Firms and Trade

Firms and Trade

- **Overall share of US firms exporting relatively small at 18% (Bernard *et al*., 2007)**
- **Also, share of firms exporting in each industry varies widely, e.g., 38% in computers and electronic products, 8% in apparel manufacturing**
- **Exporters ship relatively small share of total shipments overseas, share across firms being 14%**
- **Again wide variation across industries, e.g., 21% in computers and electronic products, to 7% in beverage and tobacco products**
- **Similar findings across countries (WTO, 2008)**

Table 1: Exporting by U.S. Manufacturing Firms, 2002

NAICS	Industry	Percent of Firms	Percent of Firms that Export	Mean Exports as a Percent of Total Shipments
311	Food Manufacturing	6.8	11.6	14.8
312	Beverage and Tobacco Product	0.7	22.9	7.4
313	Textile Mills	1.0	25.1	12.5
314	Textile Product Mills	1.9	12.2	11.7
315	Apparel Manufacturing	3.2	7.7	13.5
316	Leather and Allied Product	0.4	24.4	13.4
321	Wood Product Manufacturing	5.5	8.5	18.5
322	Paper Manufacturing	1.4	23.8	9.0
323	Printing and Related Support	11.9	5.5	14.4
324	Petroleum and Coal Products	0.4	17.8	11.5
325	Chemical Manufacturing	3.1	36.1	14.3
326	Plastics and Rubber Products	4.4	28.1	10.3
327	Nonmetallic Mineral Product	4.0	9.5	12.1
331	Primary Metal Manufacturing	1.5	30.2	10.4
332	Fabricated Metal Product	19.9	14.3	11.6
333	Machinery Manufacturing	9.0	33.0	15.5
334	Computer and Electronic Product	4.5	38.3	21.3
335	Electrical Equipment, Appliance,	1.7	37.7	12.9
336	Transportation Equipment	3.4	28.0	13.0
337	Furniture and Related Product	6.4	6.5	10.1
339	Miscellaneous Manufacturing	9.1	1.6	14.9
Aggregate Manufacturing		100.0	17.6	14.1

Source: Bernard et al. (2007).

Firms and Trade

- **US exporters found to be larger, more skill and capital-intensive, more productive and pay higher wages (Bernard *et al*., 2007)**
- **Finding consistent with traditional model of comparative advantage**
- **However, evidence exporters are also more skill and capital-intensive in developing countries (Alavarez and Lopez, 2005)**
- **Not consistent with traditional model, as developing countries often abundant in unskilled labor**

Firms and Trade Theory

- **Systematic relationship appears to exist between characteristics of firms and their participation in both exporting and foreign direct investment (FDI)**
- **Key hypothesis proposed to explain higher productivity of exporters:**

  - exporting requires extra resources in terms of transportation, distribution and marketing costs, workers with foreign managerial skills, and modification of products for export

  - only more productive firms can bear such costs

Firms and Trade Theory

- **Role of fixed entry costs also important in both export and FDI-decisions**
- **Allowing for heterogeneous firms brings two new insights into trade models:**
  - **differences in productivity *within* industries matter**
  - **resource allocation happens within industries after trade liberalization, i.e., number of firms and volume of exports can change – *extensive* and *intensive* margins**
- **How is this captured in a simple model? Focus on Helpman *et al*. (2004)**

Theoretical Framework

- **N countries that use labor to produce goods in H+1 sectors; one sector produces homogeneous good with a unit of labor per unit of output; H sectors produce differentiated goods, h=1…H**
- **β_h of income spent on h, remaining fraction 1-$\Sigma_h\beta_h$ spent on homogeneous good which is *numeraire***
- **Country i endowed with L^i units of labor, wage rate is w^i**
- **Consider a particular sector h, and drop h notation**

Theoretical Framework

- **Only factor of production is labor *L*, and to enter an industry, firms incur a fixed cost, f_E**
- **Upon entry, firms draw labor productivity coefficient a (labor per unit output) from distribution *G*(*a*)**
- **With given *a*, firms in country *i* have four choices:**

  (i) Exit domestic market

  (ii) Serve domestic market only

  (iii) Export

  (iv) Set up foreign production (*horizontal* FDI)

