Selection and Market Reallocation: Productivity Gains from Multinational Production

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Stylized Fact 1: FDI grew dramatically in past decades.
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A region witnessing steady growth in FDI inflows is developing countries in Asia.

Figure I.2. FDI inflows, by region, 2012–2014 (Billions of dollars)

Source: UNCTAD, FDI/MNE database (www.unctad.org/fdistatistics).
Stylized Fact 2: Nations with greater FDI exhibit, on average, higher productivity growth.
Stylized Fact 3: Most nations offer FDI promotion policies.

<table>
<thead>
<tr>
<th>Incentives</th>
<th>Share of countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any incentives</td>
<td>76%</td>
</tr>
<tr>
<td>Reduced tax rates</td>
<td>55%</td>
</tr>
<tr>
<td>Tax holidays</td>
<td>51%</td>
</tr>
<tr>
<td>Financial incentives (grants/loans)</td>
<td>31%</td>
</tr>
<tr>
<td>Subsidized infrastructure or services</td>
<td>23%</td>
</tr>
<tr>
<td>Regulatory concessions (exemptions)</td>
<td>11%</td>
</tr>
<tr>
<td>from labor or environmental laws</td>
<td></td>
</tr>
</tbody>
</table>

Source: World Bank Census of Investment Promotion Agencies
First, are there productivity gains from FDI?

- Macro-level evidence suggests that FDI could exert a positive effect on economic growth when host countries have sufficient human capital stock and relatively developed financial markets.
- However, causality is always an empirical concern and difficult to tackle at the country level.
Next what are the mechanisms of productivity gains?

Two channels have been emphasized in the literature:

1. Multinationals are more productive than domestic firms (Helpman, Melitz and Yeaple, 2004; Yeaple, 2009; Chen and Moore, 2010).

2. Productivity spillover from multinationals to domestic firms: Knowledge spillover, technology transfer, backward and forward production linkages (Aitken and Harrison, 1999; Javorcik, 2004 and many other words, Keller and Yeaple, 2009; Guadalupe et al., 2012; Fernandes and Paunov, 2012; Carlucco and Fally, 2013; ...).
There are, however, two less stressed, alternative channels:


2. Selection and market reallocation: FDI leads to tougher competition and market reallocation and allows only the most productive domestic firms to survive.
All the above mechanisms imply a positive relationship between FDI and aggregate host-country productivity, but they convey very different policy implications. In particular,

- Productivity spillover is a positive externality from FDI and could justify FDI promotion policies and special incentives;
- Market reallocation leads to a reallocation of output and resources from domestic to foreign multinational firms and calls for complementary policies to address the consequences of output and factor reallocations.
We investigate the productivity gains from FDI including:

- the aggregate impact;
- the relative importances of two main mechanisms: (i) within-firm productivity improvement; and (ii) between-firm selection and market reallocation.
We use a cross-country firm-level panel dataset, drawn from Orbis, that contains comprehensive financial, operation, and ownership information for over 1 million manufacturing firms in over 30 countries.

Orbis provides several distinct advantages:

- Ownership information, which covers over 30 million shareholder/subsidiary links and allows us to identify foreign owned and domestic firms;
- Time-series financial information, which enables measuring firm total factor productivity over time;
- Broad country coverage.
Stage 1: Evaluating the Impact

- Step 1: Accounting for the endogenous entry decisions of multinational firms which is estimated as a function of:
  - all time-variant country-pair industry factors
  - multinationals’ ex-ante productivity
  - multinationals' financial shocks in headquarters countries (e.g., Froot and Stein, 1991; Baker, Foley, and Wurgler, 2008)

- Multinationals with a positive financial shock in headquarters have reduced financial constraints in foreign investment especially in host countries with large entry costs.
- But such idiosyncratic financial shocks, unlike other firm characteristics such as productivity, are unlikely to be directly correlated with the future productivity growth of host-country domestic firms, thereby offering an exclusion restriction.
Stage 1: Evaluating the Impact

- Step 2: The causal effect of FDI on aggregate productivity

Table 2: Multinational Entry and Change in Average Productivity (Country-Industry Level)

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>(1) Change in ave TFP</th>
<th>(2) Change in ave TFP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNC entry</td>
<td>0.01*** (0.004)</td>
<td></td>
</tr>
<tr>
<td>MNC entry (predicted)</td>
<td></td>
<td>0.02** (0.01)</td>
</tr>
<tr>
<td>Beta coefficients</td>
<td>0.05</td>
<td>0.02</td>
</tr>
<tr>
<td>Host country FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Obs</td>
<td>3,730</td>
<td>3,730</td>
</tr>
<tr>
<td>R square</td>
<td>0.52</td>
<td>0.52</td>
</tr>
</tbody>
</table>

Notes: (i) Columns (1) and (2) report OLS and instrumented estimates, respectively; (ii) bootstrapped standard errors are reported in the parentheses; (iii) ***, **, and * represent statistical significance at 1, 5, and 10 percent, respectively.
Stage 2: Decomposing the Productivity Gains from FDI

- Weighted aggregate productivity $\tilde{\theta}^w_t$:

$$\tilde{\theta}^w_t = \sum_i s_{it} \theta_{it} = \frac{\bar{\theta}_t}{\text{unweighted mean}} + \sum_i (s_{it} - \bar{s}_t)(\theta_{it} - \bar{\theta}_t)$$

