Protectionism Unchained: Determinants and Consequences of Discretionary Trade Policy in Argentina

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Background

- Numerous accounts of discretionary trade policies that favor or punish particular firms or sectors

  - ▶ Differential enforcement of regulation, subsidies, local content restrictions, import licenses, tariff exemptions (Ederington and Ruta 16)
  - ▶ Part of an increasing globalization backlash (Colantone et al. 21)

- Difficult to estimate determinants and consequences of these policies:

  - ▶ Governments typically do not publicize them (e.g., illegal under WTO)
  - ▶ Even then, hard to measure size of non-tariff barriers

- Aggregate effects of trade policy depend on terms of trade, yet still little evidence of price effects, particularly

  - ▶ Due to (arguably more common) non-tariff barriers
  - ▶ From less-developed countries whose firms may have less market power

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Study an episode of discretionary trade policy in Argentina 2012-2015:

1. Unusual policy experiment: every transaction required explicit approval

   ▸ Data on universe of trade transactions requested, denied, and approved

2. Identify both *sector* and *firm* level determinants of these discretionary trade policies

   ▸ Macro imbalances further alter the level and dispersion of protection

3. Did these quantitative restrictions improve terms of trade?

   ▸ Restricting trade increases import prices: Argentine firms paid more for less!
   ▸ (Except when Argentinian importers have high bargaining power)

4. Rationalize results through model of import-export bargaining and use it for quantitative assesment:

   ▸ Weak domestic bargaining power:$\beta \approx 0.1$ identified from the price and quantity responses to policy.
   ▸ Impact of trade restrictions depend on bargaining power: price effects become negative for large enough β.

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Related Literature

- Price effects of trade policy
  - Tariffs: Feenstra 89, Hummels and Skiba 04, Romalis 07, De Locker et al. 15, Irwin 19
  - Quotas: Khandelwal et al. 13
  - 2018-2020 Trade War: Amiti et al. 19, Fajgelbaum et al. 20, Flaaen et al. 20, Cavallo et al. 21,...

- Trade with imperfect competition
  - Oligopoly: Brander and Spencer 84, Eaton and Grossman 86 (Brander 95 literature review)
  - Bargaining: Ornelas and Turner 08, Antras and Staiger 12, Bernard and Dhingra 19, Grossman and Helpman 20, Alviarez et al. 22
  - Developing vs developed countries: Antras 20, WDR 20

- Trade shocks and policies in Argentina
  - Gopinath and Neiman 14, Conconi and Schepel 17, Bernini and Lembergman 20

- Determinants of Protection
  - Large literature, summarized by Rodrik 95, Gawande and Krishna 03

Trade policy in Argentina: 2012-2015

- Stagnating economy, external imbalances, currency controls `more`
    - Trade restrictions in place since around 2009

- In February of 2012, new regulations to importing (DJAI system):
    - *Applied to all products*
    - Firms had to request authorization in advance
    - Government could block the request, totally or partially
    - Decisions made on a discretionary basis
    - Guidelines for appeals introduced informally to trade associations

- Stated goals of the policy:
    - Trade balance, import substitution, domestic prices, investment `more`

- System ended when opposition party unexpectedly won presidency in November 2015.

Data

Universe of transactions: `Consistency`

- Quantities and values **requested** and **approved** (2013-2017)
- Quantities and values **imported** and exported (2011-2017)
- Importing firm identifiers
- Product: 11-digit HS $\times$ origin country $\times$ measurement unit
- Matched to Orbis and D&B for global ultimate owner

Product-level:

- Datamyne and Comtrade for values and quantities (11-digit HS)
- OEDE for labor, wage bill, number of firms (4-digit ISIC)

Policy periods

1. 2011 ("Pre"-restrictions)
2. 2012-2015 ("During")
3. 2016-2017 ("Post")

Requests and Approvals
Transaction-Level Descriptive Statistics

	During DJAI (2012-15)	Post DJAI (2016-17)
Requests per year	3,413,878	2,623,489
Mean value	$33,937	$26,277
Requests fully approved	69.5%	98.1%
Requests partially approved	1.3%	0.2%
Requests fully rejected	29.2%	1.7%
Total value approved	63.5%	89.5%

