MASTER ECONOMICS
INTERNATIONAL TRADE

ENDOGENOUS MARKUPS

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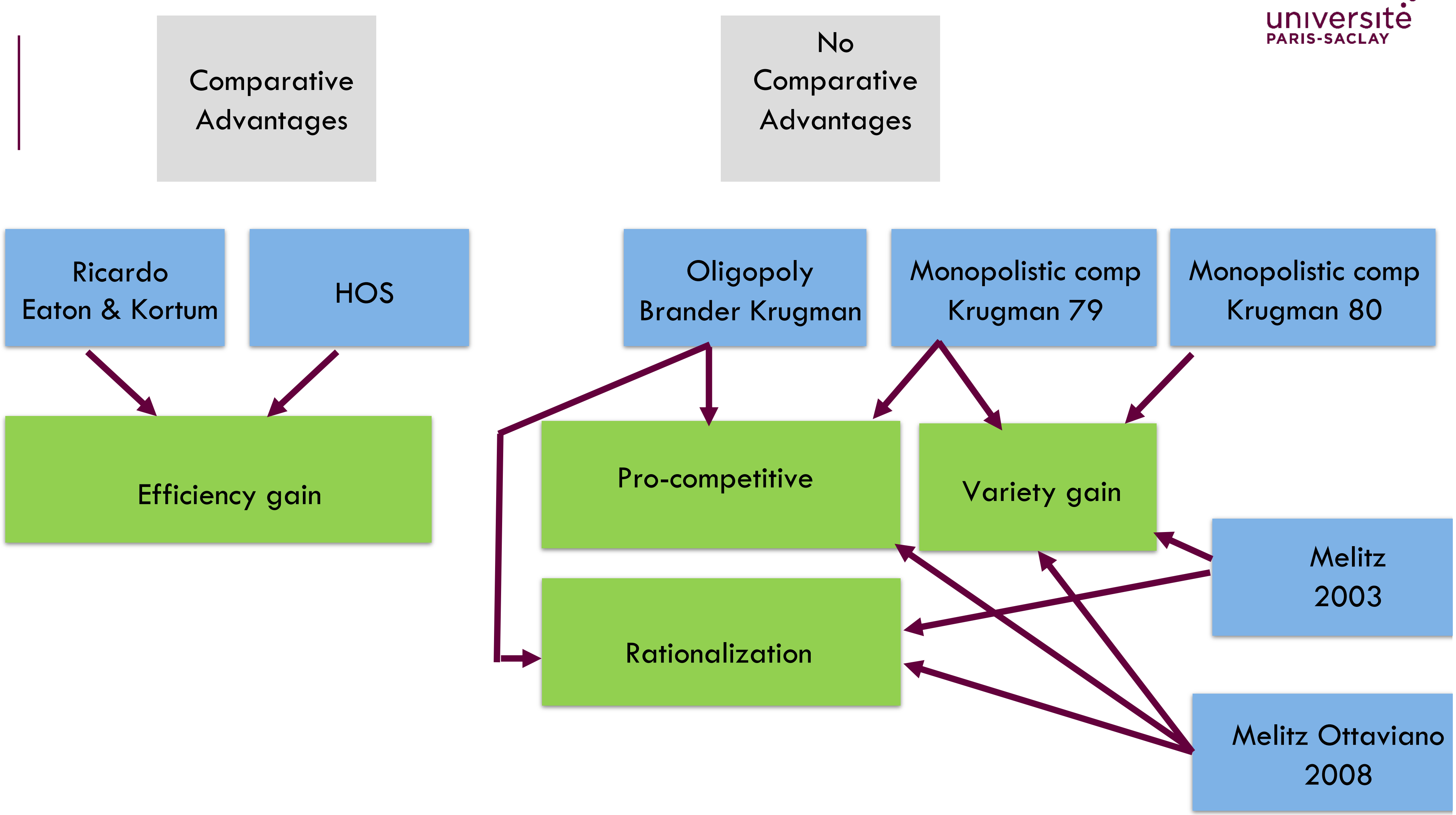
Matthieu Crozet


Comparative Advantages
No Comparative Advantages
Ricardo
Eaton & Kortum
HOS
Oligopoly
Brander Krugman
Monopolistic comp
Krugman 79
Monopolistic comp
Krugman 80
Efficiency gain
Pro-competitive
Variety gain
Rationalization
Melitz
2003
Melitz Ottaviano
2008

ROADMAP

1. Melitz Ottaviano (2008)
2. In search of pro-competitive effects

MELITZ-OTTAVIANO

THE REVIEW OF ECONOMIC STUDIES

Market Size, Trade, and Productivity FREE

Marc J. Melitz, Gianmarco I. P. Ottaviano

The Review of Economic Studies, Volume 75, Issue 1, January 2008, Pages 295–316,
https://doi.org/10.1111/j.1467-937X.2007.00463.x

THE LIMITATIONS OF MELITZ (2003)

No pro-competitive effect

In Melitz (2003) trade openness increases average productivity and decreases mean (fob) prices but through a **rationalization effect**

CES utility function ⇒ constant mark-ups ⇒ fob prices are simple mill prices (cannot change if marginal cost does not change)

Market size does not affect the distribution of firms and their performances

Mak-up and firm prices are the same in small and large market

THE QUADRATIC UTILITY

We assume a continuum of varieties (i) and a homogeneous numeraire

Utility is:

$$U = q_0^c + \alpha \int_{i\in\Omega} q_i^c di - \frac{1}{2}\gamma \int_{i\in\Omega} (q_i^c)^2 di - \frac{1}{2}\eta \left(\int_{i\in\Omega} q_i^c di\right)^2,$$

Consumption
of numeraire

Consumption
of variety i

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$\alpha, \eta > 0$

Describe the substitution pattern between the numeraire and the differentiated good: Increase in α and/or decrease in η shift out the demand for the differentiated good relative to the numeraire

THE QUADRATIC UTILITY

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$\gamma > 0$
Index the degree of product differentiation between varieties of the differentiated good

If $\gamma > 0 \Rightarrow$ consumption of each variety has a marginally decreasing impact on welfare $\Rightarrow$ consumers prefer a diversified consumption
Product differentiation increases with γ

INDIVIDUAL DEMAND FUNCTION

A very large number of varieties may be offered on the market. But not all of them will be.

Let $\Omega_j^* \subset \Omega_j$ represent the subset of varieties that are produced and consumed.

We note N the number of these varieties and $\mathrm{Q} = \int_{\Omega^*} q_i^c$

INDIVIDUAL DEMAND FUNCTION

Max utility (and noting $Q^C = \int q_i^c$) :

$$\frac{\partial \mathcal{L}}{\partial p_i} = \frac{\partial [U - \lambda(\int p_i q_i^c - E)]}{\partial q_i^c} = \alpha - \frac{1}{2}\gamma \times 2 q_i^c \text{ - } \frac{1}{2} \eta \times 2 \times Q^c \times \frac{\partial Q^c}{\partial q_i} \text{ - } \lambda p_i$$

$$\Rightarrow \ \alpha - \gamma q_i^c \text{-} \eta Q^c \text{- } \lambda p_i = 0$$

$$\Rightarrow \ q_i = \frac{1}{\gamma}(\alpha - \lambda p_i - \eta Q^c)$$

We set $\lambda = 1 \ \Rightarrow q_i = \frac{1}{\gamma}(\alpha - p_i - \eta Q^c)$

INDIVIDUAL DEMAND FUNCTION

We define:

The average sales: $\bar{q} = \frac{\int_{\Omega_j^*} q_i^c}{N} = \frac{Q^C}{N}$

and the average price: $\bar{p} = \frac{\int_{\Omega_j^*} p_i}{N}$

We write: $\bar{q} \ = \frac{1}{N} \int \left[\frac{1}{\gamma} (\alpha - p_i - \eta Q^c) \right]$

And, after simple algebra:

$$\bar{q} = \frac{\alpha - \bar{p}}{\gamma + \eta N}$$

INDIVIDUAL DEMAND FUNCTION

We plug $\bar{q} = \frac{\alpha - \bar{p}}{\gamma + \eta N}$ into $q_i = \frac{1}{\gamma}(\alpha - p_i - \eta Q^c)$ by noting that $\bar{q} = Q^c / N$

And we obtain:

$$q_i^c = \frac{\alpha}{\gamma + \eta N} - \frac{p_i}{\gamma} + \frac{\eta N}{\gamma + \eta N} \frac{\bar{p}}{\gamma}$$

Larger α and smaller η = more spending on the differentiated good

INDIVIDUAL DEMAND FUNCTION

We plug $\bar{q} = \frac{\alpha - \bar{p}}{\gamma + \eta N}$ into $q_i = \frac{1}{\gamma}(\alpha - p_i - \eta Q^c)$ by noting that $\bar{q} = Q^c/N$

And we obtain:

$$q_i^c = \frac{\alpha}{\gamma + \eta N} - \frac{p_i}{\gamma} + \frac{\eta N}{\gamma + \eta N}\frac{\bar{p}}{\gamma}$$

Crowding out effect: More firms = more competitors = lower individual demand for each variety

INDIVIDUAL DEMAND FUNCTION

We plug $\bar{q} = \frac{\alpha - \bar{p}}{\gamma + \eta N}$ into $q_i = \frac{1}{\gamma}(\alpha - p_i - \eta Q^c)$ by noting that $\bar{q} = Q^c/N$

And we obtain:

$$q_i^c = \frac{\alpha}{\gamma + \eta N} - \frac{p_i}{\gamma} + \frac{\eta N}{\gamma + \eta N}\frac{\bar{p}}{\gamma}$$

Higher price = lower demand… but the price elasticity decreases when γ is higher (more differentiation)

INDIVIDUAL DEMAND FUNCTION

We plug $\bar{q} = \frac{\alpha - \bar{p}}{\gamma + \eta N}$ into $q_i = \frac{1}{\gamma}(\alpha - p_i - \eta Q^c)$ by noting that $\bar{q} = Q^c/N$

And we obtain:

$$q_i^c = \frac{\alpha}{\gamma + \eta N} - \frac{p_i}{\gamma} + \frac{\eta N}{\gamma + \eta N}\frac{\bar{p}}{\gamma}$$

Competition: When the price of competitors is higher, the demand is larger

INDIVIDUAL DEMAND FUNCTION

There are L consumers = the total demand for each variety is:

$$q_i = Lq_i^c = \frac{L\alpha}{\gamma + \eta N} - \frac{L\, p_i}{\gamma} + \frac{L\, \eta N}{\gamma + \eta N}\frac{\bar{p}}{\gamma}$$

CHOKE PRICE

There are many potential varieties but not all will be produced.