Theoretical Framework

- If a firm chooses to produce for domestic market, bears fixed overhead labor costs f_D
- If firm chooses to export, it bears additional fixed costs f_X per foreign market, where f_X are costs of forming distribution and servicing network in foreign country
- If firm chooses FDI, it bears f_I in every foreign market, which include costs of forming subsidiary in each country, and duplicating f_D
- Goods transported from *i* to *j* subject to iceberg transport costs of $\tau^{ij} > 1$

Theoretical Framework

- Firms engage in *monopolistic competition*
- Preferences across varieties of h modeled as CES utility with elasticity of substitution $\varepsilon = 1/(1-\alpha) > 1$
- These preferences generate demand function in i for every brand, $A^i p^{-\varepsilon}$, where demand level A^i is treated as exogenous by individual firm
- Brand of monopolistic firm with labor coefficient *a*, offered at price $p = w^i a/\alpha$, where $1/\alpha$ is mark-up
- Effective domestic price is $w^i a/\alpha$, supplied by domestic firm or foreign affiliate, and if good is imported, effective price is $\tau^{ji} w^j a / \alpha$

Theoretical Framework

- **Firm in country *i* that remains in industry always serves domestic market through domestic production, but it may also serve market *j* via exporting or FDI**
- **Choice driven by proximity-concentration trade-off: relative to exports, FDI saves transport costs, but duplicates production facilities, i.e., higher fixed costs**
- **In equilibrium no firm engages in both exports and FDI in a foreign market, assume:**

$$\left(\frac{w^j}{w^i}\right)^{\varepsilon-1} f_I > \left(\tau^{ij}\right)^{\varepsilon-1} f_X > f_D$$

Theoretical Framework

- **Assume unit wages $w^i = 1$, operating profits for a firm serving domestic market are:**

$$\pi_D^i = a^{1-\varepsilon} B^i - f_D$$

for a firm with productivity coefficient *a*, and $B^i = (1-\alpha)A^i/\alpha^{1-\varepsilon}$, where B^i is demand level in *i*

Additional profits from exporting to country *j* are:

$$\pi_X^{ij} = (\tau^{ij} a)^{1-\varepsilon} B^j - f_X$$

- **Profits from FDI in *j* are:**

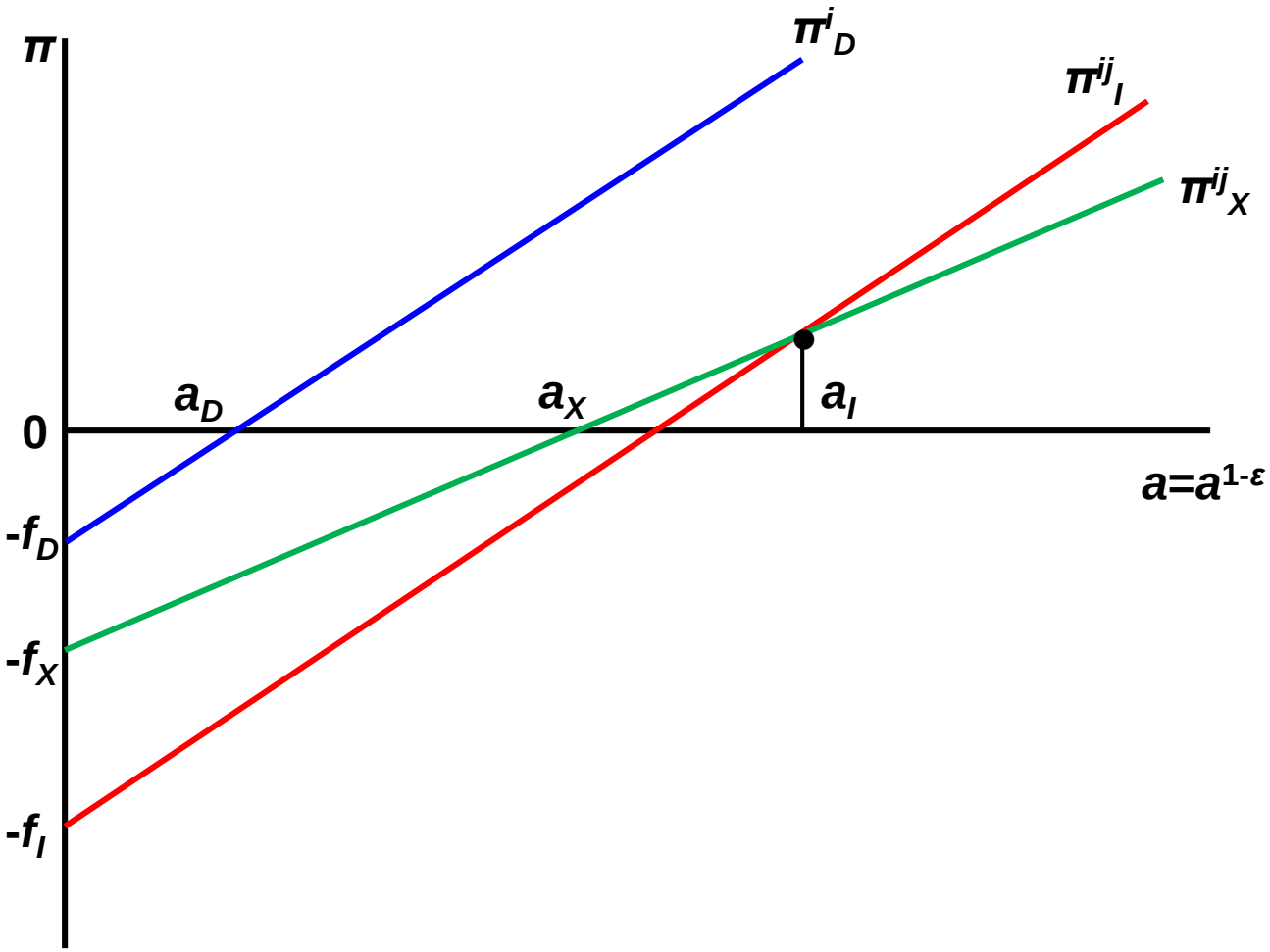
$$\pi_I^j = a^{1-\varepsilon} B^j - f_I$$

- **Profit functions are increasing and linear: more productive firms are profitable in all three activities**

Theoretical Framework

- In Figure 1, along horizontal axis, firm productivity ($a=a^{1-\varepsilon}$) increases, while profits π are measured on vertical axis
- Domestic and FDI profit functions have same slope, as countries *i* and *j* are assumed to be same in terms of demand, labor endowment and wages
- However, if there were tariffs on imports by *i*, slope of domestic profit function would be steeper
- Profits from exporting scaled by existence of trade costs τ, so slope of export profit function is shallower
- Sorting pattern of firms is consistent with empirical evidence (Helpman *et al*., 2004)