Graph

Requests and Approvals

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Variance Decomposition of Approval Rates

- Firm identities (rather than sectors) account for substantial fraction variation in approval rates AR (i.e. value approved/value requested):

    ▸ Variance decomposition from regressing

    $$AR_{sfi} = \mu_f + \mu_i + \varepsilon_{sfi}$$

    ▸ where f is firm, i is HS11-unit-origin product, s is import request

- Results:

	During DJAI	Post DJAI
Total sum of squares	1,968,648	47,986
Fraction explained by		
Firm IDs (μ_f)	24.56%	10.57%
Product IDs (μ_i)	2.20%	8.46%

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Approval Rates and Firm and Sectoral Characteristics

- Compute AR_{fi}: average approval rate across requests within firm-product **During DJAI**:

  - where f is firm, i is HS11-unit-origin product

- Project on firm and sectoral characteristics measured **Pre DJAI**:

$$AR_{fi} = X_f \beta + Z_h \gamma + \varepsilon_{fi}$$

  - X_f firm characteristics
  - Z_h sectoral characteristics for HS4 h

Approval Rates and Firm and Sectoral Characteristics

$$AR_{fi} = X_f \beta + Z_h \gamma + \varepsilon_{fi}$$

		AR_{fi}
Firm-level	$\mathbb{1}\{$**Capital importer**$\}$	**0.067***** **(0.001)**
	$\mathbb{1}\{$**Exporter**$\}$	**0.072***** **(0.001)**
	$\mathbb{1}\{$Domestically owned$\}$	-0.045*** (0.001)
	log(Revenue)	-0.007*** (0.000)
	log(Employees)	0.035*** (0.000)
Sector-level	Fraction of capital importers	0.021*** (0.003)
(of imported good)	Fraction of exporters	0.180*** (0.003)
	Fraction domestically owned	0.012*** (0.002)
	log(Total revenue)	0.022*** (0.001)
	log(Total employment)	-0.018*** (0.001)
Constant		0.225*** (0.012)
		N=809,985, R^2=0.176
		F-stat=13,955.2

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Approvals and Pre-DJAI Firm and Sectoral Characteristics

$$AR_{fi}^{\text{H1-13}} = X_f \beta + Z_h \gamma + \varepsilon_{fi}$$

		AR_{fi}	$AR_{fi}^{\text{H1-13}}$
Firm-level	$\mathbb{1}\{\text{Capital importer}\}$	0.067*** (0.001)	0.091*** (0.002)
	$\mathbb{1}\{\text{Exporter}\}$	0.072*** (0.001)	0.057*** (0.002)
	$\mathbb{1}\{\text{Domestically owned}\}$	-0.045*** (0.001)	-0.050*** (0.001)
	log(Revenue)	-0.007*** (0.000)	-0.007*** (0.001)
	log(Employees)	0.035*** (0.000)	0.034*** (0.001)
Sector-level	Fraction of capital importers	0.021*** (0.003)	0.043*** (0.005)
(of imported	Fraction of exporters	0.180*** (0.003)	0.188*** (0.006)
good)	Fraction domestically owned	0.012*** (0.002)	0.011*** (0.003)
	log(Total revenue)	0.022*** (0.001)	0.024*** (0.001)
	log(Total employment)	-0.018*** (0.001)	-0.021*** (0.002)
Constant		0.225*** (0.012)	0.217*** (0.020)
		N=809,985, R^2=0.176	N=281,386, R^2=0.176
		F-stat=13,955.2	F-stat=4,283.4

