

Frictions and adjustments in firm-to-firm trade¹

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Table of Contents

1. Introduction

2. Model

- Outline of the model
- Pricing of intermediates

3. Data and estimation strategy

4. Adjustment across markets

5. Conclusion

Motivation

- **Incidence of relative cost shocks** is central in international economics
 - exchange rate, productivity shocks, tariffs ...

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 - It depends on the transmission of shocks in complex firm-to-firm trade networks
 - Recently: substantial efforts to model the **endogenous structure of these networks**
 - But **highly stylized pricing rules**
- ⇒ Today: **quantitative assessment of the incidence of cost shocks in a Ricardian model of firm-to-firm trade with variable prices and markups**

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Contributions

1. Introduce **heterogeneous markups** in a Ricardian model of firm-to-firm trade
 - Random search + Ricardian comparative advantage (à la EKK2023)
 - Potential suppliers met by each buyer are perfect substitute
 - Bertrand competition $\Rightarrow$ price charged by the most competitive seller depends on the second best offer received by the buyer
- $\Rightarrow$ Model reproduces a number of **stylized facts** observed in F2F trade data AND the evolution of prices within and across F2F relationships

Contributions

1. Introduce heterogeneous markups in a Ricardian model of firm-to-firm trade
 2. Structural approach to **estimate search frictions** and comparative advantages
 - For 330 sector×country pairs
 - Using a simulated maximum likelihood estimator
 - Exploiting the mobility of importers along the supplier network
- ⇒ **Search frictions** explain 24% of the cross-sectional variance in trade shares
- ⇒ Model reproduces the dynamics of prices within relationships and across markets

Contributions

1. Introduce heterogeneous markups in a Ricardian model of firm-to-firm trade
2. Structural approach to estimate search frictions and comparative advantages
3. **Counterfactual** to evaluate the incidence of a productivity shock on French sellers
 - Incidence depends on pass-through within surviving relationships and cost increase due to switches away from suppliers
 - ⇒ **On impact, 36% of the shock passed on foreign buyers**, drops to 19% after two years
 - ⇒ Average PT: **weighted av. of full, nil, incomplete PT**
 - ⇒ **1/4 through switches** towards more expensive suppliers
 - ⇒ Incidence on buyers is higher in markets in which French exporters face **small frictions**

Related literature

- **Firm-to-firm trade and search frictions:** Bernard et al (2019), Miyauchi (2019), Chor and Ma (2020), Demir et al (2021), Eaton et al (2021, 2022, 2023), Lenoir et al (2022), Lu et al (2017), Grossman et al (2022)
 - ⇒ A richer view of firm pricing strategies

Related literature

- **Firm-to-firm trade and search frictions**
 - ⇒ A richer view of firm pricing strategies and incidence
- **Pricing in trade:** Bernard et al (2003), Atkeson and Burstein (2008), Drozd and Nosal (2012), de Blas and Russ (2015), Dhyne et al (2019), Devereux et al (2024), **Alviarez et al (2023)**
 - ⇒ Results on the evolution of individual prices within/across relationships
 - ⇒ Seller and buyer characteristics affect prices, but search frictions add some randomness
 - Burstein et al (2024): a sizable share of markups' dispersion cannot be explained by observed buyer and seller characteristics

Related literature

- **Firm-to-firm trade and search frictions**
 - ⇒ A richer view of firm pricing strategies
- **Pricing in trade**
 - ⇒ Seller and buyer characteristics affect prices, but search frictions add some randomness
- **Labor:** Postel-Vinay and Robin (2002), Cahuc et al (2006), Bagger et al (2014)
 - ⇒ Identification strategy from Ridder and van den Berg (2003)
 - ⇒ Use the panel dimension of the data rather than the cross-section (Bernard & Zi, 2022)

Table of Contents

1. Introduction

2. Model

- Outline of the model
- Pricing of intermediates

3. Data and estimation strategy

4. Adjustment across markets

5. Conclusion

A Ricardian model of trade in frictional product markets

- Continuous-time model of the many-to-one matching of
 1. **Sellers** s : Suppliers of one input j , heterogeneous in quality-adjusted costs
 2. **Buyers** $b(i)$: Produce using a set of intermediate inputs j
- Buyers and sellers from any pair of countries are matched randomly
- **Sellers adjust their prices to retain the buyers**

Key ingredients

- For each input, buyers purchase from the **most competitive supplier**
→ à la Antras, Fort, Tintelnot (2017)
- **Random search**: buyers meet a subset of potential suppliers
→ à la Eaton, Kortum, Kramarz (2023)
- **Bertrand competition**: price charged by the seller depends on the cost of the second most competitive supplier met by a buyer
→ à la Bernard, Eaton, Jensen, Kortum (2003)

The final good producers = buyers

- Are born unmatched
- Exit at rate μ
- Face a demand x_b for their variety (exogenous)
- Produce with a CES production function involving intermediaries $j \in [1; M_{b(i)}]$

Technology (Eaton & Kortum, 2002)

