Market size, Competition, and the Product Mix of Exporters

Thierry Mayer, Marc J. Melitz, and Gianmarco I.P. Ottaviano
Evidence on Multi-Product Firms and Trade

Multi-product firms dominate world trade flows:

Table 3: Distribution of French exporters over products and markets

Share of French exporters in 2003 (total number exporters: 99259)

<table>
<thead>
<tr>
<th>No. of products</th>
<th>1</th>
<th>5</th>
<th>10+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29.61</td>
<td>0.36</td>
<td>0.22</td>
<td>34.98</td>
</tr>
<tr>
<td>5</td>
<td>0.76</td>
<td>0.45</td>
<td>0.62</td>
<td>4.73</td>
</tr>
<tr>
<td>10+</td>
<td>0.95</td>
<td>0.89</td>
<td>10.72</td>
<td>18.57</td>
</tr>
<tr>
<td>Total</td>
<td>42.59</td>
<td>4.12</td>
<td>15.54</td>
<td>100</td>
</tr>
</tbody>
</table>

Share of French exports in 2003 (total exports: 314.3 billion €)

<table>
<thead>
<tr>
<th>No. of products</th>
<th>1</th>
<th>5</th>
<th>10+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.7</td>
<td>0.08</td>
<td>0.38</td>
<td>1.86</td>
</tr>
<tr>
<td>5</td>
<td>0.3</td>
<td>0.08</td>
<td>1.06</td>
<td>1.97</td>
</tr>
<tr>
<td>10+</td>
<td>0.28</td>
<td>0.45</td>
<td>76.3</td>
<td>81.36</td>
</tr>
<tr>
<td>Total</td>
<td>2.85</td>
<td>1.55</td>
<td>85.44</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: EFIM.
Why Is the Firm Product Margin Important?

- Most product creation and destruction occurs within existing firms
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  - Highly skewed
  - Stable over time and across markets: firms adjust product margin at the ‘bottom’
- Firms also respond to market conditions by adjusting their product mix
  - If skewed distribution across products is indicative of productivity/quality differences, then changes in product mix can have important repercussions on firm productivity and welfare
The Effects of Trade Liberalization in North America on Multi-Product Firms


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  - ... or increased skewness for both export and domestic sales
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  - ... or increased skewness for both export and domestic sales
- Evidence for Mexico:
  - Increased skewness in the distribution of export sales
    - Highest export increases for products (within firms) with highest export shares
  - Intensive margin effect in product mix responses dominates effect of extensive product margin
What We Do in This Paper

- Develop a multi-country model with multi-product firms and arbitrary differences in geography
- Explains the link:
  - Market size and geography $\rightarrow$ toughness of competition
    (distribution of markups across products)
  - Toughness of competition $\rightarrow$ skewness of firm product mix
  - Skewness of firm product mix $\rightarrow$ firm productivity

When firms export to 'tougher' markets or when trade costs fall:
- Firms skew their export sales towards their 'better' products
- Firms no longer export 'marginal' products
- Firm productivity increases (combination of both effects)

We find very strong confirmation for the effects of market size and geography on the skewness of French exporters' product mix and indirect evidence of large differences in competitive environment across export market destinations.
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Literature Review

Competition effect (endogenous markups)

- Feenstra & Ma (2008) and Eckel & Neary (2009) incorporate cannibalization effect of increasing product range
- In our model, there is no cannibalization as firms produce a discrete number of varieties and never attain finite mass
- Competition effect comes from demand side: mass of competing sellers and their average price
- Main advantage of simplifying assumption:
  - Can solve for multi-country asymmetric world equilibrium
- Nocke & Yeaple (2008) and Baldwin & Gu (2009) also incorporate competition effect but with symmetric products
Literature Review (Cont.)

