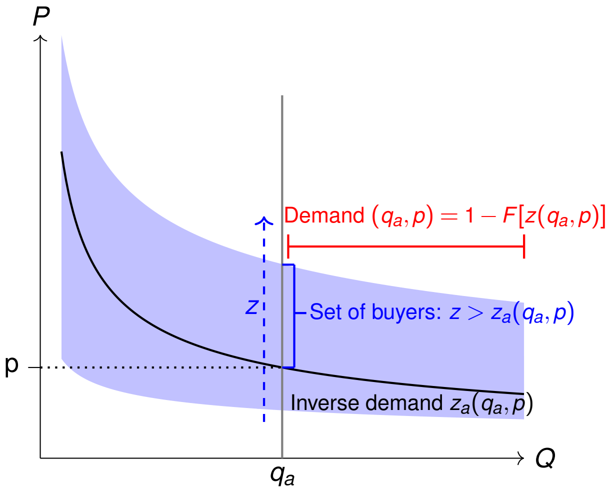
- Demand for q^{th} unit:

$$D(q,p) = 1 - F(z(q,p))$$

- Seller chooses a price for unit “q” to solve:

$$\max_p \left[1 - F(z_a(q_a,p))\right](p-c)$$

Implication 1: No profitable deviation in price



$$\max_{\{P\}} [1 - F(z_a(q_a, p))](P - c)$$

$FOC:$

$$\frac{P}{c} = \frac{\frac{\kappa\sigma}{\sigma-1}}{\frac{\kappa\sigma}{\sigma-1} - 1} = \frac{\rho}{\rho - 1}$$

- The optimal price is equal to the **allocative price of the two-part tariff**
- Seller has no incentive to charge different prices for different quantities

Implication 2: Should the Seller Exclude Low Types? No

In nonlinear pricing with private information, the seller always faces a choice:

1. Exclude low types to better extract surplus from high types

2. Serve all types, but give up some rent from high types

- However, Pareto distribution has heavy mass for low types

- Even though low types buy little q, because of their large density the seller maximizes profits by serving them ▸ Details

Reproducible argument

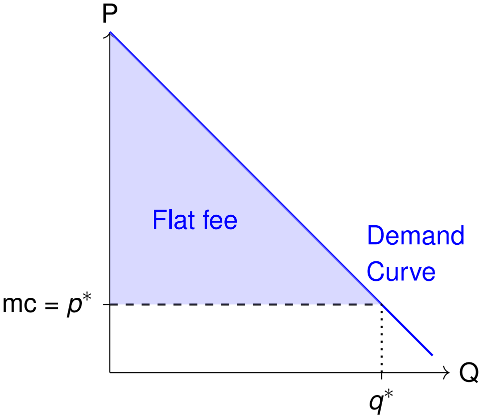
- Under a set of assumptions setup is reproducible to a supply chain with an arbitrary number of sellers, buyers and layers
- Producers of intermediate goods can price discriminate and be price discriminated against with nonlinear prices

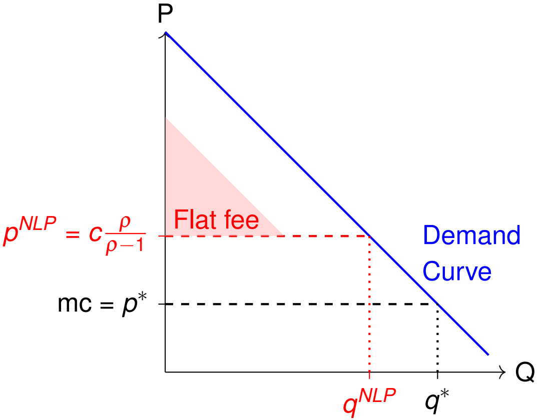
Needed assumptions

1. Homotethic revenue functions in the shape $R(q,z) = A(z)q^{\theta}$, for any arbitrary θ
2. Pareto distributed firm types
3. Firms have constant marginal cost (can be a result)

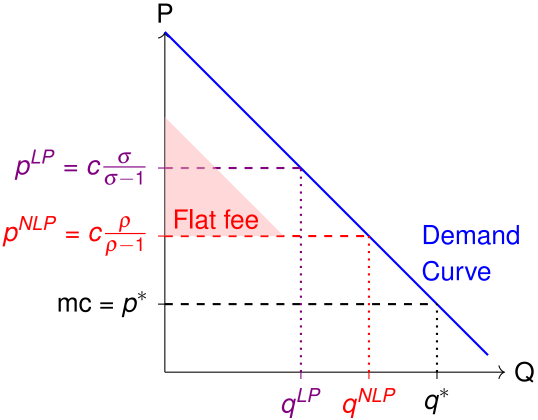
Optimal nonlinear prices take the form of a single Two-part tariff