- Sellers produce under CRS with efficiency e and quality q such that the quality-adjusted cost of serving market i is

$$c_{iF}^j(z) = \frac{v_F^j d_{iF}^j}{z}$$

d_{iF}^j the (iceberg) cost and $z \equiv eq$ the quality-adjusted productivity, which is distributed Pareto (shape θ^j)

Buyer-seller matching

- Buyers (B_i) in country i
 - Meet with French (resp. non-French) sellers at rate γ_{iF}^j (resp. $\gamma_{i\bar{F}}^j$)
 - Meet with a seller at rate $\gamma_i^j = \gamma_{iF}^j + \gamma_{i\bar{F}}^j$
- Sellers maintain links up to buyer death (rate μ) or buyer switch (endogenous)
- Sellers in a buyer's network **Bertrand compete** (no collusion)
- Buyers can always **recall** a previous seller and there is **no commitment** beyond the current transaction

Price setting: intuition

- Consider a buyer with n potential sellers, indexed by their quality-adjusted cost

$$c_1 \leq c_2 \leq \dots \leq c_n$$



- ⇒ c_1 is able to set the price such that the buyer is indifferent between her and the next best supplier:

$$p(c_2) = \text{Min} \left\{ c_2; \frac{\eta}{\eta - 1} c_1 \right\}$$

Price setting: intuition

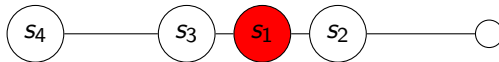
- The cheapest supplier, s_1 , is French
- s_1 hit by a shocks $\rightarrow c_1$ increases



$\Rightarrow$ Option 1: **Zero PT**, price = c_2 , markup drops

Price setting: intuition

- The cheapest supplier, s_1 , is French
- s_1 hit by a shocks – not the others



⇒ Option 2: **Switch** to s_2 , price increases

Price setting: intuition

- The cheapest supplier, s_1 , is French
- s_1 and s_2 are both French



⇒ Again, several options

Price setting: intuition

- The cheapest supplier, s_1 , is French
- s_1 and s_2 are both French



⇒ s_2 remains second: **Full PT**

Price setting: intuition

- The cheapest supplier, s_1 , is French
- s_1 and s_2 are both French



⇒ s_2 is now third: stay with s_1 , **incomplete PT**

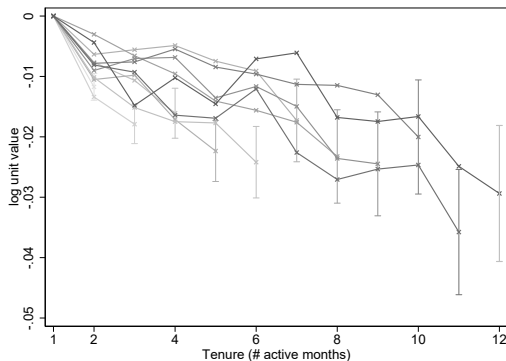
Price setting: intuition

- The cheapest supplier, s_1 , is French
- s_1 and s_2 are both French



⇒ s_3 is now first: **Switch**

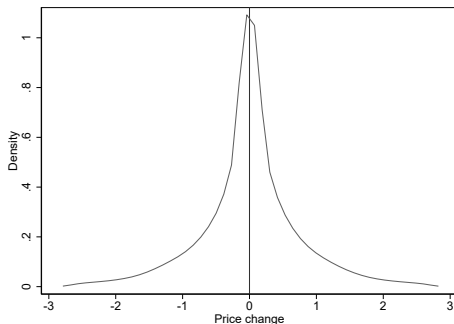
Prediction: prices decrease within relationships ✓



$$\ln p_{bjst} = FE_{bjs} + FE_{ijt} + \sum_{l=2}^K \alpha_l \mathbb{1}(Tenure_{bjst} = l) + \varepsilon_{bjst}$$

- consistent with Monarch and Schmidt-Eisenlohr (2023) and Heise (2024)

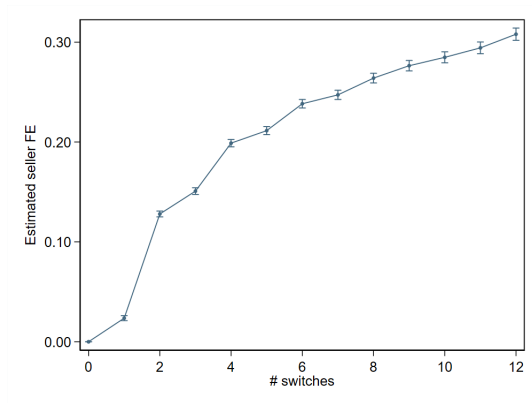
Prediction: a switch is followed by pos. or neg. price changes ✓



Note: Kernel density of price changes, conditional on a switch ($\ln p_{bjst} - \ln p_{bjs-1t-1}$). Vertical line is the empirical median

- consistent with Monarch (2022)