Nested C.E.S. preferences with a continuum of firms and products

- Cannibalization is ruled out by restricting nests in which firms can introduce products $\rightarrow$ exogenous markups
- $\rightarrow$ No differences in the toughness of competition across markets or due to trade liberalization
- $\rightarrow$ No effects of competition on the skewness of the product mix
- Focus on effects of trade on the product scope decision (and potential effect of trade costs on the product mix)
Outline

Theory

- Closed economy
  - Introduce preferences and firm product ladder
  - Effect of market size on competition and firm product mix

- Open economy
  - Skip two-country version and effect of trade liberalization
    (similar to effect of bigger market size in closed economy)
  - Effects of market size and geography on exporter’s product mix

Empirics

- Effects of market size, geography, and trade barriers on French exporters’ product mix
Model Setup: Preferences and Demand

- Continuum of differentiated varieties $i \in \Omega$ and a homogeneous good (numeraire)
- Consumer utility and individual consumption levels:

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

- Demand parameters:
  - $\gamma$: index of product differentiation
    - $\gamma = 0$ $\implies$ perfect substitutes
    - Consumer only cares about $Q^c = \int_{i \in \Omega} q_i^c \, di$
    - As $\gamma \uparrow$, increasing weight on consumption distribution across varieties
  - $\alpha$ and $\eta$: substitution with numeraire good
    - $\alpha \uparrow$ and $\eta \downarrow$ shift out demand for differentiated varieties
Preferences and Demand (Cont.)

- Quadratic utility leads to linear inverse demand for all varieties:
  \[ p_i = \alpha - \gamma q_i^c - \eta Q^c \]

- There are \( L \) consumers in a market \( \rightarrow \) index of market size
  - Market demand is \( q_i = L q_i^c \)
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- Marginal utilities are bounded \( \rightarrow \) threshold price level:
  \[
  p_i \leq \frac{1}{\eta + \gamma / M} \left( \frac{\gamma}{M} \alpha + \eta \bar{p} \right) \equiv p_{\text{max}}
  \]

where \( \bar{p} \) is average price of consumed varieties

- Threshold \( \downarrow \) as \( M \uparrow \) or \( \bar{p} \downarrow \) (tougher competition)
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- Endogenous price elasticity of residual demand:
  \[ \varepsilon_i \equiv \left| \frac{\partial q_i}{\partial p_i} \frac{p_i}{q_i} \right| = \left( \frac{p_{\text{max}}}{p_i} - 1 \right)^{-1} \]
Firms and Products

- A firm can produce multiple varieties/products.
- Production of additional varieties moves a firm away from its unique ‘core’ competency.
- ... which entails additional customization costs.
- Each additional variety/product produced entails an additional customization cost.
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- Each additional variety/product produced entails an additional customization cost
- We model these customization costs along a geometric ladder with step \( \omega^{-1} > 1 \) (\( \omega \in (0, 1) \)):
- A firm with core competency \( c \) produces its core product at this cost and each subsequent variety \( m \) at cost \( \nu(m, c) = \omega^{-m}c \)
- There is no upper bound limit on the number of products a firm can produce
Production and Firm Behavior

- One factor of production: labor (inelastically supplied)
- Homogeneous good and labor markets are competitive
  \[\rightarrow \text{ unit wages (so marginal costs are always equal to unit labor requirements)}\]
- Prior to entry, identical firms face some initial uncertainty concerning their future core competency \( c \)
- Firms must pay sunk investment cost \( f_E \) to enter
- Firm core competency is then learned/revealed:
  - Draw from a common cost distribution \( G(c) \) with support on \([0, c_M]\)
Monopolistic Competition with Multi-Product Firms

- Given the assumptions on the costs of additional products, a firm will produce a countable set of products
  - ... and there will be a continuum of firms

- With products on a continuum, a firm will never achieve discrete mass (measure zero) and the cross-price effects on the multiple varieties vanish

- This is the monopolistic competition equilibrium where a firm independently maximizes profits on any variety produced, taking the total mass of varieties and their average price $\bar{p}$ as given
All performance measures (price, output, markup, revenue, profits) can be defined both at the product and firm level.

Consider the product level measures:

- Let $\pi(v)$ represent the maximized profit from a variety with marginal cost $v$ (this is independent of the firm producing that particular variety).
- Let $v_D$ represent the cutoff cost level for profitable production:

$$v_D = \sup \{ v \mid \pi(v) \geq 0 \}$$
Product Performance Measures (Cont.)

