

# International Trade: David and Goliath

Trade under oligopolistic competition in the presence of a monopolistically competitive fringe

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# Motivation

- ▶ Export and import flows are driven by a small group of happy-few, long-lasting, large firms.
  - ▶ 1% of French exporters account for 60% of total exports
  - ▶ 3.3% of French firms account for more than half of import flows.
- ▶ Same “dichotomy” observed in the US, in Belgium, France, Germany and China...

BRS (2007), Mayer Ottaviano (2008), Berthou Fontagné (2009), Manova & Zhang (2009)

- ▶ Holds for services: Crozet Milet Mirza (2011)

# This paper

Tackles heterogeneity from a different angle:

- ▶ The happy few, superstar firms impact directly competition toughness
- ▶ They make net positive profits at equilibrium
- ▶ Small firms behave non-strategically, they compete monopolistically
- ▶ Differences in firm behavior provides a “natural” explanation to firm differences in pricing.
- ▶ The distribution of the gains from trade under a mixed market structure depart from either pure monopolistic competition / pure oligopoly.

# Literature

- ▶ Monopolistic Competition (Melitz 2003; MO 2008; MMO 2011; Antoniadès 2008; Kugler Verhoogen 2010; BRS 2009, 2010; Bustos 2011, Bas 2012)
  - ▶ *all* firms are negligible to the market: “Price-index takers”
  - ▶ have the same pricing behavior
- ▶ Empirics: Berman Martin Mayer (2011) Goldberg Hellerstein (2011)
- ▶ (Necessary) ingredients
  1. Horizontal differentiation
  2. Chamberlin’s “Large-group assumption”: Strategic interactions are second-order terms (Yang-Heijdra, 1993)
  3. Free-entry

# Literature

- ▶ Trade under oligopoly
  - ▶ Dixit-Norman (1980) Brander (1981) Brander-Krugman (1983)
  - ▶ G.O.L.E., Neary.P: “Large in the small but small in the large”
- ▶ Mixed market structures:
  - ▶ Neary (2010)
  - ▶ Shimomura Thisse (2012) : Presumption against the entry of very large firms may be not warranted

# Roadmap

- ▶ Closed Economy
- ▶ Free trade
- ▶ Bilateral trade liberalization (symmetric countries)

## A (parsimonious) model

- ▶ One homogeneous good, one differentiated good and one factor of production: labor.
- ▶ Love for variety and endogenous elasticity of demand.
- ▶ An endogenous mass  $[0, M]$  of SP (single-product).
- ▶ Exogenous number  $\Omega$  of MP (multi-product) firms that behave strategically.
  - ▶ More specifically:  $\Omega$  firms have the *ability* to become big
  - ▶ The Multi-product feature allows firms to choose how they weight in the economy.
- ▶ Simultaneous game: Cournot-Nash competition.
- ▶ Emphasize behavioural differences: rule out productivity heterogeneity.

## Preferences

Continuum quasi linear quadratic utility function (Bowley, 1924; Dixit, 1979; OTT, 2002)

$$U(A, \mathbf{x}) = A + \mathcal{U}(\mathbf{x})$$

where

$$\mathcal{U}(\mathbf{x}) = \int_{\mathcal{V}} \left( \alpha x_{\nu} d\nu - \frac{\beta}{2} x_{\nu}^2 \right) d\nu - \frac{\gamma}{2} \left( \int_{\mathcal{V}} x_{\nu} d\nu \right)^2$$

with

$$\int_{\mathcal{V}} x_{\nu} d\nu = \sum_{\omega=1}^{\Omega} \int_0^{N_{\omega}} x_{\omega k} dk + \int_0^M x_i di$$

$$X = X_o + X_m$$

One-to-one relation between  $X$  and average price  $\mathbb{E}[p]$



# Preferences

- ▶ Budget constraint

$$A + \int_0^{\mathcal{V}} p_{\nu} x_{\nu} d\nu \leq R := 1 + \frac{1}{L} \sum_{\omega=1}^{\Omega} \Pi_{\omega} + \frac{1}{L} \int_0^M \pi_i di \quad (1)$$

- ▶ The Hicksian composite good  $A$  absorbs any income effect (partial equilibrium)
- ▶ 2 important features:
  - ▶ Price-elasticity of demand increases with price
  - ▶ One-dimension aggregate statistic  $X$