Only the firms that have positive sales enter the market

Entry condition: $q_i > 0 \Rightarrow \frac{L\alpha}{\gamma+\eta N} - \frac{L\,p_i}{\gamma} + \frac{L\,\eta N}{\gamma+\eta N}\frac{\bar{p}}{\gamma} > 0$

$$p_i < \frac{\gamma\alpha+\eta N\bar{p}}{\gamma+\eta N} = p_{max}$$

Tougher competition: N larger $\bar{p}$ smaller = lower p_{max}= entry is more selective

INDIVIDUAL DEMAND FUNCTION

Note that the price elasticity:

$$\varepsilon_i = \frac{\partial q_i / \partial p_i}{q_i / p_i} = \frac{1}{p_{max}/p_i - 1}$$

Tougher competition: N larger $\bar{p}$ smaller = lower p_{max}= price elasticity is higher
Elasticity increases with p_i

Important because best firms (with small p_i) face a smaller price elasticity = able to set larger mark-ups

SUPPLY SIDE

Labor is the only factor

The wage is pinned down by the outside good (homogenous + perfect competition + free trade)

In the differentiated sector:

- Firms pay a fixed cost, f_E , to discover their marginal cost
- Marginal costs, c, are drawn from a distibution $G(c)$ with support $[0, c_M]$
- Monopolisitc competition = firms take $\bar{p}$ and N as given

SUPPLY SIDE.

Profit: $\pi = p_i q_i - c q_i - f_E$

With: $q_i = L q_i^c = \frac{L\alpha}{\gamma + \eta N} - \frac{L\, p_i}{\gamma} + \frac{L\, \eta N}{\gamma + \eta N}\frac{\bar{p}}{\gamma}$

FOC

$$p_i \times \frac{\partial q_i}{\partial q_i} - q_i \times \frac{\partial p_i}{\partial q_i} - c = 0$$

$$p_i - \frac{\gamma}{L} q_i - c = 0 \implies q_i = \frac{L}{\gamma}[p_i - c]$$

SUPPLY SIDE.

We define c_D the max marginal cost that allows entry

Firm with marginal cost c_D has a zero-profit and zero sales, i.e. its price is p_{max}

Hence, $p_{max} = c_D$

SUPPLY SIDE.

Combine the 3 following equations:

(1) $q_i = \frac{L}{\gamma}[p_i - c]$

(2) $p_{max} = c_D = \frac{\gamma\alpha + \eta N\bar{p}}{\gamma + \eta N}$

(3) $q_i = Lq_i^c = \frac{L\alpha}{\gamma + \eta N} - \frac{L\,p_i}{\gamma} + \frac{L\,\eta N}{\gamma + \eta N}\frac{\bar{p}}{\gamma}$

(1) + (3): $\frac{L}{\gamma}[p_i - c] = \frac{L\alpha}{\gamma + \eta N} - \frac{Lp_i}{\gamma} + \frac{L\,\eta N}{\gamma + \eta N}\frac{\bar{p}}{\gamma}$

Use (2) and get: $p_i = \frac{1}{2}(c + c_D)$

FIRMS PERFORMANCES

In the same way, we can define all firm-level performances as functions of c_D

$$p(c) = \frac{1}{2}(c_D + c) \qquad \text{prices}$$

$$\mu(c) = p(c) - c = \frac{1}{2}(c_D - c) \qquad \text{markups}$$

$$r(c) = \frac{L}{4\gamma}\left[(c_D)^2 - c^2\right] \qquad \text{revenues}$$

$$\pi(c) = \frac{L}{4\gamma}(c_D - c)^2 \qquad \text{profits}$$

FIRMS PERFORMANCES

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Lower cost firms set lower prices and earn higher revenues and profits than firms with higher costs

Contrary to a CES framework, lower cost firms do not pass on all of the cost differential to consumers in the form of lower prices: **they also set higher mark-ups**

FREE ENTRY

As in Melitz, firms try to enter the market by paying a fixed cost in oder to discover their marginal cost

As firms enter, profits decrease. Hence, as in Melitz, the free entry condition states that the expected profit equals the fixed cost

$$\int_0^{c_D} \pi(c)dG(c) = \frac{L}{4\gamma} \int_0^{c_D} (c_D - c)^2 dG(c) = f_E.$$

This determines the cutoff c_D

FREE ENTRY

Once we have c_D, we can compute the number of firms active on the market

$$c_D = \frac{\gamma\alpha + \eta N\bar{p}}{\gamma + \eta N} \Rightarrow N = \frac{2\gamma}{\eta}\frac{\alpha - c_D}{c_D - \bar{c}}$$

Where $\bar{c}$ is the average marginal cost of surviving firms $\bar{c} = \frac{\int_0^{c_D} c \quad dG(c)}{G(c_D)}$

FREE ENTRY

In larger markets, competition is tougher

With higher L:

- c_D is smaller (cf. $\int_0^{c_D} \pi(c)dG(c) = \frac{L}{4\gamma}\int_0^{c_D}(c_D - c)^2 dG(c) = f_E$.)
- Number of entrants is higher
- Average price is smaller
- Markups are smaller

PARAMETRIZATION

To get a value for c_D, one need and explicit distribution of costs.

Assume a Pareto distribution s

$$G(c) = \left(\frac{c}{c_M}\right)^k, \quad c \in [0, c_M]$$

$c_M > c_D$ is the max possible cost

k indicates the dispersion of cost (= degree of firm heterogeneity)

A k , increases, the share of high cost firms increases

PARAMETRIZATION

It can be shown that

$$c_D = \left[\frac{2(k+1)(k+2)\gamma\,(c_M)^k f_E}{L} \right]^{1/(k+2)}$$

We confirm here that c_D

- decreases with L
- increases with the entry sunk cost
- increases with product differentiation (γ)

From this, we can get all the agregate characteristics of the countries

PARAMETRIZATION

$$\bar{c} = \frac{k}{k+1} c_D, \qquad \bar{q} = \frac{L}{2\gamma} \frac{1}{k+1} c_D = \frac{(k+2)(c_M)^k}{(c_D)^{k+1}} f_{\mathrm{E}},$$

$$\bar{p} = \frac{2k+1}{2k+2} c_D, \qquad \bar{r} = \frac{L}{2\gamma} \frac{1}{k+2} (c_D)^2 = \frac{(k+1)(c_M)^k}{(c_D)^k} f_{\mathrm{E}},$$

$$\bar{\mu} = \frac{1}{2} \frac{1}{k+1} c_D, \qquad \bar{\pi} = f_{\mathrm{E}} \frac{(c_M)^k}{(c_D)^k}.$$

PARAMETRIZATION

In larger countries (L larger)

$$\bar{c} = \frac{k}{k+1} c_D, \qquad \text{Average cost is lower} \qquad = \frac{(k+2)(c_M)^k}{(c_D)^{k+1}} f_{\mathrm{E}},$$

$$\bar{p} = \frac{2k+1}{2k+2} c_D, \qquad \bar{r} = \frac{L}{2\gamma} \frac{1}{k+2} (c_D)^2 = \frac{(k+1)(c_M)^k}{(c_D)^k} f_{\mathrm{E}},$$

$$\bar{\mu} = \frac{1}{2} \frac{1}{k+1} c_D, \qquad \bar{\pi} = f_{\mathrm{E}} \frac{(c_M)^k}{(c_D)^k}.$$

PARAMETRIZATION

In larger countries (L larger)

$$\bar{c} = \frac{k}{k+1} c_D, \qquad \bar{q} = \frac{L}{2\gamma} \frac{1}{k+1} c_D = \frac{(k+2)(c_M)^k}{(c_D)^{k+1}} f_{\mathrm{E}},$$

$$\bar{p} = \frac{2k+1}{2k+2} c_D,$$

Average price is smaller

$$(c_D)^2 = \frac{(k+1)(c_M)^k}{(c_D)^k} f_{\mathrm{E}},$$

$$\bar{\mu} = \frac{1}{2} \frac{1}{k+1} c_D, \qquad \bar{\pi} = f_{\mathrm{E}} \frac{(c_M)}{(c_D)^k}.$$

PARAMETRIZATION

In larger countries (L larger)

$$\bar{c} = \frac{k}{k+1} c_D, \qquad \bar{q} = \frac{L}{2\gamma} \frac{1}{k+1} c_D = \frac{(k+2)(c_M)^k}{(c_D)^{k+1}} f_E,$$

$$\bar{p} = \frac{2k+1}{2k+2} c_D, \qquad \bar{r} = \frac{L}{2\gamma} \frac{1}{k+2} (c_D)^2 = \frac{(k+1)(c_M)^k}{(c_D)^k} f_E,$$

$$\bar{\mu} = \frac{1}{2} \frac{1}{k+1} c_D,$$

Average markups are smaller

PARAMETRIZATION

In larger countries (L larger)

$$\bar{c} = \frac{k}{k+1} c_D, \qquad \bar{q} = \frac{L}{2\gamma} \frac{1}{k+1} c_D = \frac{(k+2)(c_M)^k}{(c_D)^{k+1}} f_{\mathrm{E}},$$

$$\bar{p} = \frac{2k+1}{2k+2} c_D, \qquad \bar{r} = \frac{L}{2\gamma} \frac{1}{k+2} (c_D)^2 = \frac{(k+1)(c_M)^k}{(c_D)^k} f_{\mathrm{E}},$$