- All product level performance measures can be written as a function of this cutoff cost level $v_D$:

  \[ p(v) = \frac{1}{2} (v_D + v) \quad (\text{price}) \]
  \[ q(v) = \frac{L}{2\gamma} (v_D - v) \quad (\text{output}) \]
  \[ \lambda(v) = \frac{1}{2} (v_D - v) \quad (\text{markup}) \]
  \[ r(v) = \frac{L}{4\gamma} \left[ (v_D)^2 - v^2 \right] \quad (\text{revenue}) \]
  \[ \pi(v) = \frac{L}{4\gamma} (v_D - v)^2 \quad (\text{profit}) \]

- Prices decrease with variety cost $v$, while markups, output, revenue, and profits increase

- \( \rightarrow \) cost/productivity gain is not entirely passed on to consumers due to endogenous markup
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\end{align*}
\]

- Prices decrease with variety cost $v$, while markups, output, revenue, and profits increase.
- Cost/productivity gain is not entirely passed on to consumers due to endogenous markup.
- Endogenous $v_D$ summarizes ‘competitive’ environment.
Product Range Decision for a Firm

- $c_D = v_D$ will also be the cost cutoff for firm survival
  - The cutoff firm produces only its core variety
- A firm with core competency $c$ will produce at least $m$ additional varieties so long as $v(m, c) \leq v_D \iff c \leq \omega^m c_D$
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- A firm will produce any variety that delivers non-negative profits.
  - A firm with core competency \( c \) thus produces a total number of varieties
    \[
    M(c) = \begin{cases} 
    0 & \text{if } c > c_D \\
    \max \{ m \mid c \leq \omega^m c_D \} + 1 & \text{if } c \leq c_D
    \end{cases}
    \]
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- A firm’s total profit is then
  \[
  \Pi(c) = \sum_{m=0}^{M(c)-1} \pi(\omega^{-m} c)
  \]
Product Range Decision for a Firm

- \( c_D = \nu_D \) will also be the cost cutoff for firm survival
  - The cutoff firm produces only its core variety
- A firm with core competency \( c \) will produce at least \( m \) additional varieties so long as \( \nu(m, c) \leq \nu_D \iff c \leq \omega^m c_D \)
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    \]
- Overall firm productivity across all product lines, measured either as physical output per worker or sales (valued added) per worker varies monotonically (inversely) with core competency \( c \)
Product Range Decision (Cont.)

\[ M(c^{-1}) \]

\[ c_D^{-1}, \quad (\omega c_D)^{-1}, \quad (\omega^2 c_D)^{-1}, \quad (\omega^3 c_D)^{-1} \]
Equilibrium Conditions: Firm Entry and Exit

- Firm survival obeys cutoff rule:
  - Low productivity firms with $c > c_D$ exit
- Free entry:
  - Entry is unrestricted
  - Firms enter until expected profit (ex-ante) is driven to zero:

$$\int_0^{c_D} \Pi(c) dG(c) - f_E = 0$$
Parametrization of Cost Draws

- For simplicity, we use a parametrization of the distribution of cost draws $G(c)$
- We use a Pareto distribution for productivity $1/c$

$$G(c) = \left( \frac{c}{c_M} \right)^k, \quad c \in [0, c_M] \quad (k \geq 1)$$

- $k$ is an inverse measure of dispersion
- $k = 1 \implies$ uniform cost distribution
- As $k \nearrow$, distribution becomes more concentrated towards $c_M$
Equilibrium Under Pareto

- If firm core competencies $c$ are distributed Pareto, then the distribution of all varieties produced by these firms will also be distributed Pareto.
- The cost cutoff $c_D$ is then given by

$$c_D = \left( \frac{\gamma \phi}{\Omega \mathcal{L}} \right)^{\frac{1}{k+2}}$$

where

- $\phi = 2(k+1)(k+2)c_M^k f_E$ is an (inverse) index of technology
  - $\phi \uparrow$ with $c_M \uparrow$, $f_E \uparrow$
- $\Omega \equiv (1 - \omega^k)^{-1} > 1$ is an index of multi-product flexibility
  - In equilibrium, $\Omega$ is also the average number of varieties produced per firm
Comparative Statics for the Closed Economy

Recall

\[ c_D = \left( \frac{\gamma \phi}{\Omega L} \right)^{\frac{1}{k+2}} \]