# Production

- ▶ Downward-sloping demand curve

$$p(x_i, X) = \alpha - \beta x_i - \gamma X$$

- ▶ Firms maximize their operational profits:

$$\pi_m = (p(x_i, X) - c)Lx_i \quad \Pi_\omega = \int_0^{N_\omega} (p(x_\omega, X) - c)Lx_{\omega k} dk$$

- ▶ MP-firm “true” demand curve:

$$p(x_i, X) = \alpha - \beta x_i - \gamma \left( \int_0^{N_\omega} x_{\omega k} dk \right) - \gamma X_{-\omega}$$

$N_\omega$  is endogenous

## Cross-section comparisons (given $X$ )

**Output:**

$$Q_\omega := N_\omega q_\omega$$

$$Q_\omega^*(X) = L \frac{N_\omega (\alpha - c - \gamma X)}{2\beta + \gamma N_\omega} \quad \text{with density} \quad q_\omega^*(X) = L \frac{\alpha - c - \gamma X}{2\beta + \gamma N_\omega}$$

$$Q_m := M q_m$$

$$Q_m^*(X) = L \frac{M (\alpha - c - \gamma X)}{2\beta}$$

- ▶ MP-firm profits are a concave function of  $N_\omega$
- ▶ Impact of demand linkages:  $\gamma = 0 : Q_m^*(X)/M = Q_\omega^*(X)/N_\omega$

# Big and small firms

- ▶ From an aggregative-game perspective  $p_i(x_i, X)$
- ▶ Two kinds of market power

$$\frac{p - c}{p} = \varepsilon_{x_i}(p) + \varepsilon_{x_i}(X)\varepsilon_X(p)$$

- ▶ Monopolistic Competition

$$\frac{p - c}{p} = \varepsilon_{x_i}(p) + 0$$

- ▶ Cournot oligopoly

$$\frac{p - c}{p} = 0 + \varepsilon_{x_i}(X)\varepsilon_X(p)$$

## Cross-section comparisons (given $X$ )

Markups:

$$p_m - c = \frac{1}{2}(\alpha - \gamma X - c)$$

$$p_\omega^* - c = \frac{1}{2}(\alpha + \frac{\gamma}{L} Q_\omega^* - \gamma X - c) \quad \text{with} \quad Q_\omega = N_\omega q_\omega$$

*Controlling for productivity, firm size is positively correlated with firms' markups.*

- ▶ Different from the heterogeneous quality interpretation
- ▶ Elasticity of demand is a function of a firm's market share
- ▶ Internalize consumers' love of variety to charge higher prices.
- ▶ Firm pass-through decreases with firm size (Berman Martin Mayer 2011)

## Cross-section comparisons (given $X^*$ )

- ▶ Absolute and relative markups charged by MP-firms increase with  $N_\omega$
- ▶ MP-firms charge higher markups than SP-firms
- ▶ This difference in their pricing relies only on the difference in nature of firms

## Optimal choice of $N_\omega$

- ▶ Cost function:

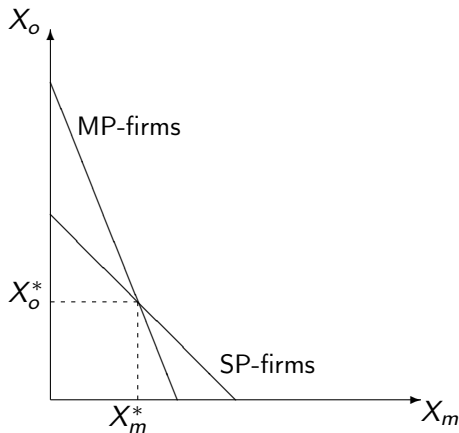
$$C(q_m) = f_p + f \quad C(\mathbf{q}_\omega) = \int_0^{N_\omega} (c \cdot q_{\omega k} + f_{p\omega} + \mathbf{1}_{k=0}f) dk$$

- ▶ Rule out within MP-firm heterogeneity:  $f_{p\omega} = f_p$
- ▶ MP-firms face a trade-off between cannibalization and economies of scope:

$$\Pi_\omega(N_\omega) = \int_0^{N_\omega} (c \cdot q_{\omega k} + f_p + \mathbf{1}_{k=0}f) dk$$

## Market Outcome under free entry

- ▶  $M^*$  endogenously determined by free entry.
- ▶ Solve for the conditions of coexistence.