Average profit is larger

$$\bar{\pi} = f_{\mathrm{E}} \frac{(c_M)^k}{(c_D)^k}.$$

PARAMETRIZATION

In larger countries (L larger)

Firms are bigger

$$\bar{q} = \frac{L}{2\gamma}\frac{1}{k+1}c_D = \frac{(k+2)(c_M)^k}{(c_D)^{k+1}}f_E,$$

$$\bar{p} = \frac{2k+1}{2k+2}c_D, \qquad \bar{r} = \frac{L}{2\gamma}\frac{1}{k+2}(c_D)^2 = \frac{(k+1)(c_M)^k}{(c_D)^k}f_E,$$

We have here market size effects that are missing in Melitz

TRADE OPENESS

Two countries, H and F, with market size L^H and L^F

Same preferences

Trade cost / segmented markets: the delivered cost to country *I (=H,F)* is $\tau^I c > c$

TRADE OPENESS

With segemented markets, firms maximise profits on each markets independently

Hence, all closed economy relations apply

e.g. the choke price on market *l is:*

$$p^l_{\max} = \frac{\alpha\eta + \eta N^l \bar{p}^l}{\eta N^l + \gamma}$$

TRADE OPENNESS – CHOKE PRICES

There are now 2 cutoffs:

c^l_D = upper bound cost for firms selling in their domestic market

c^l_X = upper bound cost for exporters from *l* to the other country, h

$$\begin{aligned} c^l_D &= \sup\left\{c : \pi^l_D(c) > 0\right\} = p^l_{\max} \\ c^l_X &= \sup\left\{c : \pi^l_X(c) > 0\right\} = \frac{p^h_{\max}}{\tau^h} \end{aligned}$$

Hence $c^h_X = c^l_D/\tau^l$

= c^h_X is lower than c^l_D = because of the transport cost, it is harder for firms from h to break even on market *l* relative to domestic producers located in *l*.

TRADE OPENNESS – FIRM PERFORMANCES

Similar to the closed economy case, we have the following performances of firms on their export market

$$
\begin{aligned}
p_D^l(c) &= \frac{c_D^l + c}{2}, \\
p_X^l(c) &= \tau^h \frac{c_X^l + c}{2}, \\
\pi_D^l(c) &= \frac{L^l}{4\gamma}\left(c_D^l - c\right)^2, \\
\pi_X^l(c) &= \frac{L^h}{4\gamma}\left(\tau^h\right)^2\left(c_X^l - c\right)^2
\end{aligned}
$$

TRADE OPENNESS – FREE ENTRY

With a second market, the free entry condition becomes:

$$\int_0^{c_D^l} \pi_D^l(c)dG(c) + \int_0^{c_X^l} \pi_X^l(c)dG(c) - f_e = 0.$$

In the case of a Pareto distribution, it becomes

$$L^l \left(c_D^l\right)^{k+2} + L^h \left(\tau^h\right)^2 \left(c_X^l\right)^{k+2} = \gamma\phi,$$

with $\phi \equiv 2(k+1)(k+2)\left(c_M\right)^k f_e$

TRADE OPENNESS – FREE ENTRY

$$L^l\left(c_D^l\right)^{k+2}+L^h\left(\tau^h\right)^2\left(c_X^l\right)^{k+2}=\gamma\phi$$

Recalling that $c_X^h=\frac{c_D^l}{\tau^l}$ we can rewrite the free entry condition as:

$$L^l\left(c_D^l\right)^{k+2}+L^h\rho^h\left(c_D^h\right)^{k+2}=\gamma\phi$$

Where $\rho^h\equiv\left(\tau^h\right)^{-k}$

TRADE OPENNESS – FREE ENTRY

$$L^l\left(c_D^l\right)^{k+2}+L^h\rho^h\left(c_D^h\right)^{k+2}=\gamma\phi$$

This relationship hold for the two countries

$$\begin{aligned}L^H\left(c_D^H\right)^{k+2}+L^F\rho^F\left(c_D^F\right)^{k+2} &= \gamma\phi\\ L^F\left(c_D^F\right)^{k+2}+L^H\rho^H\left(c_D^H\right)^{k+2} &= \gamma\phi.\end{aligned}$$

2 equations, 2 unknown (c^H_D and c^F_D)

TRADE OPENNESS – CHOKE COST

Solving the system of equations gives the choke cost in country *l*:

$$c_D^l = \left[\frac{\gamma\phi}{L^l} \frac{1-\rho^h}{1-\rho^h\rho^l} \right]^{\frac{1}{k+2}}$$

Remember that, in autarky, it was $c_D = \left[\frac{2(k+1)(k+2)\gamma\,(c_M)^k f_{\mathrm{E}}}{L} \right]^{1/(k+2)}$

With $\phi \equiv 2(k+1)(k+2)\,(c_M)^k f_e$, we have the autarky choke cost in country *l*: $c_{aD}^l = \left[\frac{\gamma\phi}{L^l} \right]^{\frac{1}{k+2}}$

TRADE OPENNESS

Choke cost autarky

$$c^l_{aD} = \left[\frac{\gamma\phi}{L^l}\right]^{\frac{1}{k+2}}$$

Choke cost trade:

$$c^l_D = \left[\frac{\gamma\phi}{L^l}\frac{1-\rho^h}{1-\rho^h\rho^l}\right]^{\frac{1}{k+2}}$$

With

$$\rho^h \equiv \left(\tau^h\right)^{-k}$$

Let's imagine symmetric trade costs to facilitate the comparison between the two choke costs

TRADE OPENNESS

$$\rho^h \equiv \left(\tau^h\right)^{-k}$$

$$c^l_{aD} = \left[\frac{\gamma\phi}{L^l}\right]^{\frac{1}{k+2}}$$

If $\tau^h = \tau^l \Rightarrow \rho^h = \rho^l$

Then $c^l_D = \left[\frac{\gamma\phi}{L^l}\frac{1-\rho}{1-\rho^2}\right]^{\frac{1}{k+2}} = \left[\frac{\gamma\phi}{L^l}\frac{1}{1-\rho}\right]^{\frac{1}{k+2}}$

Autarky = $\tau \to \infty \Rightarrow \rho \to 0 \Rightarrow c^l_D \to c^l_{aD}$

When countries open to trade, τ decreases, ρ increases and c^l_D decreases

TRADE OPENNESS

When countries open to trade, c_D^l decreases =

- The least productive firms exit = rationalization effect which increases productivity (a la Melitz (2003)
- Average price and markup decrease (pro-competitive effect)
- Number of availlable variety increases

ROADMAP

Empirical search of pro-competitive effects universite PARIS-SACLAY

IMPACT OF TRADE OPENNESS ON MARK-UPS AND PRICES

ECONOMETRICA
JOURNAL OF THE ECONOMETRIC SOCIETY

Original Articles

Prices, Markups, and Trade Reform

Jan De Loecker, Pinelopi K. Goldberg, Amit K. Khandelwal, Nina Pavcnik

First published: 21 March 2016 | https://doi.org/10.3982/ECTA11042

IMPACT OF TRADE OPENNESS ON MARK-UPS AND PRICES

The paper

- Estimates the impact of trade liberalization on:
  - Costs (through import liberalization for inputs)
  - Markups
  - Prices

Case of the Indian liberalization from 1987 to 2001

Contributions

- Technical: new method to estimate jointly markups and marginal cost from production and trade date, taking into account multiproduct firms (not discussed here)
- Economic: provide an assessment of pro-competitive effects

IMPACT OF TRADE OPENNESS ON MARK-UPS AND PRICES

Expected effects of the trade liberalization:

1. Output tariffs cuts = Increased competition = may reduce markup and prices
2. Intermediate tariffs cuts = decreased costs = may reduce prices and increase markups

DATA

PROWES data

Firm-level database = traks firms over 1989-2003

Key feature of the database:

Provides firm-product-level information (allow identification of multiproduct firms, etc)