(output–productivity covariance)

(1)

- Comparing $\tilde{\theta}^w_t$ in two periods yields:

$$\Delta \tilde{\theta}^w_t = \left(\frac{\bar{\theta}^\text{surviving}_t - \bar{\theta}^\text{surviving}_{t-1}}{\text{within–firm}}\right) + \left(\frac{\bar{\theta}^\text{surviving}_{t-1} - \bar{\theta}^\text{all}_{t-1}}{\text{selection}}\right)$$

$$+ \Delta \sum_i (s_{it} - \bar{s}_t)(\theta_{it} - \bar{\theta}_t)$$

(reallocation)

(2)
Stage 2: Decomposing the Productivity Gains from FDI

- **Within-firm improvement**: Greater FDI will shift the productivity distribution of surviving domestic firms rightward ($\bar{\theta}_{t}^{\text{surviving}} > \bar{\theta}_{t-1}^{\text{surviving}}$).

- **Selection**: Greater FDI will raise the cutoff productivity and the cutoff revenue of domestic firms and force the least productive firms to exit ($\bar{\theta}_{t-1}^{\text{surviving}} > \bar{\theta}_{t-1}^{\text{all}}$).

- **Market reallocation**: Greater FDI will shift the revenue distribution of domestic firms leftward, especially at the left tail of the productivity distribution ($\Delta \sum_{i}(s_{it} - \bar{s}_{t})(\theta_{it} - \bar{\theta}_{t}) > 0$).
### Table 3: The Shift of Domestic Productivity Distribution

<table>
<thead>
<tr>
<th>Dependent var.:</th>
<th>(1) All</th>
<th>(2) Bin 1 (&lt;25%)</th>
<th>(3) Bin 2 (25-50%)</th>
<th>(4) Bin 3 (50-75%)</th>
<th>(5) Bin 4 (&gt;75%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in TFP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNC entry (predicted)</td>
<td>0.021***</td>
<td>0.029***</td>
<td>0.017***</td>
<td>0.020***</td>
<td>0.019***</td>
</tr>
<tr>
<td>(0.001)</td>
<td>(0.002)</td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.002)</td>
<td></td>
</tr>
<tr>
<td>Host-country FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Obs</td>
<td>397,618</td>
<td>99,997</td>
<td>99,104</td>
<td>100,068</td>
<td>98,449</td>
</tr>
<tr>
<td>R square</td>
<td>0.05</td>
<td>0.06</td>
<td>0.07</td>
<td>0.06</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Notes: (i) Bootstrapped standard errors are reported in the parentheses; (ii) ***, **, and * represent statistical significance at 1, 5, and 10 percent, respectively.
Stage 2: Within-firm Productivity Improvement

Estimated within-firm productivity gains (%)  
(with a 10% increase in FDI flow)

Productivity Bins (1=least productive, 4=most productive)
Stage 2: Between-firm Selection

Estimated selection effect: differences between surviving and exiting firms (%) (with a 10% increase in FDI inflow)
Stage 2: Between-firm Market Reallocation

Estimated revenue effects (%) (with a 10% increase in FDI inflow)

Productivity Bins (1=least productive, 4=most productive)
Stage 2: Between-firm Market Reallocation

Estimated employment effects (%) (with a 10% increase in FDI inflow)

Productivity Bins (1=least productive, 4=most productive)
Stage 2: Decomposing the Productivity Gains from FDI

Decomposing the productivity gains (with a 10% increase in FDI inflow)

- Selection: 1.2
- Market reallocation: 0.2
- Within-firm: 0.2
Additional Productivity Gains

- Productivity spillover between industries through backward and forward production linkages
- Market reallocation between industries with greater labor and capital good mobilities
Robustness Analysis

- Productivity measure
  - Other measures of productivity: Levinsohn and Petrin (2003), Ackerberg, Caves, and Frazer (2006), and simple labor productivity,
  - Re-estimate the shift of productivity distribution for relatively homogeneous industries.

- Data coverage: consider only countries with best data coverage

- Controlling for the role of trade
Stage 2: Decomposing the Productivity Gains from FDI across Regions

Estimated productivity gains (%) (with a 10% increase in FDI inflow)

- Latin America: Selection and market reallocation
- East Asia: Within-firm
- West Europe: Selection and market reallocation
- East Europe: Within-firm
Policy Implications

Three types of policy have been offered to foster FDI and spillover to local economies:

1. Policies to reduce FDI restrictions and attract FDI such as IPAs, tax holidays or cash incentives.

2. Policies improving the business environment including human capital or financial access to reduce the barriers that hinder both the ability of multinational affiliates to innovate and the capacity of local firms to absorb knowledge transfers.

3. Policies to strengthen the links between foreign-owned and domestic firms including minimum local content requirements and labor requirements.
However, policies to address the output and factor reallocation effects of FDI are also crucial, especially in industrial nations.

1. Policies to address the adjustment costs of labor and capital reallocation between firms and industries such as education and training programs and adjustment assistance;

2. Policies to encourage domestic firm innovation and improve domestic firm efficiency.