Two-Part Tariff: First Degree vs. Nonlinear Pricing





Two-Part Tariff: NLP vs LP CES markup ($\rho > \sigma$)



- Allocations in NLP are less distorted relative to LP

$$q^* > q^{NLP} > q^{LP}$$

- Because of the flat fee, rents are subject to different distortions in NLP vs. LP

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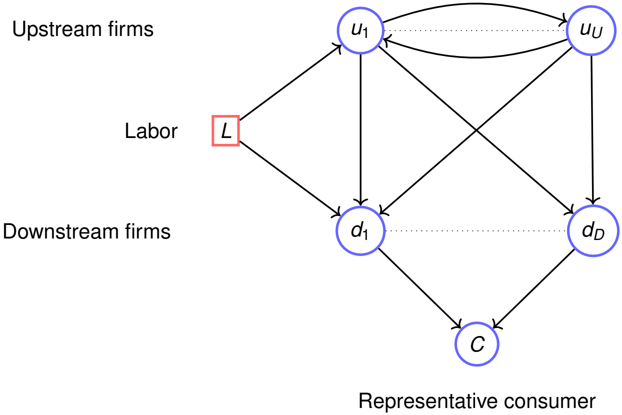
Supply Chain Structure



Representative Consumer

- CES aggregator on downstream varieties d

$$Y = \left(\int_{d_0} q_d^{\frac{\sigma-1}{\sigma}} N_D \mu_d dd \right)^{\frac{\sigma}{\sigma-1}}$$

- N_D is the mass of downstream firms and $\mu(z)$ is the density of type z firms
- Offer labor and owns firms and receive their profits
- Budget constraint: $Y = wL^P + \Pi^U + \Pi^D$
- Exogenous aggregate labor supply; labor market clearing: $L^T = L^P + L^E$

Production

- Firm partition on upstream $u \in U$ (sells to other firms only) and downstream $d \in D$ firms (sell to final consumers only)
- Cobb-Douglas production function for all firms $i \in D + U$

$$q_i = A_i \, L_i^{\alpha} M_i^{1-\alpha}$$

- M is a CES bundle of upstream varieties:

$$M_i = \left[\int_{u_0} m_{iu}^{\frac{\sigma-1}{\sigma}} N_U \mu(\zeta) du \right]^{\frac{\sigma}{\sigma-1}}$$

- N_u is the mass of upstream firms and μ_u the density of upstream firms type u

Firm Entry

- Static model, where firms decide to enter and conditional on entry, produce
- Unbounded pool of prospective entrants that are ex-ante identical
- Pay a sunk cost c_e in units of labor
- Upon entry, firms draw a type from a layer-specific Pareto distribution G_U, G_D with tail κ_U, κ_D,
- Free entry into both firms groups ($\mathbb{E}[\pi_\gamma] = c_e w$); M_U, M_D **are endogenous**
- Equilibrium mass of firms

$$\underbrace{M_E}_{\text{Entrant}} = \underbrace{(M_U + M_D)}_{\text{Mass of Firms}}$$

Linear Price Equilibrium

- Firms demand input to minimize expenditure given linear prices
- Firms choose a linear price, Upstream and Downstream

$$\max_{p_i} (p_i - MC_i) \underbrace{D_i}_{\text{Demand}}, \quad i \in \{\text{Upstream, Downstream}\}$$

- markup:

$$\frac{p_i}{MC_i} = \frac{\sigma}{\sigma - 1}$$

- Firm production is distorted and smaller relative to the planner's solution

Planner's Price Equilibrium

- Firms must charge markups to incentivize the optimal entry level
- But markup distorts input choices by acting as a uniform tax on production
- An output subsidy can restore undistorted marginal cost, conditional on entry
- The subsidy is paid via a lump sum tax to the representative consumer
- With linear prices, the **efficient allocation** is achieved with an output subsidy:

$$\tau_i = \frac{\sigma - 1}{\sigma}$$

Nonlinear Price Equilibrium Setup

1. **Upstream firms charge nonlinear prices** to other upstream firms and downstream firms
2. Downstream firms charge linear prices to the representative consumer, normalized to 1 price
3. **Firms are infinitesimal** and do not internalize other firms' outcomes nor their actions' effects on other firms

Nonlinear Price Equilibriium Reproducible Assumptions

Using the reproducible argument requires the following assumptions:

1. Homotethic revenue functions in the shape $R(q,z) = A(z)q^{\theta}$, for any arbitrary θ
   Achieved trough Cobb-Dougles PF and CES input demands

2. Pareto distributed firm types
   Assumption

3. Firms have constant marginal cost (Result in our model)
   Given CES structure give a fully connected network, under our guesses:

$$c_i(w, p_m) = \frac{1}{A_i}\left[\alpha^{\eta} w^{1-\eta} + (1-\alpha)^{\eta} p_m^{1-\eta}\right]^{\frac{1}{1-\eta}}, \quad \text{where} \quad p_m = \left(\int_{u_0} p_u^{1-\sigma} N_u \mu_u \, du\right)^{\frac{1}{1-\sigma}}$$

General Equilibrium

Upstream profit maximization problem

Guesses:

1. Seller chooses a two-part tariff: $T = F + p(q)m$
2. Revenue shape: $R_i = q_i^{\theta} A_i, \quad \forall i$

Mechanism design problem

- Chose a transfer (T) and quantities (m), separately for upstream (u) and downstream (d) firms

$$\max_{\substack{\{T_{ud}, m_{ud}\},\\ \{T_{uu'}, m_{uu'}\}}} \Pi_u = \underbrace{\mathbb{E}_d \left[T_{ud} - c_u \, m_{ud}\right] N_D}_{\text{Downstream firms}} + \underbrace{\mathbb{E}_u \left[T_{uu'} - c_u \, m_{uu'}\right] N_U}_{\text{Other upstream firms}}$$

Subject to

- Individual Rationality (IR): Buyers receive non-negative surplus from buying
- Incentive Compatibility (IC): Buyers self-select into their tailored menu

Upstream price scheme

A flat fee and a linear component describe the solution to the mechanism design problem of the seller:

$$T_{ui} = F_{ui} + p_u m_{ui}, \quad i \in \{U, D\}$$

Flat fee: Extract surplus of lower (upstream or downstream) type

Linear allocative markup: $p_u = \frac{\rho}{\rho - 1} c_u, \quad \rho = \frac{\sigma \kappa}{\sigma - 1}, \quad \rho > \sigma$

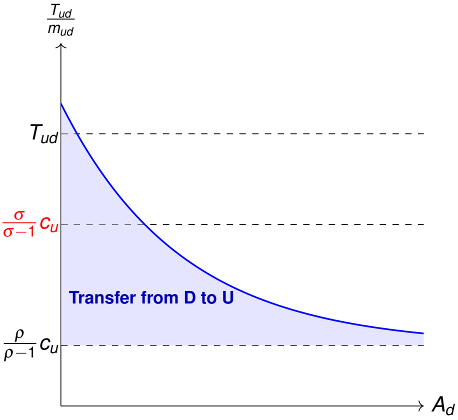
- Two different flat fees for upstream and downstream firms
- Allocative markup is smaller than linear price markup ($\rho > \sigma$)
- Upstream has no incentives to deviate on price or exclude any type

Upstream unit price scheme to downstream firms

Unit price paid by downstream firms:

$$\frac{T_{ud}}{m_{ud}} = \frac{F_{ud}}{m_{ud}} + p_u$$

- The flat fee unit price share is decreasing in firm productivity A_d:
- Allocative markup: $\frac{\rho}{\rho-1} < \frac{\sigma}{\sigma-1}$
- Transfer from downstream to upstream firms: $\frac{F_{ud}}{m_{ud}}$



Welfare: Nonlinear Pricing (NLP) vs Linear Pricing (LP)

- Weighted mean output per firm:

$$\widehat{q}^r = \left[\int q_d^{\tau} \cdot \mu_d N_D^r(z) dd \right]^{\sigma/\sigma-1} / N_D^r$$

- Welfare in price regime $r \in \{LP, NLP\}$:

$$Y^r = \underbrace{(N_D^r)^{\sigma/\sigma-1}}_{\text{Extensive Margin}} \cdot \underbrace{\widehat{q}^r}_{\text{Intensive Margin}}$$

- Higher output per firm in NLP because of lower “output tax”: $\widehat{q}^{NLP} > \widehat{q}^{LP}$
- Firms substitute m with L; fewer L usage in entry: $N_D^{\mathbf{NLP}} < N_D^{\mathbf{LP}}$
- Effects on welfare will depend on what margin dominates