Increases in market size, technology \((c_M, f_E)\), and variety substitutability \((\gamma)\) lead to decreases in the cutoff \(c_D\) and increases in the mass of varieties produced/sold

\[ \rightarrow \text{tougher competition and higher aggregate productivity} \]
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- \(\longrightarrow\) tougher competition and higher aggregate productivity
- Although the average number of varieties per firm \(\Omega\) remains constant, all firms respond to the tougher competition by decreasing the number of products produced: \(M(c) \downarrow\) (weakly) \(\forall c\)
- \(\longrightarrow\) Focus on core competency – associated increase in average firm productivity
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Welfare rises (higher productivity, product variety, and lower markups)

If market size increases, then output and sales per variety increase
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- \( \rightarrow \) Focus on core competency – associated increase in average firm productivity
- Average \( \Omega \) remains constant due to selection effects: higher cost firms producing the smallest product ranges exit
- Lower average prices and markups (distribution of markups shifts \( \downarrow \))
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Effect of Tougher Competition on Product Range

\[ M(c^{-1}) \]

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Effect of Tougher Competition on Product Mix

This increase in the competitive environment is also associated with additional within-firm reallocations across products:

- **Sales of variety** $m$ **by firm** $c$:

  $$ r(v(m, c)) = r(\omega^{-m} c) = \frac{L}{4\gamma} \left[ (v_D)^2 - (\omega^{-m} c)^2 \right] $$

  For any 2 varieties $m < m'$ produced by same firm, the sales ratio ($m$ to $m'$) increases (given $v_D$ ↓).
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  - $\rightarrow$ Leads to increase in firm-level productivity (over and above effects from product scope)
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  - \( \rightarrow \) Leads to increase in firm-level productivity (over and above effects from product scope)

- The effect of an increase in the toughness of competition (measured as an upward shift in price elasticities at any given prices) on the skewness of firm product sales holds for a wide class of demand parametrization
Open Economy

- Countries $h = 1, \ldots, J$ with size $L^h$
- Markets are segmented – but firms can export any of their products
- Exporting involves two types of additional costs:
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- This customization cost allows for variations (across destinations) in the ratio of delivered cost (across varieties) for a given firm
  - The ratio of delivered cost to $h$ of variety $m$ relative to $m'$ is $(\theta^{lh} \omega)^{m'-m}$
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- This customization cost allows for variations (across destinations) in the ratio of delivered cost (across varieties) for a given firm
  - The ratio of delivered cost to \( h \) of variety \( m \) relative to \( m' \) is \( (\theta^{lh} \omega)^{m' - m} \)
- Empirically, we find that it is important to account for such variations in this ratio across destinations
Open Economy Equilibrium

- Variety cost cutoffs for production and export in country $l$:

$$n_D^l = \sup \{ c : \pi_D^l (v) > 0 \} = p_{\text{max}}^l, \quad n_X^{lh} = \sup \{ c : \pi_X^{lh} (v) > 0 \} = \frac{p_{\text{max}}^h}{\tau^{lh}}$$

Based on those cutoffs, a firm in country $l$ decides how many products $M_D^l (c)$ to produce, and how many products $M_X^{lh} (c)$ to export.
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- Variety cost cutoffs for production and export in country $l$:

$$
\nu_D^l = \sup \left\{ c : \pi_D^l(v) > 0 \right\} = p_{max}^l, \quad \nu_X^{lh} = \sup \left\{ c : \pi_X^{lh}(v) > 0 \right\} = \frac{p_{max}^h}{\tau^{lh}}
$$

- Based on those cutoffs, a firm in country $l$ decides how many products $M_D^l(c)$ to produce, and how many products $M_X^{lh}(c)$ to export.

- Firm level cutoffs for survival and export are also given by variety cost cutoffs: $c_D^l = \nu_D^l$, $c_X^{lh} = \nu_X^{lh} = \nu_D^l / \tau^{lh}$
Open Economy Equilibrium (Cont.)

- Set of free entry conditions in every country jointly determine cutoffs:

\[ c_D^l = \left( \frac{\gamma \Phi \sum_{h=1}^{\mathcal{J}} |C_{hl}| 1}{\Omega |P| L^l} \right)^{\frac{1}{k+2}} \]

where \( |P| \) and \( |C_{hl}| \) are the determinant and co-factor of the matrix of trade costs \( P = [\rho^{lh}]_{lh} \) that combines the effects of \( \tau^{lh} \) and \( \theta^{lh} \)

- Cutoff \( c_D^l = \nu_D^l \) in each country completely summarizes the competitive environment in \( l \)
Open Economy Equilibrium (Cont.)