Provides details on production in value and quantity for each product

= proxies for prices

= clean assigment of the production and prices to each product

DATA

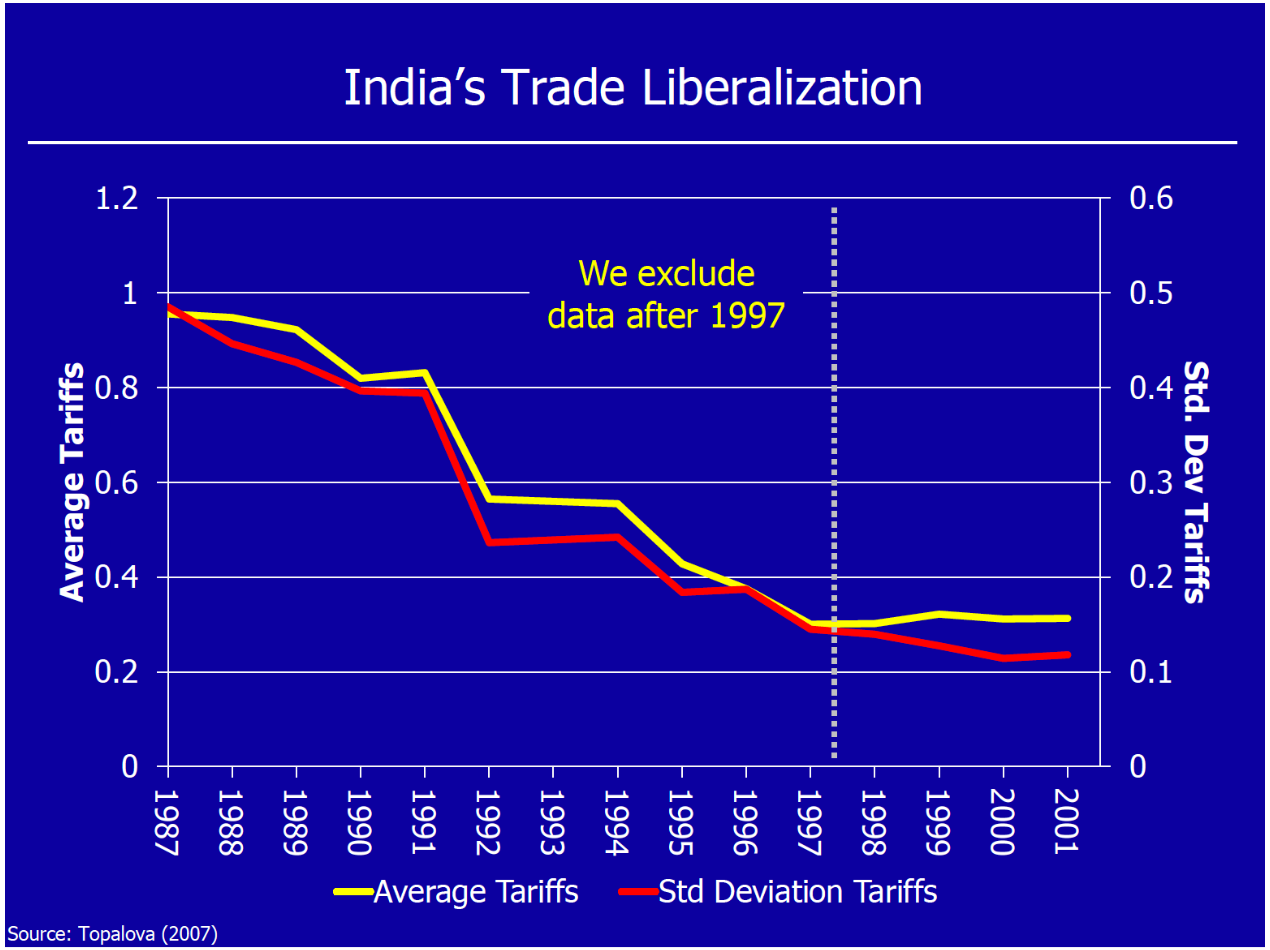
Tariff data

Import tariffs rates for 10-digit goods = aggregated at the industry-level of the industrial classification (about 1,800 industries)

Input tariffs are computed by passing the output tariffs through the Indian input/output tables

(i.e. the input tariff for industry *k* is the sum of all tariffs weighted by the share of each industry in the total of industry *k*)

TRADE LIBERALIZATION



RESULTS – INDUSTRY AND FIRM-LEVEL CHARACTERISTICS

They exploit the data and structural models to estimate the output elasticites (defining the production function)

TABLE IV

MEDIAN OUTPUT ELASTICITIES, BY SECTOR[a]

Sector	Labor (1)	Materials (2)	Capital (3)	Returns to Scale (4)
15 Food products and beverages	0.12	0.75	0.20	1.09
17 Textiles, apparel	0.11	0.82	0.09	1.02
21 Paper and paper products	0.18	0.79	0.03	0.98
24 Chemicals	0.16	0.79	0.06	1.02
25 Rubber and plastic	0.21	0.75	0.04	1.03
26 Nonmetallic mineral products	0.18	0.69	0.04	0.88
27 Basic metals	0.14	0.78	0.02	0.96
28 Fabricated metal products	0.17	0.75	0.02	0.94
29 Machinery and equipment	0.17	0.75	0.16	1.08
31 Electrical machinery and communications	0.10	0.80	0.01	0.91
34 Motor vehicles, trailers	0.23	0.64	0.10	0.97

[a]Table reports the median output elasticities from the production function. Columns 1–3 report the median estimated output elasticity with respect to each factor of production for the translog production function for all firms. Column 4 reports the median returns to scale.

RESULTS – INDUSTRY AND FIRM-LEVEL CHARACTERISTICS

Mark-ups

TABLE VI

MARKUPS, BY SECTOR[a]

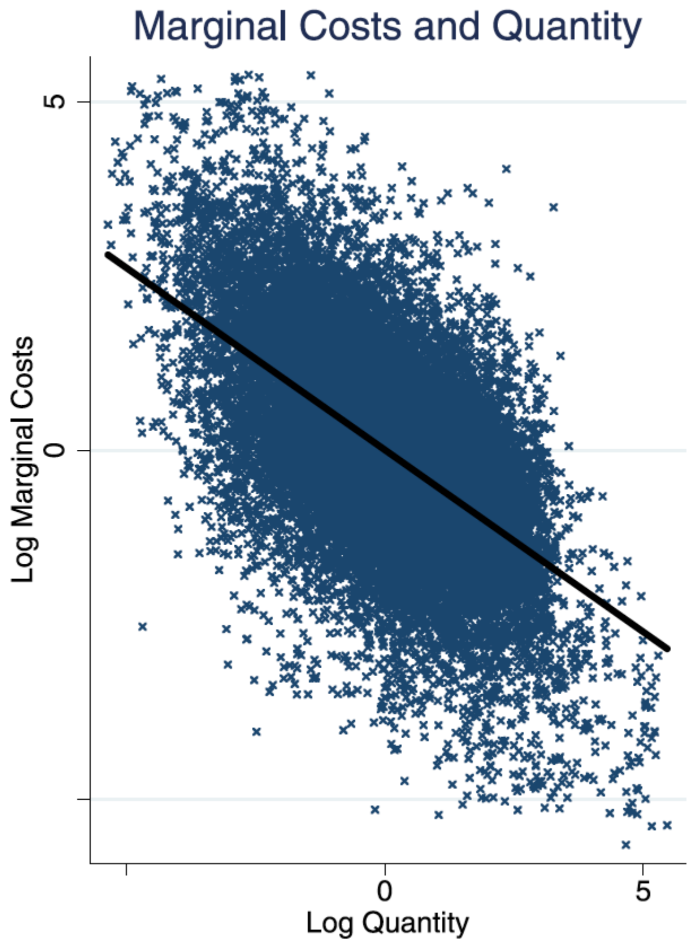
Sector	Markups Mean	Markups Median
15 Food products and beverages	1.78	1.15
17 Textiles, apparel	1.57	1.33
21 Paper and paper products	1.22	1.21
24 Chemicals	2.25	1.36
25 Rubber and plastic	4.52	1.37
26 Nonmetallic mineral products	4.57	2.27
27 Basic metals	2.54	1.20
28 Fabricated metal products	3.70	1.36
29 Machinery and equipment	2.48	1.34
31 Electrical machinery and communications	5.66	1.43
34 Motor vehicles, trailers	4.64	1.39
Average	2.70	1.34

[a] Table displays the mean and median markup by sector for the sample 1989–2003. The table trims observations with markups that are above and below the 3rd and 97th percentiles within each sector.

RESULTS – INDUSTRY AND FIRM-LEVEL CHARACTERISTICS

Bigger firms have lower marginal cost

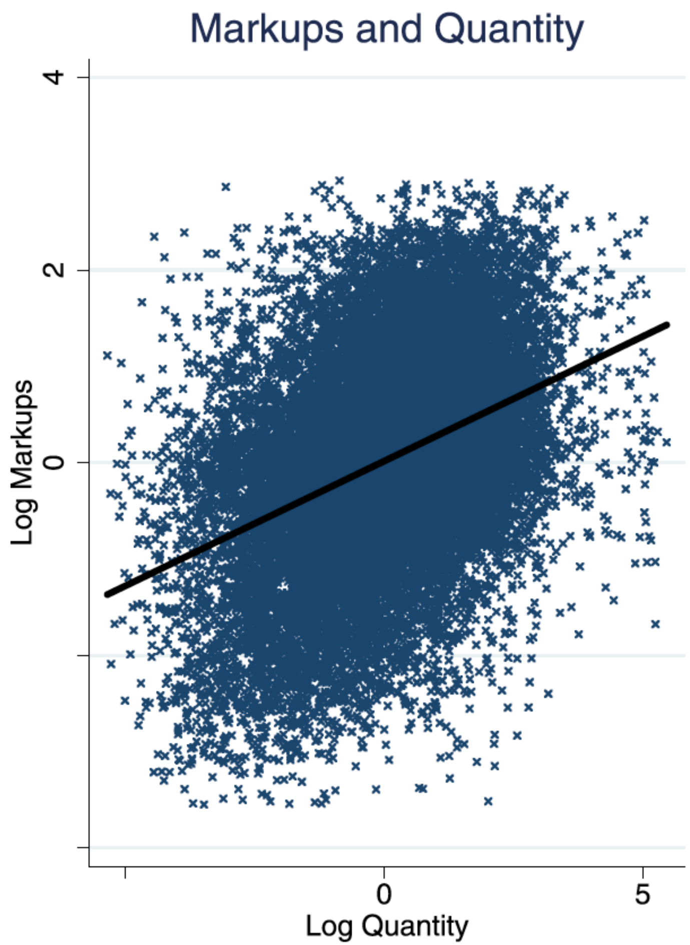
(ok with Melitz)



RESULTS – INDUSTRY AND FIRM-LEVEL CHARACTERISTICS

Bigger firms have bigger markups

(Ok with Melitz-Ottaviano)



RESULTS – PASS-THROUGH

How much of the cost is passed into the price?

The log price can be decomposed into its two components, i.e. marginal cost and markup (μ), i.e. (for firm f, producting good j at time t):

$$(33) \qquad \ln P_{fjt} = \ln mc_{fjt} + \ln \mu_{fjt}.$$

Or equivalently (demeaning the firm markup)

$$(34) \qquad \ln P_{fjt} = \ln \mu_{fj} + \ln mc_{fjt} + (\ln \mu_{fjt} - \ln \mu_{fj}),$$

RESULTS – PASS-THROUGH

How much of the cost is passed into the price?