Prediction: buyers switch to lower quality-adj. cost suppliers ✓



$$\hat{FE}_{sji}^b = FE_{bj} + \sum_{l=2}^K \alpha_l \mathbb{1}(\text{Partner}_{bjs} = l) + \varepsilon_{bjs}$$

where $\hat{FE}_{sji}^b$ is the seller's attribute

Table of Contents

1. Introduction

2. Model

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Data

- Firm-to-firm export data from the French Customs
- Use data over 2002-2006 + pre- and post-sample periods to control for left and right censoring
- Restrict the analysis to the 14 historical members of the EU

Estimation

- Vector of parameters to be estimated (by market $i \times j$): $\{\gamma_{iF}^j, \gamma_{iF}^j, (\tau_{iFF}^j)^{-\theta}, \mu^j\}$
- Use **simulated maximum likelihood**, together with data on switch frequencies at the buyer level (e.g. Jolivet et al, 2006)
- Once integrated over the distribution of matches, the switching proba only depends on structural parameters (as in Ridder and van den Berg, 2003)
 - Uses assumption that buyers switch if this improves their intertemporal profit (looser than Bertrand competition) → does not exploit price moments

Table of Contents

1. Introduction

2. Model

- Outline of the model
- Pricing of intermediates

3. Data and estimation strategy

4. Adjustment across markets

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A 10% shock of French exporters' costs

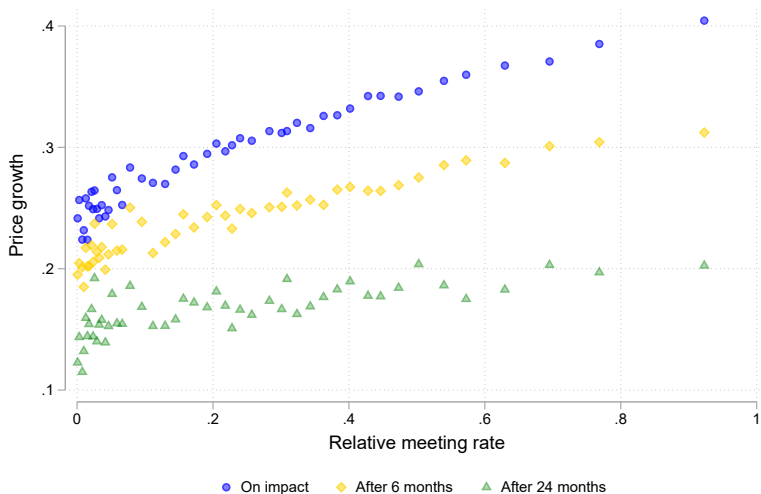
- Same shock for all French firms
 - Foreign competitors not hit by the shock
 - Different adjustments: Zero PT, Incomplete PT, Full PT, Switches
 - Model used to quantify the importance of each of these adjustments ...
- ... and to explore how they are shaped by frictions faced by French sellers relative to those faced by their competitors

Counterfactual analysis: incidence of a 10% shock

$$d \ln \tilde{P}_{jt}^{shock} \equiv \frac{1}{N_{jt}} \sum_{b=1}^{N_{jt}} d \ln P_{bt}^{shock} - \frac{1}{N_{jt}} \sum_{b=1}^{N_{jt}} d \ln P_{bt}^{no\ shock}$$

Average incidence on buyers in $j := d \ln \tilde{P}_{jt}^{shock} / 10\%$

Incidence



Intensive and extensive margins

$$d \ln \tilde{P}_{jt}^{shock} \equiv \frac{N_{jt} - N_{jt}^S}{N_{jt}} \frac{1}{N_{jt} - N_{jt}^S} \sum_{b \notin S_{jt}} d \ln \tilde{P}_{bt}^{shock} + \frac{N_{jt}^S}{N_{jt}} \frac{1}{N_{jt}^S} \sum_{b \in S_{jt}} d \ln \tilde{P}_{bt}^{shock}$$

with S_{jt} the sample of buyers interacting with a French supplier at the time of the shock that switched afterward

Intensive vs extensive adjustments

Table: Decomposition of the incidence of a 10% cost shock on French suppliers

Meeting rates:	Low		High	
	Share	Incidence	Share	Incidence
Panel A: Effect on impact				
Full PT	14.0%	99.8%	27.8%	99.8%
Incomplete	6.0%	41.0%	9.5%	43.8%
Zero PT	48.7%	0.0%	37.0%	0.0%
Switch	31.3%	25.6%	25.7%	31.3%
Total		24.4%		40.0%
Panel B: 24 months after the shock				
Full PT	3.8%	99.8%	5.6%	99.8%
Incomplete	2.1%	41.0%	2.4%	46.1%
Zero PT	14.9%	0.1%	15.5%	4.2%
Switch	79.2%	12.8%	76.5%	17.5%
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Table of Contents

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Conclusion

- Frictions + price bargaining: rich heterogeneity in pass-through across firms and markets, and over time
- French data: incidence on buyer of a 10% shock is 36% on impact, 19% after 24 months
- Can we reach more than 36% PT? Yes: for countries with a higher market share (less frictions and more comparative advantage – eg. Chinese toys in the US)
- High heterogeneity in incidence across buyers → any policy to help buyers shall :
 - either target markets with higher incidence (low friction, high C.A.)
 - provide buyers with assistance in diversifying away from their supplier ex post