Prices and Quantities

Pre-During-Post DJAI Effects μ_t (within Firm-Product)

$$\ln y_{fit} = \mu_t + \mu_{fi} + \varepsilon_{fit}$$

$\ln(q_t)$

$\ln(p_t)$
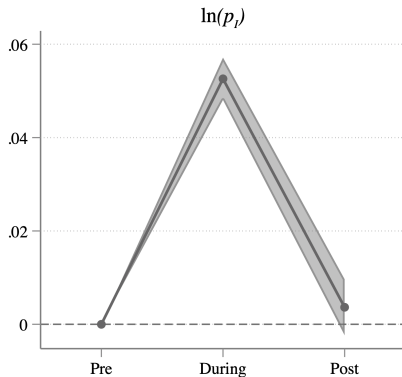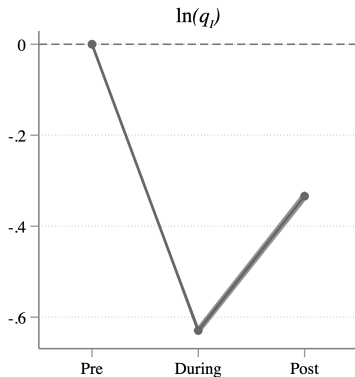
Prices and Quantities by Approval Rate

More Stringent Policy Associated with Lower Quantities and Higher Prices

$$\ln y_{fit} = \mu_t^{Q1AR} + \mu_t^{Q2AR} + \mu_t^{Q3AR} + \mu_t^{Q4AR} + \mu_{fi} + \varepsilon_{fit}$$
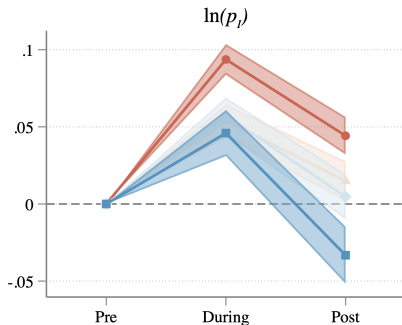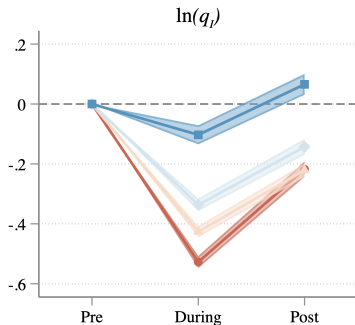

Legend: 1st quart. AR — 2nd quart. AR — 3rd quart. AR — 4th quart. AR

Assessing the Causal Impacts of the DJAI

- Concerns:
  - ▶ Three period analysis—types of firms and products targeted may be on different trajectories during DJAI period (spurious trends)
  - ▶ Policy adjusted based on import values due to unobserved shocks (reverse causation)

- Approach:
  - ▶ Exploit higher frequency variation within the DJAI period ($t = $ 6-month period)
  - ▶ Instrument changes in approval rates (ΔAR)

Instrumenting for Trade Policy through Macro Imbalances

Approval Rates Fell When Foreign Currency Reserves Were Low
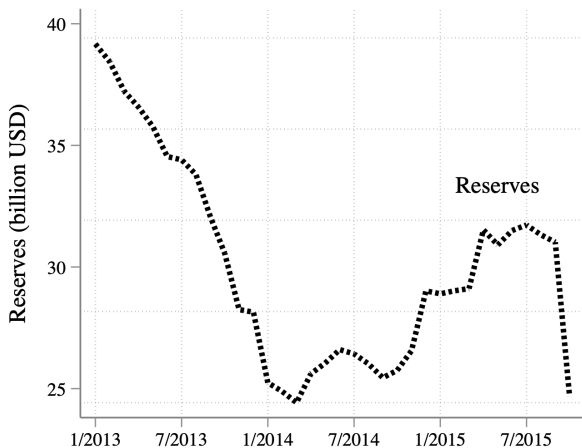
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Approval Rates Fell When Foreign Currency Reserves Were Low

"Zeroth" Stage

$$\Delta AR_{fit} = \gamma \Delta \ln(Reserves_t) \times \widehat{AR}_{fi}^{H1\text{-}13} + \mu_t + \mu_{fi} + \varepsilon_{fit}$$

	ΔAR
$\Delta \ln(Reserves) \times \widehat{AR}^{H1\text{-}13}$	0.105***
	(0.012)
Half-year FE	Yes
Firm-product FE	Yes
Observations	461,119
F-stat	71.5

"Zeroth" Stage

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Firm-products with initially higher predicted ARs experience larger drops in approvals when reserves fall.