Welfare: Intensive Margin Wedges For Price Regime r

$$\frac{\widehat{q}^r}{\widehat{q}^{EFF}} = \left(\frac{A_d^r}{A_d^{EFF}}\right)^{\tau} \cdot \left(\frac{l/m^r}{l/m^{EFF}}\right)^{\alpha\tau} \cdot \left(\frac{m^r}{m^{EFF}}\right)^{\tau} \cdot \left(\frac{N_U^r}{N_U^{EFF}}\right)^{\tau/(\sigma-1)}$$

1. **Productivity Selection**: Captures productivity composition
2. **Input Mix**: How far firms deviate from their efficient cost-minimizing input mix
3. **Material Usage**: Material scale usage affected by markups (N-marginalization problem)
4. **Input Variety**: Fewer upstream varieties increase the price index for materials, lowering downstream demand

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Data sources

Invoice example

Invoice transactions for the universe of Chilean formal firms for 2018

- Around 1.3 billion transactions
- More than 10 million different products. Assume seller-specific products
- Data on prices and quantities for every product transacted

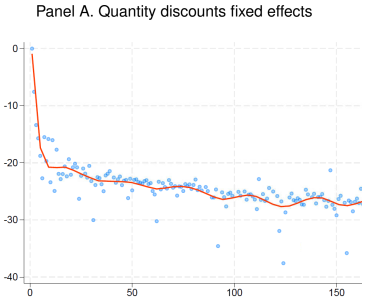
Merged with firms' accounting balance sheet data

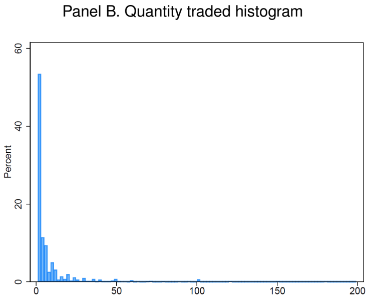
- Sales, materials, investment, 6-digit industry
- Employer-employee: Wages, headcount of employees
- Capital stock and investment

Data Cleaning

Suggestive Evidence of NLP (June 2018)

$$\ln p_{ijg} = \beta_0 + \sum_{r=1}^{200} \beta_r \ln \mathrm{Q\ bin}_r + \ln \psi_{ijg} + \ln \varepsilon_{ig}$$





- Marginal discount decreases with quantity Daily Average effect By industry Price-quantity menus Firm sales Partition

Parameter Calibration

Model Parameters

	Value	Source
Labor share in production (α)	0.48	Calibrated from data
Material bundle elasticity (σ)	3.2	Assumed
Entry cost (c_e)	0.2	Assumed
Productivity Pareto tail (κ)	3.96	Calibrated from data

Productivity Pareto tail

- Firm labor demand scale up with productivity, hence labor is also Pareto distributed
- Labor Pareto Tail MLE estimate from data $\xi = \frac{\kappa}{\sigma - 1} = 1.8$
- Can recover $\kappa = 3.96$

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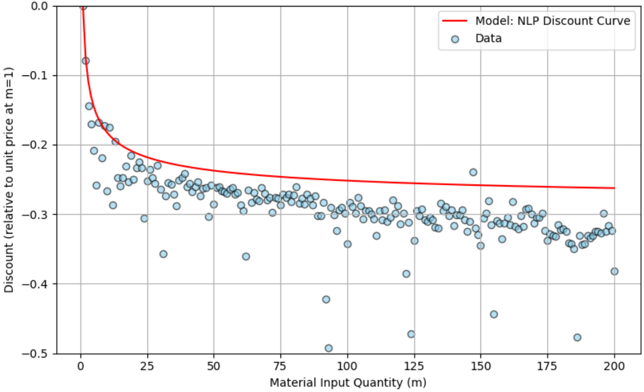
Quantity discounts: Data vs model



- For the average upstream firm price schedule to the downstream firm, normalizing the continuous input quantity to be in the bounds of 1 to 200

Welfare Decomposition Relative to Efficiency

Define the welfare ratio: $\frac{Y^r}{Y^{\text{EFF}}} = \underbrace{\left(\frac{\widehat{q}^r}{\widehat{q}^{\text{EFF}}}\right)}_{\text{Intensive margin}} \cdot \underbrace{\left(\frac{M_z^r}{M_z^{\text{EFF}}}\right)^{\sigma/\sigma-1}}_{\text{Extensive margin}}$

	Linear Pricing (LP)	Nonlinear Pricing(NLP)
Welfare	0.59	0.66
Intensive Margin (Ratio)	0.42	0.50
Extensive Margin (Ratio)	$1.65^{\sigma/\sigma-1}$	$1.50^{\sigma/\sigma-1}$
Intensive Margin (log deviation)	63%	37%
Extensive Margin (log deviation)	62%	38 %