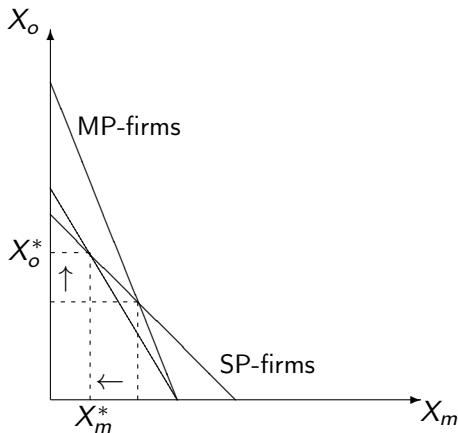


*The effect of an increase in  $\Omega$  on market outcome.*



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## Conditions for a mixed market structure

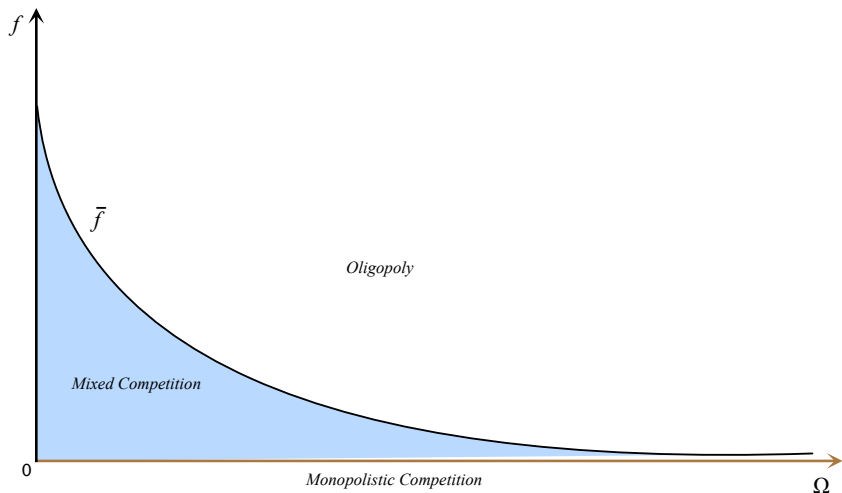


Figure : Evolution of the market structure according to  $(f, \Omega)$

## $f=0$ ; David, Goliath and free-riding

- ▶ *Ceteris paribus*, MP-firms choose to be negligible.
- ▶ Common demand shifter(s)
- ▶ Analogy: merger paradox

## $f > 0$ ; Comparative statics

*Under a mixed-market structure an increase in  $\Omega$  does not change MP-firms' profits (resp. prices and product scopes)*

Decompose short and long run effects for intuition.

- ▶ Pro-competitive effect in the short run
- ▶ Selection among SP-firms
- ▶ Demand shift (inter-firm reallocation of resources)

Emphasize the importance of entry and exit flows. Small firms act as a buffer (heterogeneous SP-firms).

*Under a mixed-market structure an increase in  $\Omega$  increases the overall number of varieties.*

## Welfare and market structure

Welfare:

$$U(R, \mathcal{V}, \mathbb{E}[p], \mathbb{V}[p]) = R + \frac{1}{2} \left[ \frac{(\alpha - \mathbb{E}[p])^2}{\eta + \frac{\gamma}{\mathcal{V}}} \right] + \frac{1}{2} \frac{\mathcal{V}}{\gamma} \mathbb{V}[p]$$

When  $\Omega \nearrow$  :

- ▶  $\mathcal{V}$  increases
- ▶ New varieties are sold with a higher markup:  
 $\mathbb{E}[p] \nearrow$  (composition effect)
- ▶  $\mathbb{V}[p]$  decreases as the majority of varieties are provided by MP-firms.

## Welfare and market structure

Consumer surplus  $U - R$  decreases unambiguously

- ▶ Opposite effects of within-firm and across-firm extensive margins.
- ▶ A new variety means more competition (entry of a new firm) or more market power (increase in incumbent's market share)
- ▶ Producer's surplus increases
- ▶ Social welfare increases.

Do consumers gain from trade liberalization?