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  - ▶ Policy adjusted based on import values due to unobserved shocks (reverse causation)

- Approach:
  - ▶ Exploit variation within the DJAI period (t = 6-month period)
  - ▶ Instrument changes in approval rates (ΔAR) with macro imbalances $\times$ initial characteristics:
    $$\Delta\ln(Reserves_t) \times \widehat{AR}_{fi}^{H1\text{-}13}$$
  - ▶ **Identifying assumption**: initially favored sectors and firms are not subsequently on diff trends coinciding with macro shocks
    - ★ Reassuring: bias of opposite sign from 3 period analysis (where initially unfavored saw biggest quantity reduction)

IV Estimates of the Price and Quantity Effects

Prices rise with (plausibly exogenous) quantity restrictions

1st Stage: $\Delta\ln(q_I)_{fit} = \gamma_1 \Delta\ln(Reserves_t) \times \widehat{AR}_{fi}^{H1\text{-}13} + \mu_t + \mu_{fi} + u_{fit}$

2nd Stage: $\Delta\ln(p_I)_{fit} = \gamma_2 \widehat{\Delta\ln(q_I)}_{fit} + \mu_t + \mu_{fi} + \varepsilon_{fit}$

	1^{st}stage $\Delta\ln(q_I)$	OLS $\Delta\ln(p_I)$	Red.form $\Delta\ln(p_I)$	2^{nd}stage $\Delta\ln(p_I)$
$\Delta\ln(Reserves) \times \widehat{AR}^{H1\text{-}13}$	0.156*** (0.035)		-0.167*** (0.028)	
$\Delta\ln(q_I)$		-0.245*** (0.003)		-1.067*** (0.253)
Half-year FE	Yes	Yes	Yes	Yes
Firm-product FE	Yes	Yes	Yes	Yes
Observations	629,818	629,818	629,818	629,818
F-stat	19.4			

Extensive M

Heterogeneous Effects and Buyer Power

- Focus on a measure of buyer market power
- Import share of firm f among Argentine importers of product $hs11$ from country c:

$$m^F_{h11,f,c} = \frac{(f\text{'s imports from } c)_{h11}}{(\text{Total imports from } c)_{h11}}$$

  - ▶ Measured in 2011 (before DJAI)
  - ▶ $m^F = 1$ means the firm is the sole importer of that product in Argentina
  - ▶ $m^F \to 0$ when there are many firms importing that product in Argentina

Heterogeneous Effects and Buyer Power: Results

Buyer Power Mitigates Price Increases, and Can *Revert* Them

$$\Delta\ln(p_l)_{fit} = \gamma_1 \Delta\ln(Reserves_t) \times \widehat{AR}_{fi}^{H1\text{-}13}$$
$$+ \gamma_2 \Delta\ln(Reserves_t) \times \widehat{AR}_{fi}^{H1\text{-}13} \times m^F + \mu_t + \mu_i + u_{fit}$$

	Reduced form
	$\Delta\ln(p_l)$
$\Delta\ln(Reserves) \times \widehat{AR}^{H1\text{-}13}$	-0.165***
	(0.022)
$\Delta\ln(Reserves) \times \widehat{AR}^{H1\text{-}13} \times m^F$	0.187***
	(0.040)
Half-year FE	Yes
Product FE	Yes
Observations	445,371
Price elasticity, 50% pctile	-0.162
Price elasticity, 90% pctile	0.022

By quartiles

Trade Framework

- We have shown: lower approval rates $\rightarrow$ lower import quantities and higher import prices.

- Next: model of importing with bargaining.