How would you do estimate that?

They run the following regression (for firm f, producing good j at time t), with a_{fj} a firm product fixed effect

$$(35) \qquad \ln P_{fjt} = a_{fj} + \zeta \ln mc_{fjt} + \varepsilon_{fjt},$$

If markups are constant: $\xi = 1$ $\Rightarrow$ complete pass-through (all the change of marginal cost is passed through to the consumers)

If markups are variable: $\xi < 1$ $\Rightarrow$ *in*complete pass-through

RESULTS – PASS-THROUGH

$$\text{(35)} \qquad \ln P_{fjt} = a_{fj} + \zeta \ln mc_{fjt} + \varepsilon_{fjt},$$

They suspect endogeneity (i.e. correlation between $\ln(mc)$ and the error term, ε) because the observed marginal cost is likely to be affected by a systematic measurement error.

$\Rightarrow \ln(mc)$ is instrumented by the input tariff and lagged marginal cost

RESULTS – PASS-THROUGH

ξ is significantly less than 1

Incomplete pass-through. Only 30% of the changes in marginal cost is passed intro the prices

TABLE VII

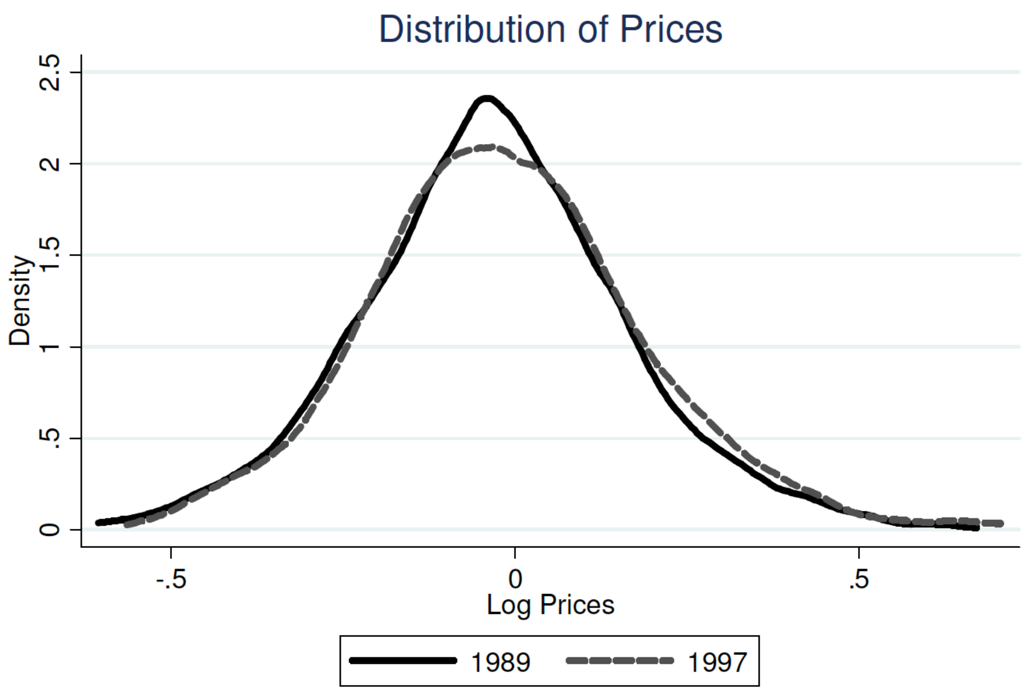
PASS-THROUGH OF COSTS TO PRICES[a]

	$\ln P_{fjt}$		
	(1)	(2)	(3)
$\ln mc_{fjt}$	0.337***	0.305***	0.406†
	0.041	0.084	0.247
Observations	21,246	16,012	12,334
Within R-squared	0.27	0.19	0.09
Firm–product FEs	yes	yes	yes
Instruments	–	yes	yes
First-stage F-test	–	98	5

[a]The dependent variable is (log) price. Column 1 is an OLS regression on log marginal costs. Column 2 instruments marginal costs with input tariffs and lag marginal costs. Column 3 instruments marginal costs with input tariffs and two-period lag marginal costs. The regressions exclude outliers in the top and bottom 3rd percent of the markup distribution. All regressions include firm–product fixed effects. The regressions use data from 1989–1997. The standard errors are bootstrapped and are clustered at the firm level. Significance: †10.1 percent, *10 percent, **5 percent, ***1 percent.

RESULTS – IMPACT OF TRADE LIBERALIZATION

First, plot the distribution of prices in 1989 and 1997



Sample only includes firm-product pairs present in 1989 and 1997.
Observations are de-meaned by their time average, and outliers above and below the 3rd and 97th percentiles are trimmed.

RESULTS – IMPACT OF TRADE LIBERALIZATION

Now, they estimate how output tariff influenced the prices

$$(37) \qquad p_{fjt} = \lambda_{fj} + \lambda_{st} + \lambda_1 \tau_{it}^{\text{output}} + \eta_{fjt}.$$

RESULTS – IMPACT OF TR

10 % decrease in output tariff decreases the prices... But not much: by 1.67%

From 1989 to 1997, output tariff decreased by 62%

⇒ it decreased the prices by 8.4% (=62 x 0.136)

TABLE VIII

PRICES AND OUTPUT TARIFFS, ANNUAL REGRESSIONS[a]

	$\ln P_{fjt}$ (1)	$\ln P_{fjt}$ (2)
$\tau_{it}^{\text{output}}$	0.136**	0.167***
	0.056	0.054
Within R-squared	0.00	0.02
Observations	21,246	21,246
Firm–product FEs	yes	yes
Year FEs	yes	no
Sector–year FEs	no	yes
Overall impact of trade liberalization	−8.4**	−10.4***
	3.4	3.3

[a]The dependent variable is a firm–product's (log) price. Column 1 includes year fixed effects and Column 2 includes sector–year fixed effects. The regressions exclude outliers in the top and bottom 3rd percent of the markup distribution. All regressions include firm–product fixed effects and use data from 1989–1997. Standard errors are clustered at the industry level. The final row uses the average 62% decline in output tariffs from 1989–1997 to compute the mean and standard error of the impact of trade liberalization on prices. That is, for each column the mean impact is equal to the $-0.62 \times 100 \times$ {coefficient on output tariffs}. Significance: *10 percent, **5 percent, ***1 percent.

RESULTS – IMPACT OF TRADE LIBERALIZATION

They include input tariffs

$$p_{fjt} = \lambda_{fj} + \lambda_{st} + \lambda_1 \tau_{it}^{\text{output}} + \lambda_2 \tau_{it}^{\text{input}} + \eta_{fjt}. \tag{38}$$

RESUL

Confirms the pro-competitive effect

Positive as expected, but small and strangely non-significant

TABLE IX

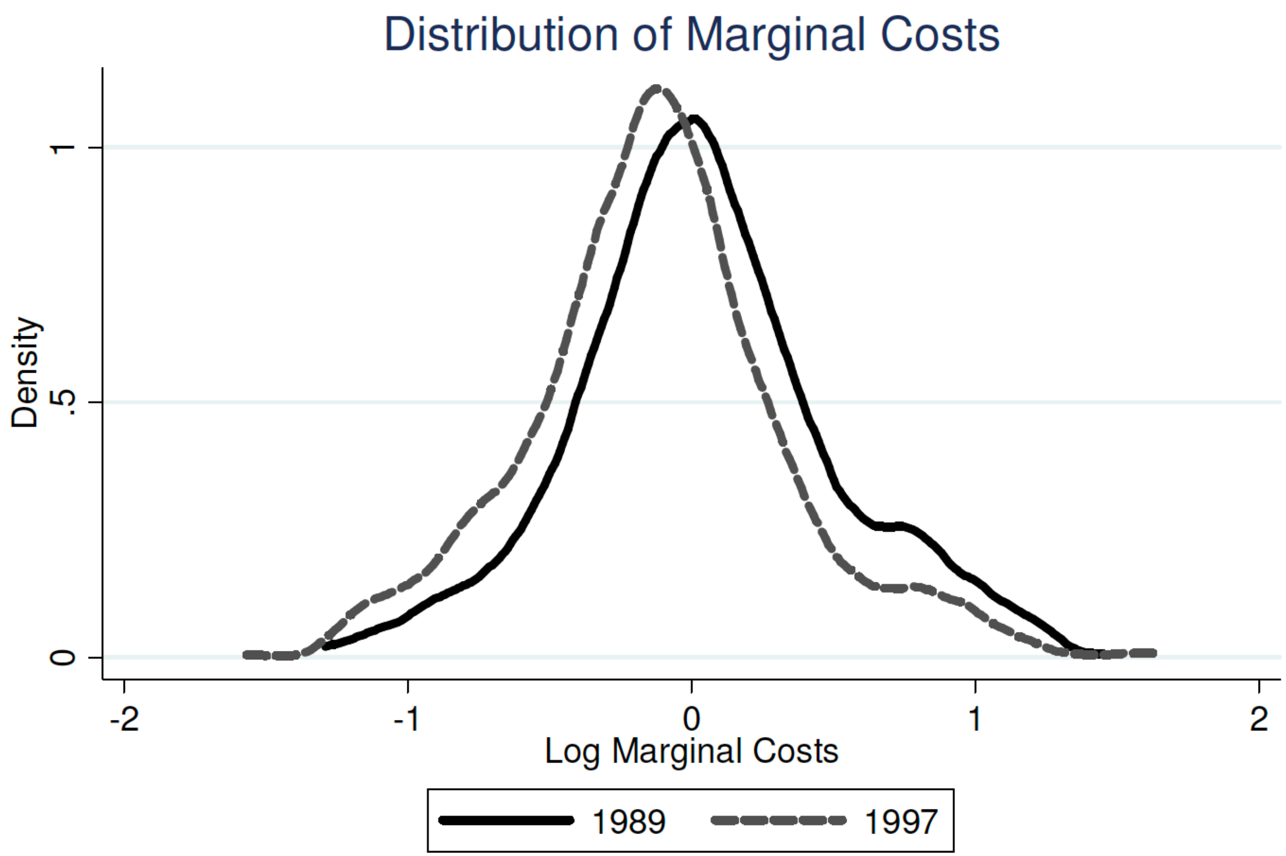
PRICES, COSTS, AND MARKUPS AND TARIFFS[a]

	$\ln P_{fjt}$ (1)
$\tau_{it}^{\text{output}}$	0.156***
	0.059
τ_{it}^{input}	0.352
	0.302
Within R-squared	0.02
Observations	21,246
Firm–product FEs	yes
Sector–year FEs	yes
Overall impact of trade liberalization	–18.1**
	7.4

[a]The dependent variable is noted in the columns. The sum of the coefficients from the markup and marginal costs regression equals their respective coefficient in the price regression. The regressions exclude outliers in the top and bottom 3rd percent of the markup distribution, and include firm–product fixed effects and sector–year fixed effects. The final row uses the average 62% and 24% declines in output and input tariffs from 1989–1997, respectively, to compute the mean and standard error of the impact of trade liberalization on each performance measure.