- Set of free entry conditions in every country jointly determine cutoffs:

$$c_{D}^{l} = \left( \frac{\gamma \phi \sum_{h=1}^{J} |C_{hl}|}{\Omega} \frac{1}{|P|} \frac{1}{L^{l}} \right)^{1/(k+2)}$$

where $|P|$ and $|C_{hl}|$ are the determinant and co-factor of the matrix of trade costs $P = [\rho^{lh}]_{lh}$ that combines the effects of $\tau^{lh}$ and $\theta^{lh}$

- Cutoff $c_{D}^{l} = v_{D}^{l}$ in each country completely summarizes the competitive environment in $l$

- Competition is affected both by market size $L^{l}$ and geography via the effect of remoteness captured by $\sum_{h=1}^{J} |C_{hl}| / |P|$
Set of free entry conditions in every country jointly determine cutoffs:

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Multilateral trade liberalization induces effects in every country that are very similar to an increase in market size in the open economy
Exporters’ Product Mix Across Destinations

- A firm from $l$ that exports variety $m$ to location $h$ generates export sales

$$r_X^{lh}(v_X^{lh}(m, c)) = \frac{L^h}{4\gamma} \left\{ \left( v_D^h \right)^2 - \left[ \tau^{lh} \left( \theta^{lh} \omega \right)^{-m} c \right]^2 \right\}$$

- For any given firm $c$, the relative export sales of any two exported varieties $m < m'$ (ratio $m$ to $m'$):
Exporter’s Product Mix Across Destinations

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- For any given firm $c$, the relative export sales of any two exported varieties $m < m'$ (ratio $m$ to $m'$):
  - Depends only on toughness of competition in destination $h$ (via effect on cutoff $v_D^h$) and bilateral trade costs $\tau^{lh}$ and $\theta^{lh}$
  - Increases with tougher competition ($\downarrow v_D^h$) in destination market
  - Export sales are skewed towards core products
Exporters’ Product Mix Across Destinations

A firm from $l$ that exports variety $m$ to location $h$ generates export sales

$$r_{X}^{lh}(v_{X}^{lh}(m, c)) = \frac{L^{h}}{4\gamma} \left\{ \left( v_{D}^{h} \right)^{2} - \left[ \tau^{lh} \left( \theta^{lh} \omega \right)^{-m} c \right]^{2} \right\}$$

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- Increases with tougher competition ($\nabla v_{D}^{h}$) in destination market
  $\rightarrow$ Export sales are skewed towards core products

This prediction holds for more general demand parametrization (assuming an upward shift in price elasticities)
Recall
\[
\rho_X^l (v_X^l (m, c)) = \frac{L}{4 \gamma} \left\{ \left( v_D^h \right)^2 - \left[ \tau^l \left( \theta^l \omega \right)^{-m} c \right]^2 \right\}
\]

For exported varieties \( m < m' \), the relative export sales (\( m \) to \( m' \)):
- Increases with higher proportional cost \( \tau^l \)
- Price elasticities increase as firm is pushed up linear demand curve: similar effect to tougher competition
Exporters’ Product Mix Across Destinations (Cont.)

- Recall
  
  \[ r_{X}^{lh}(v_{X}^{lh}(m, c)) = \frac{L^{h}}{4\gamma} \left\{ \left( v_{D}^{h} \right)^{2} - \left[ \tau^{lh} \left( \theta^{lh} \omega \right)^{-m} c \right]^{2} \right\} \]

- For exported varieties \( m < m' \), the relative export sales \((m \text{ to } m')\):
  - Increases with higher proportional cost \( \tau^{lh} \)
    - Price elasticities increase as firm is pushed up linear demand curve: similar effect to tougher competition
  - Increases with higher customization cost increment \( 1/\theta^{lh} \)
    - Driven both by tougher competition and direct effect on relative delivered cost \((\theta^{lh} \omega)^{m'-m}\)
Recall

\[ r_X^l(h(v_X^l(m, c))) = \frac{L^h}{4\gamma} \left\{ (v_D^h)^2 - \left[ \tau^l(h)(\theta^l h \omega)^{-m} c \right]^2 \right\} \]