- Goals:

  1. Show that evidence can be rationalized through low domestic bargaining power
  2. Estimate bargaining power to match IV estimates
  3. Measure aggregate effects and importance of bargaining power

Trade Framework: Setup

- Freely traded outside good and multiple products ω (HS4)
    - Log utility over outside good and products ω
    - CES (σ) aggregation of differentiated varieties
    - Free entry of domestic firms

- Technologies and timing:
    - Firms pay fixed cost to enter, then matches with foreign supplier
    - Production uses domestic labor and a foreign input (Cobb-Douglas)
    - A matched pair makes import request q which is fully approved with probability $\alpha_\omega(q)$
    - If approved, firms bargain over the surplus and determine import price
        - ★ Domestic power $= \beta$

Import Quantity, Price, and Equilibrium

- Problem of matched pair:

$$q_\omega^* = \arg\max \alpha_\omega(q) \underbrace{(R_\omega(q) - \psi_\omega(q))}_{\Pi_\omega(q)}$$

  ▸ FOC shows how policy introduces a distortion:

  $$\varepsilon_{\Pi_\omega}(q_\omega^*) + \varepsilon_{\alpha_\omega}(q_\omega^*) = 0,$$

  ▸ Elasticity (not level) of $\alpha_\omega(q)$ is what matters

- Nash Bargaining conditional on approval:

  $$p_{l\omega}^* = (1 - \beta) \frac{R_\omega(q_\omega^*)}{q_\omega^*} + \beta \frac{\psi_\omega(q_\omega^*)}{q_\omega^*}$$

  ▸ Low $\beta \rightarrow$ price moves along average revenue curve
  ▸ High $\beta \rightarrow$ price moves along average cost curve

- Equilibrium: $(q_\omega^*, p_{l\omega}^*, P_\omega, M_\omega)$ such that import requests and prices are optimal and there is free entry:

  $$\mathbb{E}[\alpha(q_\omega^*) \beta \Pi_\omega(q_\omega^*)] = F_\omega.$$

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Bargaining Power and Policy Impact

- Assume:
    - Probability of full approval: $\alpha_\omega(q) = \phi_{0\omega} q^{-\phi_{1\omega}}$
    - Foreign cost: $\psi_\omega(q) = Z_\omega q^{1+\frac{1}{\eta}}$

- Result: An increase in the request size penalty $\phi_{1\omega}$ leads to:

    1. Lower quantity requested, $\frac{\partial q_\omega^*}{\partial \phi_{1\omega}} < 0$.

    2. Higher import price if foreign supplier has enough bargaining power:

    $$\frac{\partial p_{I\omega}^*}{\partial \phi_{1\omega}} > 0 \iff \beta \leq \overline{\beta}(\eta, \sigma, \phi_{1\omega})$$

Quantity solution

Taking Model to Data

1. Estimate the policy parameters $\phi_{0\omega t}, \phi_{1\omega t}$ at product-period level

2. Run similar IV regressions as in previous analysis using $\phi_{1\omega t}$ instead of AR

3. Estimate (β, η) to match those IV responses

4. Perform counterfactuals to measure aggregate impacts of policy
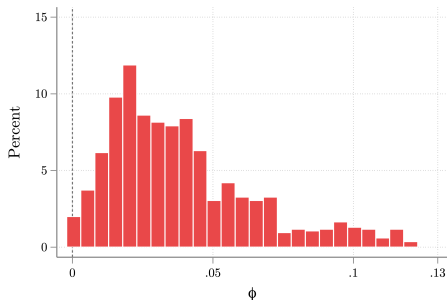
Approval Likelihood Falls with Request Size
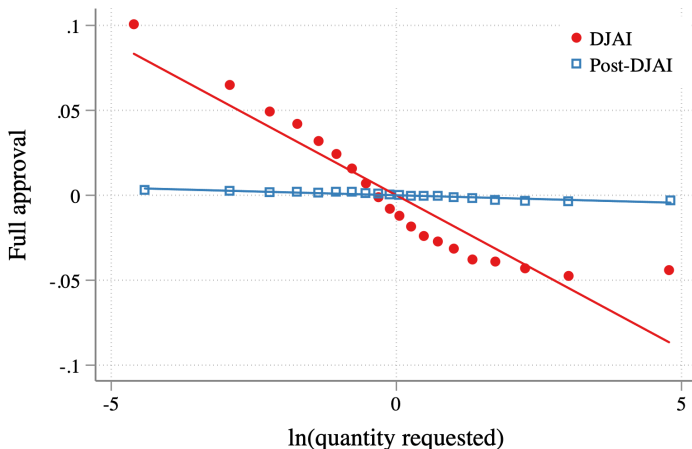
Notes: Binned scatter plot and a linear fit of an indicator of full approval on the log of the quantity requested, after residualizing both variables on product indicators.