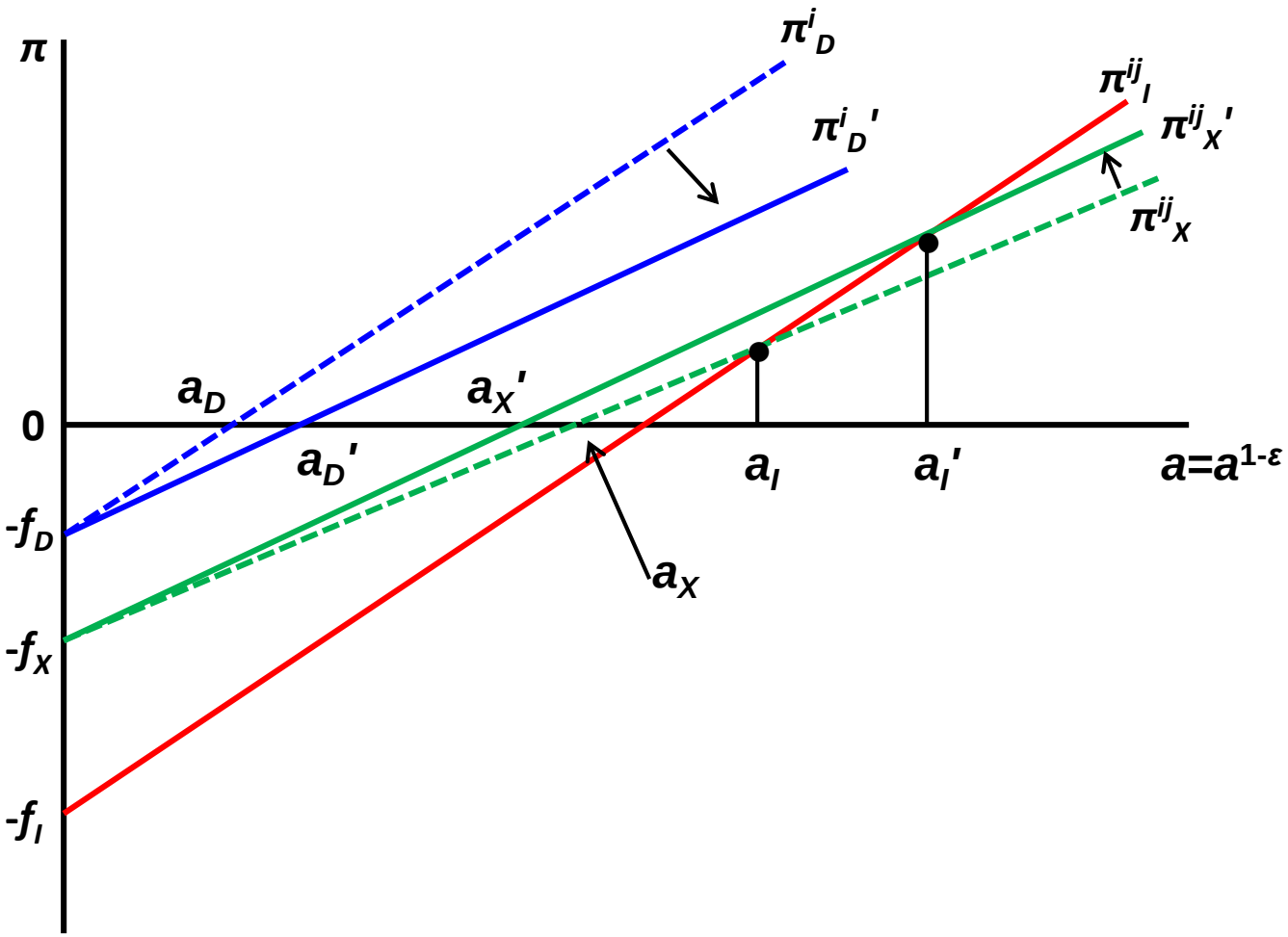
Figure 1: Profits from Domestic Sales, Exports and FDI



Firms and Trade Liberalization

- Suppose productivity pattern same as in Figure 1
- Trade liberalization is fall in τ^{ij}, τ^{ji} raises (lowers) profits of existing exporters (non-exporters), and lowers (raises) their productivity cutoff (Figure 2)
- Firms previously only supplying domestic market may become exporters (extensive margin), and volume of exports also increases (intensive margin)
- Labor demand increases due to increase in both exports and number of firms exporting – wages bid up, reducing profits of non-exporting firms

Figure 2: Trade Liberalization



Firms and Trade Liberalization

- **Induces low productivity firms to exit market, resulting in higher average industry productivity due to turnover of firms from domestic to export markets (Melitz, 2003; Bernard *et al*., 2007)**

- **Even though there are within industry gains, the gains are greater in any industry that has stronger comparative advantage – i.e., greater export opportunities intensify impact on wages, driving out more low-productivity firms**

- **Differential productivity growth across industries magnifies factor-abundance-based gains from trade**

Conclusions

- **Role of firms in traditional and new trade models limited – Ricardian/Heckscher-Ohlin models focus on industries, while monopolistic competition model of Krugman assumes identical firms**
- **Empirical evidence indicates firms differ across and within industries of a country in multiple dimensions such as productivity**
- **Implies comparative advantage (disadvantage) does not mean all firms in an industry export (import)**
- **Additional gains from trade from increased within-industry productivity is critical**