For exported varieties \( m < m' \), the relative export sales \((m \text{ to } m')\):
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- If trade costs \( \tau^l \) and \( 1/\theta^l \) are (weakly) positively correlated:
  - Export sales ratio increases
Recall

\[ r^h_X(v^h_X(m, c)) = \frac{L^h}{4\gamma} \left\{ \left( v^h_D \right)^2 - \left[ \tau^h (\theta^h \omega)^{-m} c \right]^2 \right\} \]

For exported varieties \( m < m' \), the relative export sales (\( m \) to \( m' \)):

- Increases with higher proportional cost \( \tau^h \)
  - Price elasticities increase as firm is pushed up linear demand curve: similar effect to tougher competition
- Increases with higher customization cost increment \( 1/\theta^h \)
  - Driven both by tougher competition and direct effect on relative delivered cost \( (\theta^h \omega)^{m' - m} \)
- If trade costs \( \tau^h \) and \( 1/\theta^h \) are (weakly) positively correlated:
  - Export sales ratio increases
- If they are negatively correlated, then export sales ratio can decrease (if negative correlation is strong enough)
  - Increase in delivered cost across product line is smaller when trade cost for core variety is high
Data on French Exporters

- Comprehensive customs data for firm-product exports to 181 destinations in 2000
- Exclude service and wholesale/distribution firms (keep manufacturing and agriculture)
- Products recorded at 8-digit level (over 10,000 product codes)
Data on French Exporters

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  - Ratio 1/2 and 1/3 based on world exports ranking
  - Ratio 1/2 and 1/3 based on destination specific ranking
  - Theil index (a measure of entropy) over all of the firm’s export sales to a destination
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- Test for the effects of toughness of competition (market size and geography) and trade costs (distance and common language)
- Measure of geography: Foreign supply potential
Mean Global Sales Ratio and Destination Market Size
# Global Sales Ratio

<table>
<thead>
<tr>
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<th>1 to 2</th>
<th>1 to 3</th>
<th>1 to 2</th>
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<td>GDP (log)</td>
<td>0.060a</td>
<td>0.077a</td>
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<td>(0.007)</td>
<td>(0.014)</td>
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<td>(0.010)</td>
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<td>0.026c</td>
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<td>-0.103a</td>
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<td>(0.019)</td>
<td>(0.032)</td>
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<td>(0.023)</td>
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<tr>
<td>Common Language</td>
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<td>-0.100b</td>
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<td>(0.028)</td>
<td>(0.042)</td>
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<td>Observations</td>
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<td>64892</td>
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<tr>
<td>R-squared (within)</td>
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Notes:
Constant and firm fixed effects suppressed
Robust standard errors in parentheses (clustered by firm)
a,b,c represent significance level at 1%, 5%, 10%
## Local Sales Ratio

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<td>1 to 3</td>
<td>1 to 2</td>
<td>1 to 2</td>
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<tr>
<td>GDP (log)</td>
<td>0.033a</td>
<td>0.045a</td>
<td>0.039a</td>
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<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.003)</td>
<td>(0.004)</td>
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<tr>
<td>Supply Potential (log)</td>
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<td></td>
<td>(0.005)</td>
<td>(0.008)</td>
<td>(0.006)</td>
<td>(0.007)</td>
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<tr>
<td>Distance (log)</td>
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</table>

**Notes:**
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- a,b,c represent significance level at 1%,5%,10%
## Theil Index

<table>
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<td>(0.001)</td>
<td>(0.001)</td>
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<td>GDP (log)</td>
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<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.002)</td>
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<tr>
<td>Supply Potential (log)</td>
<td>0.002</td>
<td>0.011a</td>
<td>0.011a</td>
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<tr>
<td></td>
<td>(0.002)</td>
<td>(0.002)</td>
<td>(0.003)</td>
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<tr>
<td>Distance (log)</td>
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<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Common Language</td>
<td>0.003</td>
<td>-0.022a</td>
<td>-0.047a</td>
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<tr>
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<td>Observations</td>
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<tr>
<td>R-squared (within)</td>
<td>0.365</td>
<td>0.354</td>
<td>0.332</td>
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</table>

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