Estimating Policy Parameters

$$\mathbb{1}\{q_{A,fit} = q_{R,fit}\} = \phi_{0,h} - \phi_{1,h} \ln q_{R,fit} + \mu_f + \gamma_t + e_{fit}$$
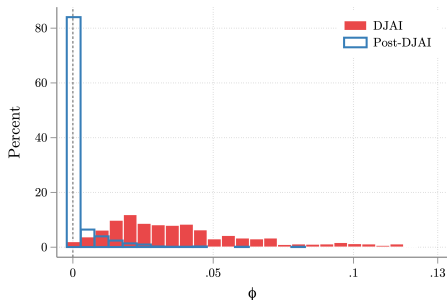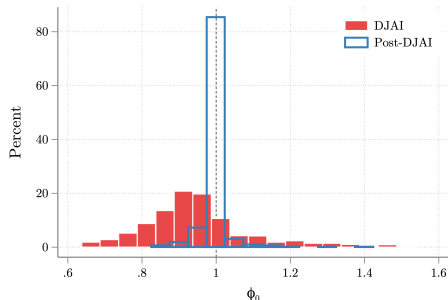
(a) Size penalty ($\phi_{1,h}$) (b) Approval level ($\phi_{0,h}$)

Spec · ϕ vs ϕ_0 · ϕ over time · ϕ_1 with CIs · Other fixed effects

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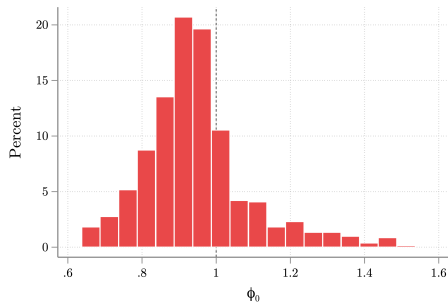
Responses of Prices and Quantities to ϕ_1

Variation within the policy period

	0th stage $\Delta\phi_1$	$\Delta\ln(q_I)$	1st stage $\Delta\ln(q_I)$	OLS $\Delta\ln(p_I)$	Red.form $\Delta\ln(p_I)$	2nd stage $\Delta\ln(p_I)$
$\Delta\ln(Reserves) \times \widehat{AR}^{H1\text{-}13}$	-0.015*** (0.002)		0.204*** (0.041)		-0.181*** (0.022)	
Predicted $\Delta\phi_1$		-9.336** (3.525)				
$\Delta\ln(q_I)$				-0.236*** (0.009)		-0.883*** (0.180)
Half-year FE	Yes		Yes	Yes	Yes	Yes
Firm-product FE	Yes		Yes	Yes	Yes	Yes
Observations	772,206	772,206	832,848	832,848	832,848	832,848
F-stat	41.4	7.0	24.6			

Notes: The sample is from the 1st half of 2014 to the 2nd half of 2015. The standard errors are one-way clustered by HS4–period and shown in parentheses. Asterisks indicate 10% (*), 5% (**), and 1% (***) significance.

Buyer Power

Calibration: Bargaining Power and Supply Elasticity

- Feed estimated policy shocks $\{\phi_{0,\omega t}, \phi_{1,\omega t}\}$ for each 4-digit HS product and half-year period

- Choose (β, η) to match our IV regression estimates of:
  - ▸ $\Delta \ln(p_{I\omega t})$ on $\Delta \ln(q_{\omega t})$
  - ▸ $\Delta \ln(q_{\omega t})$ on $\Delta \ln(\phi_{1\omega t})$

| Parameter		Targeted Moment		
Description	Value	Description	Model	Data
Home bargaining power (β)	0.12	Reg. coeff prices on quant.	-0.88	-0.88
Foreign cost elasticity (η)	2.06	Reg. coeff quant. on ϕ_1	-9.33	-9.33