- ▶ Free trade
- ▶ Costly trade

# Free Trade

- ▶ Market size and the number of MP firms increase by a factor  $k$  (number of trading partners)
- ▶ Equilibrium mass of the competitive fringe:

$$M^* = \frac{2\gamma}{\eta k} \left[ F(kL) - \left( 1 - \sqrt{\frac{f_p}{f + f_p}} \right) k\Omega \right]$$

- ▶ Benchmark:  $\Omega = 0$  (Krugman 1979)

$$M^* \searrow \quad kM^* \nearrow$$

## Free trade

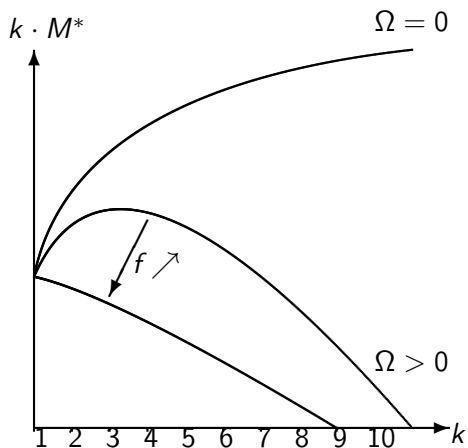


Figure : The effects of openness on the across-firm extensive margin under free trade



# Free trade

- ▶ Free trade adds a new effect on welfare: pro-competitive effect.
- ▶ The monopolistically competitive fringe is more aggressive (economies of scale).
- ▶ Consumer surplus increases.

## Costly trade with variable and fixed costs

- ▶ At the margin, big firms incur  $f_p$ , small firms incur  $f + f_p$ . Only MP firms find it profitable to export.
- ▶ Intra-firm reallocation **in the short-run**: MP firms drop some products on the domestic market but export new varieties (BRS 2010, EIJN 2010)
- ▶ Comparative statics **in the long-run**:
  - ▶ Selection effect : SP firms exit. Leads to pure oligopoly.
  - ▶ fob price is lower than domestic price (dumping).
  - ▶ MP firms increase their markup as trade costs decrease. Average price increases.
- ▶ Prices do not depend on  $\tau$ .

*The intensification of competition through import penetration falls only on small firms.*

# Trade liberalization

Trade liberalization:

- ▶ leads to the exit of SP firms
- ▶ Increases  $\mathcal{V}$  (new imported products), average price, total income.

$$U(R, \mathcal{V}, \mathbb{E}[p], \mathbb{V}[p]) \quad ?$$

- ▶ Monotonic decrease (increase) in consumer (firm) surplus with a fall in trade costs.
- ▶ Departs from pure oligopoly/monopolistic competition.

# Trade liberalization and market structure

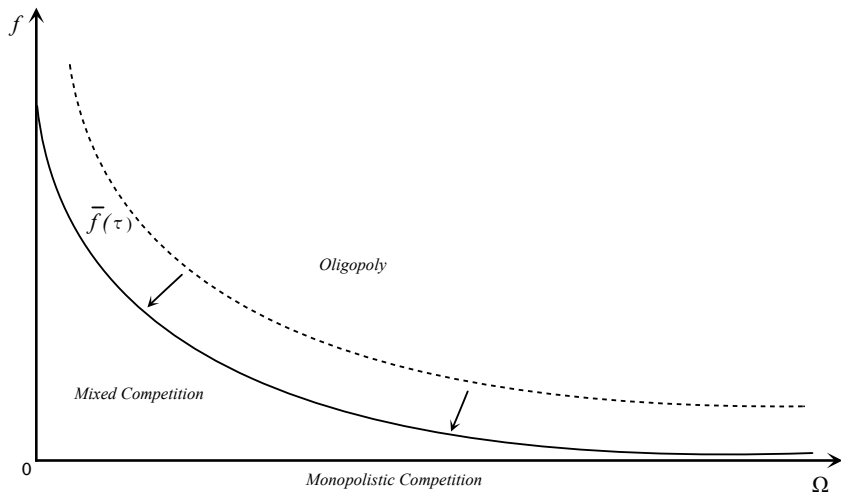


Figure : Evolution of market structure with trade liberalization

## Discussion: market power versus efficiency

- ▶ In a model with negligible firms, more profitable firms have always lower prices/higher quality.
- ▶ Productivity gains are always passed-on, to some extent, to consumers...
- ▶ .. through cheaper varieties (Melitz), less-substitutable varieties (Melitz-Ottaviano)
- ▶ Firms' market power which stems from strategic interactions decreases consumer surplus.
- ▶ Consumers gain from trade liberalization only if large firms are significantly more productive

# Conclusion

- ▶ Mixed market structure offers an alternative to take into account firm heterogeneity.
- ▶ Departs from the new new trade theory predictions on the distribution of the gains of trade.
- ▶ Concentration on the supply side withholds the gains from trade that could be passed-on to consumers.
- ▶ Limits :
  - ▶ small/non productive firms may still export
  - ▶ how does a firm become a superstar?

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- ▶ Limits :
  - ▶ small/non productive firms may still export
  - ▶ how does a firm become a superstar?
- ▶ Thank you!