- Welfare losses under NLP are 82% of of LP $((1-66)/(1-59))$
- In log differences intensive margin accounts for 63% of welfare changes

Intensive and Extensive margin: Shares relative to planner pricing

$$\underbrace{\widehat{q}^r}_{\text{Intensive Margin}} = \underbrace{(A_d^r)^{\sigma/\sigma-1}}_{\text{Productivity selection}} \cdot \underbrace{(I/m^r)^{\alpha\sigma/\sigma-1}}_{\text{Input mix}} \cdot \underbrace{(m^r)^{\sigma/\sigma-1}}_{\text{Material usage}} \cdot \underbrace{(N_U^r)^{1/\sigma}}_{\text{Input variety}}$$

Intensive Margin	Linear Pricing	Nonlinear Pricing
Productivity selection	1	1
Input mix	1.36	1.29
Material usage	0.41	0.48
Input variety	0.94	0.87

Extensive Margin	Linear Pricing	Price discrimination
Total firm mass	1.23	1.07
Upstream firms mass	0.85	0.66
Downstream firms mass	1.65	1.51

Intensive margin decomposition ratio: Which component matters the most

$$\underbrace{\widehat{q}^r}_{\text{Intensive Margin}} = \underbrace{(A_d^r)^{\sigma/\sigma-1}}_{\text{Productivity selection}} \cdot \underbrace{(I/m^r)^{\alpha\sigma/\sigma-1}}_{\text{Input mix}} \cdot \underbrace{(m^r)^{\sigma/\sigma-1}}_{\text{Material usage}} \cdot \underbrace{(N_U^r)^{1/\sigma}}_{\text{Input variety}}$$

Log deviations from planners pricing

	Linear Pricing	Nonlinear Pricing
Productivity selection	0%	0%
Input mix	25%	23%
Material usage	71%	65%
Input variety	4%	12%

- No selection as all firm types participate
- Input mix and material distortions explain the bulk of the intensive margin

Fixing Entry $N^{EFF} = N^{NLP}$: Shares relative to planner pricing

Intensive Margin	NLP planner Mass of Firms	NLP
Productivity selection	1	1
Input mix	1.27	1.29
Material usage	0.49	0.48
Input variety	0.86	0.87
Welfare	0.64	0.66

- Total mass of firms fixed but, masses per layer can move in general equilibrium
- With a fixed number of firms, NLP remain to distort welfare through a)inefficient input scaling, b) misallocation across inputs, c) and reduced effective supplier coverage

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Conclusion

- We develop a tractable strategy to solve for optimal linear prices
- Under Pareto distributed firm types, a two-part tariff fits the prices observed in the data
- Accounting for observed price discrimination, markups welfare costs are around 80% of linear price setup costs
- Intensive margin explains around 60% of welfare changes
- Failing to incorporate nonlinear prices overestimate markups welfare costs

Binding Constraints and IC via Envelope Theorem ▸ Return

- (IR) binds only for the lowest type ($z_0 = 1$)
- For all other buyers, the only binding constraint is the downward local (IC)
- Buyer utility:

$$U(z) = \frac{z^{\sigma-1}}{\alpha} q(z)^{1-1/\sigma} - T(z), \quad \alpha = \frac{\sigma}{\sigma - 1}$$

- Envelope theorem:

$$U'(z) = \frac{(\sigma-1)z^{\sigma-2}}{\alpha} q(z)^{1-1/\sigma}$$

- Integrating from lowest type:

$$U(z) = \int_1^z \frac{(\sigma-1)\tilde{z}^{\sigma-2}}{\alpha} q(\tilde{z})^{1-1/\sigma} d\tilde{z}$$

Transformed Seller Profit Maximization problem ▸ Return

$$\max_{q(z)} \int [T(z) - cq(z)] f(z) dz$$

- **Virtual valuation, ϕ**: marginal value of a buyer type z after adjusting for (IC)
- Using $T(z) = \frac{z^{\sigma-1}}{\alpha} q(z)^{1-1/\sigma} - U(z)$ and plugging in $U(z)$, the virtual valuation is

$$\phi(z) = \frac{z^{\sigma-1}}{\alpha} - \frac{1-F(z)}{f(z)} \cdot \frac{d}{dz}\left(\frac{z^{\sigma-1}}{\alpha}\right)$$