RESULTS – IMPACT OF TRADE LIBERALIZATION

Now look at marginal costs in 1989 and 1997…



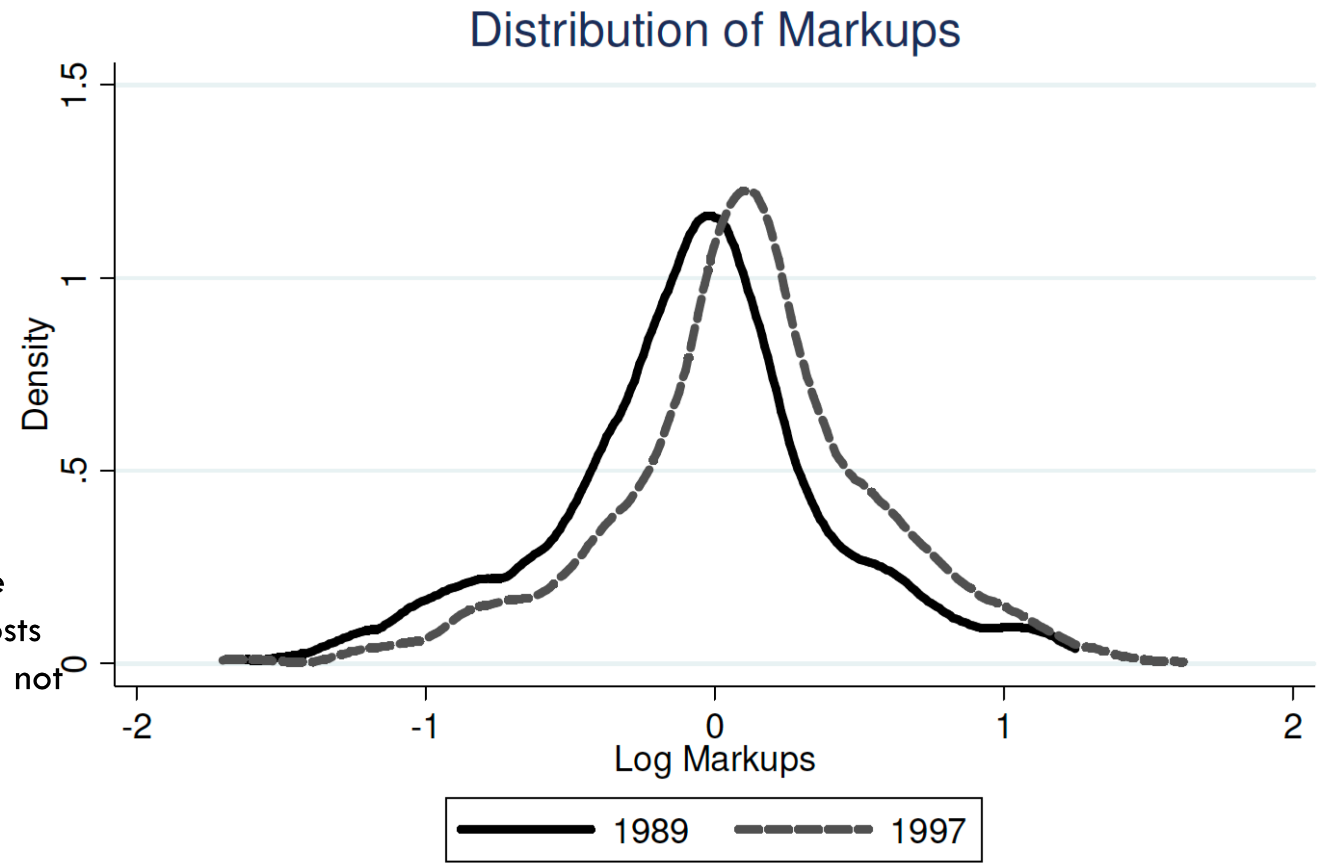
RESULTS – IMPACT OF TRADE LIBERALIZATION

… and markups

Markups have increased

Not decreased !!

Increase in mark-up seems to have offset the decrease in marginal costs (which explains why the prices did not changed much)



Sample only includes firm-product pairs present in 1989 and 1997.
Observations are de-meaned by their time average, and outliers above and below the 3rd and 97th percentiles are trimmed.

RESULTS – IMPACT OF TRADE LIBERALIZATION

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No pro-competitive effect !!

But small pass through: Decline in input tariff, decreased the marginal cost… and the firms absorbed this intro their margins

TABLE IX

PRICES, COSTS, AND MARKUPS AND TARIFFS[a]

	$\ln P_{fjt}$ (1)	$\ln mc_{fjt}$ (2)	$\ln \mu_{fjt}$ (3)
$\tau_{it}^{\text{output}}$	0.156***	0.047	0.109
	0.059	0.084	0.076
τ_{it}^{input}	0.352	1.160**	−0.807‡
	0.302	0.557	0.510
Within R-squared	0.02	0.01	0.01
Observations	21,246	21,246	21,246
Firm–product FEs	yes	yes	yes
Sector–year FEs	yes	yes	yes
Overall impact of trade liberalization	−18.1**	−30.7**	12.6
	7.4	13.4	11.9

[a] The dependent variable is noted in the columns. The sum of the coefficients from the markup and marginal costs regression equals their respective coefficient in the price regression. The regressions exclude outliers in the top and bottom 3rd percent of the markup distribution, and include firm–product fixed effects and sector–year fixed effects. The final row uses the average 62% and 24% declines in output and input tariffs from 1989–1997, respectively, to compute the mean and standard error of the impact of trade liberalization on each performance measure.

RESULTS – IMPACT OF TRADE LIBERALIZATION

Does the result above suggests unambiguously an absence of pro-competitive effect?

Not sure:

- If output tariff influence also the production costs (by boosting competition, firms react by improving their X-efficiency),
- … then firms may take advantage of this cost reduction to increase their mark-ups

To assess the pro-competitive effect (= impact of the output tariff on markups), one needs ta specification that control for marginal costs.

RESULTS – IMPACT OF TRADE LIBERALIZATION

TABLE X

PRO-COMPETITIVE EFFECTS OF OUTPUT TARIFFS[a]

	$\ln \mu_{fjt}$			
	(1)	(2)	(3)	(4)
$\tau_{it}^{\text{output}}$	0.143***	0.150**	0.129**	0.149**
	0.050	0.062	0.052	0.062
$\tau_{it}^{\text{output}} \times \text{Top}_{fp}$			0.314**	0.028
			0.134	0.150
Within R-squared	0.59	0.65	0.59	0.65
Observations	21,246	16,012	21,246	16,012
Second-order polynomial of marginal cost	yes	yes	yes	yes
Firm–product FEs	yes	yes	yes	yes
Sector–year FEs	yes	yes	yes	yes
Instruments	no	yes	no	yes
First-stage F-test	–	8.6	–	8.6

[a]The dependent variable is (log) markup. All regressions include firm–product fixed effects, sector–year fixed effects and a second-order polynomial of marginal costs (these coefficients are suppressed and available upon request). Columns 2 and 4 instrument the second-order polynomial of marginal costs with second-order polynomial of lag marginal costs and input tariffs. Columns 3 interacts output tariffs and the second-order marginal cost polynomial with an indicator if a firm–product observation was in the top 10 percent of its sector's markup distribution when it first appears in the sample. The regressions exclude outliers in the top and bottom 3rd percent of the markup distribution. The table reports the bootstrapped standard errors that are clustered at the industry level. Significance: *10 percent, **5 percent, ***1 percent.

All regressions control for marginal costs (and squared of it) – coefs not reported

Columns 2 and 4 use IV for marginal costs

Column 3 interacts the tariff with a dummy = 1 for firms with large markups (in the top 10 of their product)

RESULTS – IMPACT OF TRADE LIBERALIZATION

Pro competitive effect is back…
Trade liberalization decreases markups (<u>at given marginal cost)</u>

but pro-comp effect is small:
A 10% decrease in output tariff decreases markups by 1.43%
(This is much less than the increase in markup following the decrease in input tariff)

The firms with larger markups react more (= decrease their markups more)

TABLE X

PRO-COMPETITIVE EFFECTS OF OUTPUT TARIFFS[a]

	$\ln \mu_{fjt}$			
	(1)	(2)	(3)	(4)
$\tau_{it}^{\text{output}}$	0.143***	0.150**	0.129**	0.149**
	0.050	0.062	0.052	0.062
$\tau_{it}^{\text{output}} \times \text{Top}_{fp}$			0.314**	0.028
			0.134	0.150
Within R-squared	0.59	0.65	0.59	0.65
Observations	21,246	16,012	21,246	16,012
Second-order polynomial of marginal cost	yes	yes	yes	yes
Firm–product FEs	yes	yes	yes	yes
Sector–year FEs	yes	yes	yes	yes
Instruments	no	yes	no	yes
First-stage F-test	–	8.6	–	8.6

[a]The dependent variable is (log) markup. All regressions include firm–product fixed effects, sector–year fixed effects and a second-order polynomial of marginal costs (these coefficients are suppressed and available upon request). Columns 2 and 4 instrument the second-order polynomial of marginal costs with second-order polynomial of lag marginal costs and input tariffs. Columns 3 interacts output tariffs and the second-order marginal cost polynomial with an indicator if a firm–product observation was in the top 10 percent of its sector's markup distribution when it first appears in the sample. The regressions exclude outliers in the top and bottom 3rd percent of the markup distribution. The table reports the bootstrapped standard errors that are clustered at the industry level. Significance: *10 percent, **5 percent, ***1 percent.