Effect of Policy on Prices and Quantities

Baseline model: using observed policy, calibrate foreign cost shifter $Z_{\omega t}$ and fixed cost of entry $F_{\omega t}$ to match observed import quantity $\bar{q}_{\omega t}$ and price $\bar{p}_{I\omega t}$
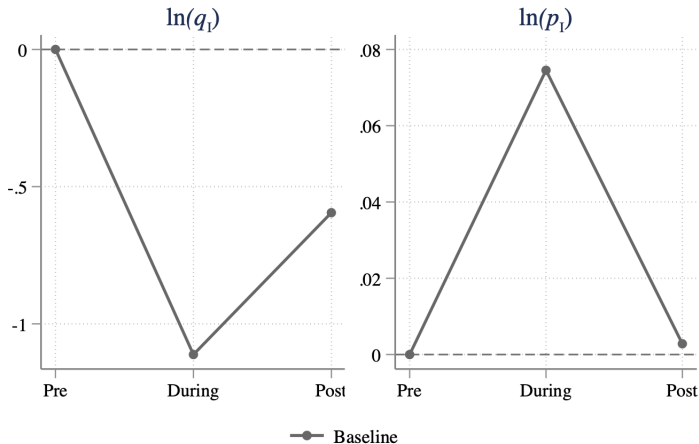
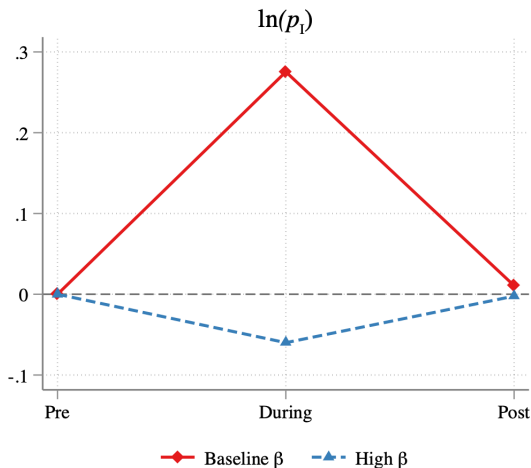# Effect of Removing the Policy

Counterfactual with $\phi_{0\omega t} = 1$ and $\phi_{1\omega t} = 0$
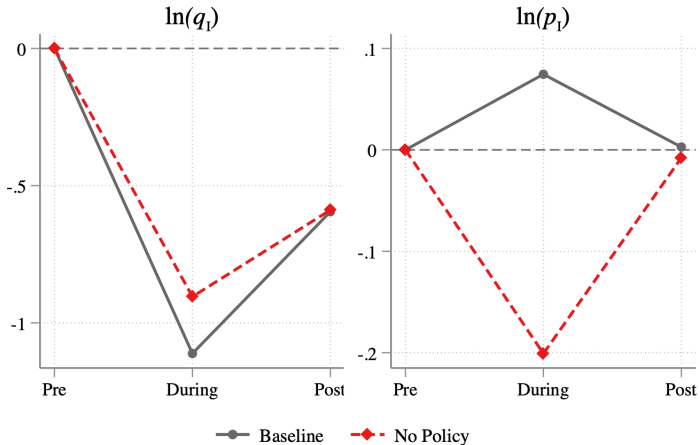
Without policy: quantities fall by less (7.6 pp difference) and prices fall instead of increase (26 pp difference).

The Role of β

Difference Baseline - No Policy

ln(p_1)

Legend: Baseline β (red solid), High β (blue dashed)

X-axis: Pre, During, Post

Higher domestic market power: prices fall with policy.

Conclusion

- Study episode of discretionary trade policy in Argentina 2012-2015

  - Observe policy at the firm level
  - Identify firm and sector level determinants of trade policy
  - Surprising result: restrictions lead to deterioration of terms of trade

- Trade model with importer-exporter bargaining:

  - Can rationalize the evidence as long as home firms have low bargaining power
  - Used to identify bargaing power from empirical estimates
  - Implies large effect of the policy on import prices and quantities

    - and important role of market power