- The problem becomes a **pointwise profit maximization problem**

$$\max_{q(z)} \left\{\phi(z) q(z)^{1-1/\sigma} - cq(z)\right\}$$

Solve For Optimal Quantities ▸ Return

- From FOC:

$$q(z) = \left[\frac{(1 - 1/\sigma) \cdot \phi(z)}{c}\right]^{\sigma}$$

- For Pareto-distributed z with parameter κ, we have:

$$\phi(z) = \frac{z^{\sigma-1}}{\alpha}\left(1 - \frac{\sigma - 1}{\kappa}\right) = \frac{z^{\sigma-1}}{\alpha} \cdot \frac{\rho - \sigma}{\rho}, \quad \text{with } \rho = \frac{\sigma\kappa}{\sigma - 1}$$

- The optimal quantity scales up with type z:

$$q(z) = Bz^{\rho}, \quad \text{where } B = \left(\frac{(1 - 1/\sigma)}{c\alpha} \cdot \frac{\rho - \sigma}{\rho}\right)^{\sigma}$$

Recovering the Transfer Function

- Transfer:

$$T(z) = \frac{z^{\sigma-1}}{\alpha} q(z)^{1-1/\sigma} - U(z)$$

- With envelope theorem:

$$T(z) = \underbrace{\frac{z^{\sigma-1}}{\alpha} q(z)^{1-1/\sigma}}_{\text{Gross Surplus}} - \underbrace{\int_1^z \frac{(\sigma-1)\tilde{z}^{\sigma-2}}{\alpha} q(\tilde{z})^{1-1/\sigma} d\tilde{z}}_{\text{Information Rents}}$$

Flat Fee and Per Unit Price ▸ Return

- Suppose the seller implements a two-part tariff: $T(z) = F + pq(z)$

- Match marginal utility to price:

$$p = \frac{d}{dq}\left(\frac{z^{\sigma-1}}{\alpha}q^{1-1/\sigma}\right) = \frac{z^{\sigma-1}}{\alpha}(1-1/\sigma)q(z)^{-1/\sigma} = \frac{\rho}{\rho-1}c$$

- From (IR) at $z = 1$: $U(1) = 0$, $F = T(1) - pq(1)$:

$$T(1) = \frac{1}{\alpha}q(1)^{1-1/\sigma}, \quad F = \frac{1}{\alpha}q(1)^{1-1/\sigma} - pq(1)$$

1. **Flat fee extracts all surplus from the lowest type**
2. **Constant per unit price as a function of elasticity and Pareto tail**

Implication 2: All types are served ▸ Return

Virtual surplus: profit from serving a buyer type, net of the informational rents that must be left to higher types to preserve IC

- Virtual surplus for type z ($\alpha = \frac{\sigma}{\sigma-1}$:

$$\text{VS}(z) = \underbrace{\left(\frac{z^{\sigma-1}}{\alpha}\right) q(z)^{1-1/\sigma}}_{\text{Gains from serving type } z} - \underbrace{\left(\frac{1-F(z)}{f(z)} \cdot \frac{d}{dz}\left(\frac{z^{\sigma-1}}{\alpha}\right)\right) q(z)^{1-1/\sigma}}_{\text{Informational rents left to ensure IC}}$$

- For the lowest type $z_0 = 1$, the virtual surplus simplifies:

$$\text{VS}(1) = \left[\frac{1}{\alpha}\left(1 - \frac{\sigma-1}{\kappa}\right)\right] q(1)^{1-1/\sigma}$$

- This is strictly positive whenever $\kappa > \sigma - 1$ (necessary condition for finite output)
- If its profitable to serve the lowest type, the seller will not exclude any buyer

General Equilibrium NLP ▸ Return

A decentralized nonlinear pricing equilibrium is a collection of firm level productivity A_i, linear prices $\{p_u, p_d\}$, flat fees $\{F_u, F_d\}$, wage w, and quantities $\{y_i, q_i, l_i, m_{iu}, N_U, N_D\}$ such that:

- Each producer minimizes its costs and charges a linear price that equals marginal cost times the markup
- Each producer pays a transfer, such that the lowest types have zero surplus from transacting with upstream sellers
- Entrants earn zero expected profit
- The representative consumer maximizes its consumption
- Markets clear for all goods and factors