MORE ON PASS-THOUGH AND MARKUPS?

EXHANGE RATE PASS THROUGH

HETEROGENEOUS REACTION TO EXCHANGE RATE SHOCKS

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Volume 127, Issue 1
February 2012

How do Different Exporters React to Exchange Rate Changes?

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Nicolas Berman, Philippe Martin, Thierry Mayer

The Quarterly Journal of Economics, Volume 127, Issue 1, February 2012, Pages 437–492,
https://doi.org/10.1093/qje/qjr057
Published: 19 January 2012

EXCHANGE RATE PASS-THROUGH

Currency appreciation

-Your products are now more expensive abroad

- Do nothing: fob price unchanged / consumer price increase = Complete PT
- Reduce margins: fob price decrease / consumer price increase less = incomplete PT

VARIABLE MARKUPS ⇒ HETEROGENOUS PASS-THROUGH

Models with heterogenous firms and variable markups:

- Melitz-Ottaviano
- Oligopoly
- Corsetti and Dedola (2005)

  Model with destination-specific distribution cost which (i) introduces non-log linear marginal cost (as in Hummels and Skiba), which makes the markup demand on firm-level productivity and (ii) markup depends on the exchange rate because the distribution cost is paid in foreign currency

All predict that more productive firms (i) have larger markup and (ii) have a lower exchange rate pass-through

Intuition = firms with very small markup have no room to decrease it in order to absorb a negative shock

DATA

French firm-level data:

- Douanes (quantity and values exported, by firm, destination, nc8 product, year)
- Balance sheets (to estimate firm-level TFP)

- Retain non-eurozone destinations only

DATA

French firm-level data:

- Douanes (quantity an values exported, by firm, destination, nc8 product, year)
- Balance sheets (to estimate firm-level TFP)

- Retain non-eurozone destinations only

- Limitation: TFP is estimated at the firm-level… but firms may produce different products, may not export all of them (and certainly not all of them to all destination), and may even export goods they have not produced

PASS-THROUGH ESTIMATES

They estimate how much of a real exchange rate shock is passed though the foreign consumer, i.e. into the export price

$$(1) \qquad \ln(UV_{jit}) = \alpha_p \ln(\widetilde{\varphi}_{jt-1}) + \beta_p \ln(RER_{it}) + \gamma_p \ln(\widetilde{\varphi}_{jt-1}) \times \ln(RER_{it}) + \psi_t + \mu_{ji} + \epsilon_{jit},$$

RER_{it} is the average real echange rate between France and country *i* during year t (an increase denotes a depreciation of the Euro)

β_p = average pass-through

γ_p = coeff on interaction term, with $\tilde{\varphi}_{jt-1}$ is the productivity of firm *j*, with one year lag and normalized (= divided by the average sample productivity in t-1)

TABLE III

BASELINE RESULTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sample	Single product	Main product (val.)	Main product (dest.)	Stable mix	Single NC4	Firm level	Firm-product level
# observations	355996	429022	486403	364672	489079	858271	2289051
Dep. var.				ln unit value			
				Coefficients			
ln TFP_{t-1}	0.012^{a}		06^{b}	0.014^{a}	0.012^{a}	0.010^{a}	0.010^{a}
	(0.004)		03)	(0.004)	(0.003)	(0.002)	(0.002)
ln RER	0.084^{a}		08^{a}	0.097^{a}	0.078^{a}	0.052^{a}	0.124^{a}
	(0.019)		16)	(0.018)	(0.016)	(0.017)	(0.020)
ln $\text{TFP}_{t-1} \times$ ln RER	0.047^{a}		55^{a}	0.042^{a}	0.040^{a}	0.024^{a}	0.023^{a}
	(0.015)		09)	(0.014)	(0.013)	(0.009)	(0.008)
rank product							-0.003^{a}
							(0.000)
rank product $\times$ ln RER							-0.003^{a}
							(0.001)
			: change in the effect of RER (%), for				
mean TFP$\rightarrow$ mean + s.d TFP	$8.4 \rightarrow 13.4$		$\rightarrow 16.4$	$9.7 \rightarrow 14.1$	$7.8 \rightarrow 12.2$	$5.2 \rightarrow 7.9$	$12.4 \rightarrow 15.2$
1st$\rightarrow$ 5th product							$12.4 \rightarrow 11.0$
1st$\rightarrow$ 10th product							$12.4 \rightarrow 9.3$

Coef = 0.084

A 10% depreciation increases export prices by 0.84%

92% of the exchange rate shock is passed-through the consummer

(firms do not change their prices much)

TABLE III

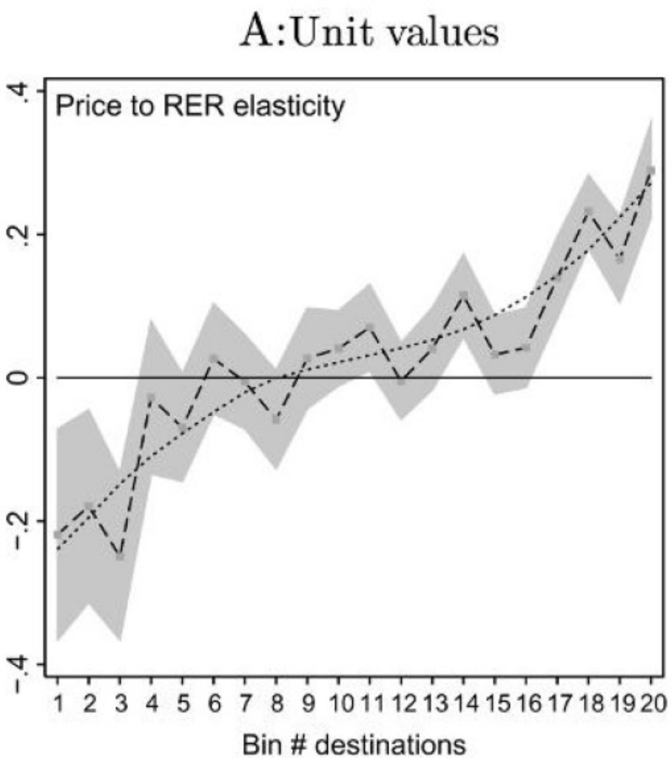
BASELINE RESULTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sample	Single product	Main product (val.)	Main product (dest.)	Stable mix	Single NC4	Firm level	Firm-product level
# observations	355996	429022	486403	364672	489079	858271	2289051
Dep. var.				ln unit value			
				Coefficients			
ln TFP_{t-1}	0.012[a]	0.018[a]	0.006[b]	0.014[a]	0.012[a]	0.010[a]	0.010[a]
	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.002)	(0.002)
ln RER	0.084[a]	[illegible]	.108[a]	0.097[a]	0.078[a]	0.052[a]	0.124[a]
	(0.019)	[illegible]	.016)	(0.018)	(0.016)	(0.017)	(0.020)
ln $\text{TFP}_{t-1}\times$ ln RER	0.047[a]	[illegible]	.055[a]	0.042[a]	0.040[a]	0.024[a]	0.023[a]
	(0.015)	[illegible]	.009)	(0.014)	(0.013)	(0.009)	(0.008)
rank product							-0.003[a]
							(0.000)
rank product $\times$ ln RER							-0.003[a]
							(0.001)
				he effect of RER (%), for			
mean TFP$\rightarrow$ mean + s.d TFP	8.4 $\rightarrow$ 13.4	1	[illegible]	9.7 $\rightarrow$ 14.1	7.8 $\rightarrow$ 12.2	5.2 $\rightarrow$ 7.9	12.4 $\rightarrow$ 15.2
1st$\rightarrow$ 5th product							12.4 $\rightarrow$ 11.0
1st$\rightarrow$ 10th product							12.4 $\rightarrow$ 9.3

The price increase is larger for more productive firms (=markups increase more and pass through is lower)

Firms with TFP = mean + 1 sd have a 87% pass-through

PASS-THROUGH ESTIMATES



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The World Economy

Original Article

Export Performance, Invoice Currency and Heterogeneous Exchange Rate Pass-through

Richard Fabling, Lynda Sanderson

First published: 21 June 2014 | https://doi.org/10.1111/twec.12198 | Citations: 11

Fabling and Sanderson replicate BMM on New Zeeland data

They have one additional information: the invoicing currency

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Table 2: Invoice currency share of trade by destination (TWI14)

	Unweighted				Trade-weighted			
	Producer	Local	Vehicle		Producer	Local	Vehicle	
			USD	Other			USD	Other
Australia	0.562	0.405	0.030	0.003	0.396	0.409	0.194	0.001
Canada	0.318	0.391	0.288	0.003	0.072	0.547	0.380	0.001
China	0.235	0.000	0.729	0.036	0.108	...	0.875	...
Eurozone	0.519	0.363	0.109	0.009	0.158	0.655	0.175	0.011
United Kingdom	0.536	0.400	0.043	0.021	0.198	0.709	0.076	0.018
Hong Kong	0.518	0.015	0.455	0.011	0.236	0.006	0.753	0.004
Indonesia	0.167	0.000	0.829	0.004	...	0.000	0.934	...
Japan	0.458	0.265	0.269	0.009	0.187	0.254	0.554	0.005
South Korea	0.331	0.000	0.665	0.004	...	...	0.862	0.001
Malaysia	0.415	0.000	0.578	0.007	0.118	0.000	0.879	0.003
Other (non-TWI14)	0.740	0.022	0.214	0.024	0.163	0.036	0.746	0.054
Singapore	0.542	0.096	0.353	0.009	0.190	...	0.747	...
Thailand	0.322	0.021	0.650	0.008	0.073	...	0.917	...
United States	0.370	0.624	N/A	0.005	0.107	0.892	N/A	0.001
Overall	0.570	0.238	0.179	0.013	0.200	0.332	0.453	0.015

Shares of ΔP_{SR} observations. Trade weights based on the NZD-converted average value over t and $t-M$. ... denotes values suppressed due to Statistics New Zealand confidentiality requirements. Taiwan excluded because necessary macroeconomic data are not available. Other (non-TWI14) countries are pooled.