Invoice Example

Return

KITCHEN CENTER SPA

IMPORTACIÓN Y DISTRIBUCIÓN DE ELECTRODOMÉSTICOS

FDV SIMPLE COOK Cuisinart BULL DeLonghi smeg SUPERCOOK Ariete LOFRA

Casa Matriz:	Av. El Salto 3485, Recoleta, Santiago
Sucursales:	
Casa Costanera:	Av. Nueva Costanera 3900, Vitacura
Mall Parque Arauco:	Av. Kennedy 5413 Local 572, Las Condes - Teléfono: (56-2) 24117777 - Fax: (56-2) 24117711
Mall Plaza Los Dominicos:	Padre Hurtado Sur 875, Local A2080/2076, Las Condes - Teléfono: (+56 2) 24117738
Mall Buenaventura:	San Ignacio 500 Local 12, Quilicura - Teléfono: (+56 2) 24117769
Mall Plaza La Serena:	Av. Huanhualí 105 BA 190, La Serena - Teléfono: (56-2) 24117732
Mall Marina Arauco:	Av. Libertad 1348, Local PD-01/02, Viña del Mar - Teléfono: (56-2) 24117767/68
Outlet Park Viña:	Camino Internacional 2440 Local 72, Viña del Mar
Mall Plaza Maule:	Circunvalación 1055, Local 226/227, Talca - Teléfono: (56-2) 24117748
Concepción:	Paicaví 2567, Local 2, Teléfono: (56-2) 2411 7716 / 17
Temuco:	Avda. Alemania 0611, Temuco - Teléfono: (+56 2) 24117774 R
Mall Easton Temuco:	Rudencio Ortega 01780, Local L168-170, Temuco - Teléfono: (+56 2) 24117714
Servicio Técnico:	Lautaro #260, Quilicura - Teléfono: 6004117709 / 737 / 504
Centro de Distribución:	Camino lo Boza #8887, Pudahuel, Santiago
Viña del Mar:	8 Nte. 514, Viña del Mar.
Alto Las Condes:	Av. Kennedy 9001 Local 1017, Las Condes.
Outlet El Salto:	Av. El Salto 3400, Recoleta, Santiago.

R.U.T. 96.999.930-7

BOLETA ELECTRÓNICA

Nº 0015959119

S.I.I. - SANTIAGO NORTE

FECHA EMISIÓN : 01/08/2022

SEÑORES Antonio Martner

DIRECCIÓN Los Misioneros 1923 TELEFONO +569995703551

COMUNA Providencia CIUDAD : Santiago

R.U.T. 16.211.960-5 EMAIL : amartner@gmail.com

FECHA EMISIÓN :

FECHA VENCIMIENTO : 03/08/2022

TIPO DESPACHO :

FORMA DE PAGO : Contado

COD. VENDEDOR :

Dirección Origen: Camino lo Boza 8887

Comuna : Pudahuel Ciudad : Santiago

Dirección Destino: Los Misioneros 1923

Comuna : Providencia Ciudad : Santiago

Orden de Venta: 793325

Número de OC:

CÓDIGO	DETALLE	CANTIDAD	PRECIO UNITARIO	PRECIO ÍTEM
13452	Lavaplatos FDV Small Acqua bajo cubierta	1	92.428,57	92.429
14761	Encimera FDV Design 4T GLTX 65 BUT 2.0	1	142.848,74	142.849
14265	Campana Kubli Neu Slider	1	100.831,93	100.832
19110	Horno FDV Design	1	201.672,27	201.672
13377	Lavavajillas FS FDV Element 14C	1	243.689,07	243.689
14917	Griferia FDV CONICA FLEX	1	84.025,21	84.025
10232	Transporte - Providencia	1	15.529,41	15.529

Data cleaning Return

Goal: Keep all plausible transactions

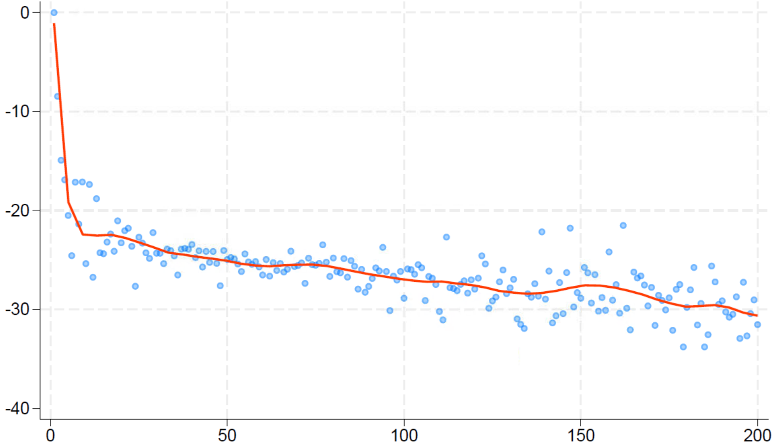
- Prices are net of discounts and recharges
- Drop if a transaction has missing or zero price or quantity
- Drop if product description is missing
- Drop prices above 10 times the mean price by seller-product-day
- Under this cleaning we keep around 99% of transactions