3 possibility for exporters:

- Invoice in the producer currency (NZ$ here)
- Invoice in the local (consummer) currency
- Invoice in a vehicle currency (USD mostly)

When NZ firms export to Australia:

56.2% use NZ$
40.5% use AUS$
3% use US$

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Table 2: Invoice currency share of trade by destination (TWI14)

	Unweighted				Trade-weighted			
	Producer	Local	Vehicle		Producer	Local	Vehicle	
			USD	Other			USD	Other
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China	0.235	0.000	0.729	0.036	0.108	...	0.875	...
Eurozone	0.519	0.363	0.109	0.009	0.158	0.655	0.175	0.011
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Hong Kong	0.518	0.015	0.455	0.011	0.236	0.006	0.753	0.004
Indonesia	0.167	0.000	0.829	0.004	...	0.000	0.934	...
Japan	0.458	0.265	0.269	0.009	0.187	0.254	0.554	0.005
South Korea	0.331	0.000	0.665	0.004	...	...	0.862	0.001
Malaysia	0.415	0.000	0.578	0.007	0.118	0.000	0.879	0.003
Other (non-TWI14)	0.740	0.022	0.214	0.024	0.163	0.036	0.746	0.054
Singapore	0.542	0.096	0.353	0.009	0.190	...	0.747	...
Thailand	0.322	0.021	0.650	0.008	0.073	...	0.917	...
United States	0.370	0.624	N/A	0.005	0.107	0.892	N/A	0.001
Overall	0.570	0.238	0.179	0.013	0.200	0.332	0.453	0.015

Shares of ΔP_{SR} observations. Trade weights based on the NZD-converted average value over t and $t-M$. ... denotes values suppressed due to Statistics New Zealand confidentiality requirements. Taiwan excluded because necessary macroeconomic data are not available. Other (non-TWI14) countries are pooled.

3 possibility for exporters:

- Invoice in the producer currency (NZ$ here)
- Invoice in the local (consummer) currency
- Invoice in a vehicle currency (USD mostly)

But smaller firms use NZ$ and big ones use US$

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They estimate

$$\Delta P_{fcgt} = \beta \Delta e_{ct} + \mathbf{Z}_{cgt}\gamma + \epsilon_{fcgt}, \Delta \in \{\Delta_{SR}, \Delta_{LR}\} \tag{3}$$

where the log change in NZD-converted unit values within a specific firm-country-good relationship (ΔP_{fcgt}) is regressed on the cumulative (normalised by M) log difference in the bilateral exchange rate with the destination country (Δe_{ct}) since the last observed trade, and a set of control variables $\mathbf{Z}_{cgt}$. Following Gopinath et al. (2010), $\mathbf{Z}$ includes destination×HS4-digit product dummies, and log changes in destination country GDP and CPI, and New Zealand CPI (all normalised by M).

$\beta = 0 \Rightarrow$ Sticky prices = Complete pass-through
$\beta = 1 \Rightarrow$ Zero pass-through

Table 6: Short-run ERPT by invoice currency group

	(1)	(2)	(3)	(4)
β	0.475**			
	[0.015]			
$\beta_{non\text{-}producer}$		0.804**		
		[0.021]		
$\beta_{producer}$		0.092**	0.092**	0.086**
		[0.022]	[0.022]	[0.022]
β_{local}			0.909**	0.901**
			[0.029]	[0.029]
$\beta_{vehicle}$			0.700**	
			[0.029]	
$\beta_{vehicle(p/v)}$				0.825**
				[0.030]
$\beta_{vehicle(v/l)}$				0.065
				[0.047]
$N(\Delta_{SR})$	1,207,100	1,207,100	1,207,100	1,207,100
Within R^2	0.013	0.013	0.013	0.013

Regressions include unreported HS4-destination fixed effects and macroeconomic variables as outlined in the main text. Standard errors in brackets (** denotes significance at the 1% level). β coefficients all significantly different from each other at the one percent level with the exception of $\beta_{producer}$ and $\beta_{vehicle(v/l)}$ in column 4 (p-value 0.682).

Pass-through is quite small compared to BMM

47.5% of the exchange rate shock is passed into fob prices, i.e. absorbed into exporters' margins

Table 6: Short-run ERPT by invoice currency group

	(1)	(2)	(3)	(4)
β	0.475**			
	[0.015]			
$\beta_{non\text{-}producer}$		0.804**		
		[0.021]		
$\beta_{producer}$		0.092**	0.092**	0.086**
		[0.022]	[0.022]	[0.022]
β_{local}			0.909**	0.901**
			[0.029]	[0.029]
$\beta_{vehicle}$			0.700**	
			[0.029]	
$\beta_{vehicle(p/v)}$				0.825**
				[0.030]
$\beta_{vehicle(v/l)}$				0.065
				[0.047]
$N(\Delta_{SR})$	1,207,100	1,207,100	1,207,100	1,207,100
Within R^2	0.013	0.013	0.013	0.013

Regressions include unreported HS4-destination fixed effects and macroeconomic variables as outlined in the main text. Standard errors in brackets (** denotes significance at the 1% level). β coefficients all significantly different from each other at the one percent level with the exception of $\beta_{producer}$ and $\beta_{vehicle(v/l)}$ in column 4 (p-value 0.682).

But the behavior is very different for:

- Firms that invoice in producer currency = almost complete pass-through
- Firm that use a foreign currency = almost no pass-through (for the ones that invoice in consumers' currency)

BMM REVISITED

They replicate BMM

They do not observe productivity, but use (lag) total export or (lag) number of destinations are measures of firm performance

BMM REVISITED

Elasticity of prices with respect to exchange rate:

For small/low-performance firms

For large/high-performance firms

Results confirm BMM: more performant firms adjust their prices more (have lower pass through

Table 9:

	Total exports	Number of countries	
β^0	0.379**‡	0.377**‡	(
	[0.024]	[0.023]	
β^1	0.540**‡	0.555**‡	(
	[0.021]	[0.021]	
$N(\Delta_{SR})$	1,029,100	1,029,100	1
Within R^2	0.014	0.014	

Regressions include unreported HS4-destinat
denotes significance at the 1% level). ‡ signifi

Elasticity of prices with respect to exchange rate:

For small/low-performance firms

For large/high-performance firms

Within the group of firms invoicing in NZ$ BMM result is not here anymore

	Total exports	Number of countries	
$\beta^0_{producer}$	0.137**†	0.105**	
	[0.034]	[0.033]	
$\beta^1_{producer}$	0.045†	0.070*	
	[0.032]	[0.033]	
β^0_{local}	0.885**	0.938**	
	[0.046]	[0.046]	
β^1_{local}	0.913**	0.871**	
	[0.040]	[0.041]	
$\beta^0_{vehicle}$	0.688**	0.720**	
	[0.044]	[0.043]	
$\beta^1_{vehicle}$	0.723**	0.694**	
	[0.041]	[0.042]	
$N(\Delta_{SR})$	1,029,100	1,029,100	1
Within R^2	0.014	0.014	

Elasticity of prices with respect to exchange rate:

For small/low-performance firms

For large/high-performance firms

Within the group of firms invoicing in destination country currency
BMM result is not here anymore

	Total exports	Number of countries	
$\beta^0_{producer}$	0.137**†	0.105**	
	[0.034]	[0.033]	
$\beta^1_{producer}$	0.045†	0.070*	
	[0.032]	[0.033]	
β^0_{local}	0.885**	0.938**	
	[0.046]	[0.046]	
β^1_{local}	0.913**	0.871**	
	[0.040]	[0.041]	
$\beta^0_{vehicle}$	0.688**	0.720**	
	[0.044]	[0.043]	
$\beta^1_{vehicle}$	0.723**	0.694**	
	[0.041]	[0.042]	
$N(\Delta_{SR})$	1,029,100	1,029,100	1
Within R^2	0.014	0.014	

Elasticity of prices with respect to exchange rate:

For small/low-performance firms

For large/high-performance firms

	Total exports	Number of countries	
$\beta^0_{producer}$	0.137**†	0.105**	
	[0.034]	[0.033]	
$\beta^1_{producer}$	0.045†	0.070*	
	[0.032]	[0.033]	
β^0_{local}	0.885**	0.938**	
	[0.046]	[0.046]	
β^1_{local}	0.913**	0.871**	
	[0.040]	[0.041]	
$\beta^0_{vehicle}$	0.688**	0.720**	
	[0.044]	[0.043]	
$\beta^1_{vehicle}$	0.723**	0.694**	
	[0.041]	[0.042]	
$N(\Delta_{SR})$	1,029,100	1,029,100	1
Within R^2	0.014	0.014	

Within the group of firms invoicing in a vehicle country currency
BMM result is not here anymore

THE END