Quantity discounts regressions ▸ Return

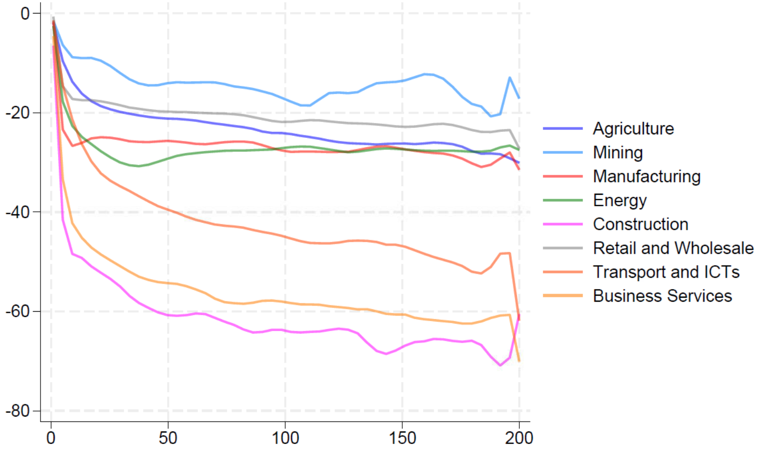
$$\ln p_{ijg} = \beta_0 + \beta_1 \ln q_{ijg} + \ln \psi + \ln \varepsilon_{ijg}$$

	(1)	(2)	(3)	(4)	(5)
ln q	-0.083	-0.051	-0.045	-0.087	-0.071
	(0.00006)	(0.0001)	(0.001)	(0.0001)	(0.00007)
FE Seller×product	✓				
FE Seller×product× buyer		✓			
High price products (>p95)			✓		
Manufacturing				✓	
Retail and wholesale					✓
Observations (millions)	92	52	3.5	25	58
Adjusted R^2	0.928	0.956	0.756	0.911	0.945

Quantity discounts evidence June 29, 2018 ▸ Return



Quantity discounts evidence by seller industry ▸ Return



Price dispersion on price-quantity menus

Return

- Under pure second-degree: fix quantity, price variance should be zero
- Group X:{Seller-Product-Month + Quantity, Buyer}

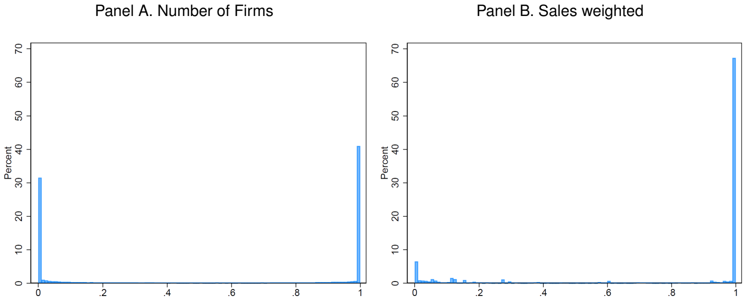
$$C_X = \frac{\text{Standard deviation } p_X}{\text{median } p_X}; \quad X \in \{\text{Seller-Product + Quantity, Buyer}\}$$

	C_X Moments				
	p10	p25	Median	p75	p90
Seller - product	0.00	0.01	0.06	0.17	2.5
Seller - product - quantity	0.00	0.00	0.04	0.14	1.41
Seller - product - quantity - buyer	0.00	0.00	0.00	0.04	0.24

- Evidence of buyer-specific quantity-menus

Sales partition Return

$$X_i = \begin{cases} 0 & \text{if all sales go to final consumers} \\ 1 & \text{if all sales go to other firms} \end{cases}$$



- More than 70% of firms sell only to final consumers or to other firms By sector

Sales partition: Sales shares (excluding exports)

Sector (sales)	All to final consumer	All to other firms
Firm population	0.08	0.67
Agriculture (2%)	0.04	0.60
Mining (1%)	0.27	0.08
Manufacturing (15%)	0.05	0.68
Utilities (3%)	0.20	0.51
Construction (8%)	0.02	0.89
Retail and Wholesale (32%)	0.09	0.68
Transport (10%)	0.16	0.68
Financial Services (18%)	0.18	0.67
Real Estate Services (1%)	0.24	0.37
Business Services (7%)	0.08	0.81
Personal Services (2%)	0.68	0.10