FDI, Ownership Structure, and Productivity

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STRUCTURE OF PRESENTATION

1. INTRODUCTION
2. THEORY
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1. INTRODUCTION

- The standard firm heterogeneity model of FDI (Helpman et al., AER, 2004) considers the case of **whole ownership** of foreign affiliates.

- However, there exist a lot of **partially-owned** foreign affiliates.

- Raff et al. (2009) reveal that about 45% of Japanese firms' FDI into developed countries is a **joint venture (JV)**.

- We find that Japanese General Trading Companies ("Sogo Shosha") engaged in FDI as one of the shared owners in many cases.

- Our study tries to answer the economic reason for **JV** or **shared ownership**. We use the terms JV and shared ownership or partial ownership, interchangeably.

Related literature

Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export versus FDI with heterogeneous firms. *American economic review*, *94*(1), 300-316.

- Helpman et al. (2004) assume that a firm incurs a fixed cost for FDI, and there is a productivity cutoff for FDI.

- They consider **the case of whole ownership** of foreign affiliates.

- We will modify their model to explain **shared ownership** of foreign affiliates.

Other previous studies

- There are many other previous studies on the relationship between ownership structure and FDI.
  - Asiedu, E., & Esfahani, H. S. (2001). Ownership structure in foreign direct investment projects. *The Review of Economics and Statistics*, *83*(4), 647-662.
  - Desai, M. A., Foley, C. F., & Hines, J. R. (2004). The costs of shared ownership: Evidence from international joint ventures. *Journal of Financial Economics*, *73*(2), 323-374.
  - Raff, H., Ryan, M., & Stähler, F. (2009). Whole vs. shared ownership of foreign affiliates. *International Journal of Industrial Organization*, *27*(5), 572-581.
  - Bircan, Ç. (2019). Ownership structure and productivity of multinationals. *Journal of International Economics*, *116*, 125-143.

2. THEORY

- We extend the model of Helpman et al. (2004) to explain **shared ownership of FDI**.

- We will compare the **whole ownership** with the **partially-ownership** with outside partners.

- We follow the model of Helpman et al. (2004). Therefore, we skip the set-up of the model.

(i) Wholly-owned foreign affiliate

If a firm establishes a **wholly-owned affiliate** in country j, the profit from FDI is given by

$$\boldsymbol{\pi_W(\varphi)} = \boldsymbol{w_j}^{\boldsymbol{1-\sigma}} \boldsymbol{A_j} \boldsymbol{\varphi}^{\boldsymbol{\sigma-1}} - \boldsymbol{f_I}.$$

- The firm must incur **100%** of the fixed cost for FDI: f_I .

- The profit from FDI is increasing in the measure of firm productivity: $\varphi^{\sigma-1}$.

- The level of profit is also increasing in the mark-up adjusted demand level A_j and decreasing in wage w_j in a country j.

(ii) Shared ownership

If a firm establishes a partially-owned affiliate with a partner in country j, the profit from FDI is given by the following equation:

$$\pi_S(\varphi) = \lambda w_j^{1-\sigma} A_j(\gamma\varphi)^{\sigma-1} - \lambda\mu f_I - f_S.$$

- The fixed cost of FDI, μf_I, is smaller than f_I.
  - $0 < \mu < 1$
  - This is because a partner has the knowledge and other intangible assets to set up an affiliate in the country.
- A firm's ownership ratio is shown as λ.
  - The firm incurs $\lambda \in (0,1)$ of the fixed cost for FDI (μf_I) and will obtain the λ of the operating profit.
- Following Raff et al. (2009), we assume that shared ownership results in a decrease in the productivity of a foreign affiliate, as shown in $\gamma \in (0,1)$.
- In addition to the fixed cost of FDI, the firm incurs a fixed cost for shared ownership f_S, which reflects the fact that it is costly for the firm to find a partner.
  - See the case of Toyota's shared ownership with GM in the US.
  - https://www.toyota.co.jp/jpn/company/history/75years/text/leaping_forward_as_a_globa l_corporation/chapter1/section3/item2.html

Assumption for the existence of shared ownership

In our model, we assume the following inequality:

$$\lambda f_I(\gamma^{\sigma-1} - \mu) > f_S,$$

which ensures the existence of shared ownership in FDI project.

From this assumption, the zero-profit cutoff productivity for shared ownership is lower than the zero-profit cutoff productivity for whole ownership.

Figure 1: Whole ownership versus shared ownership
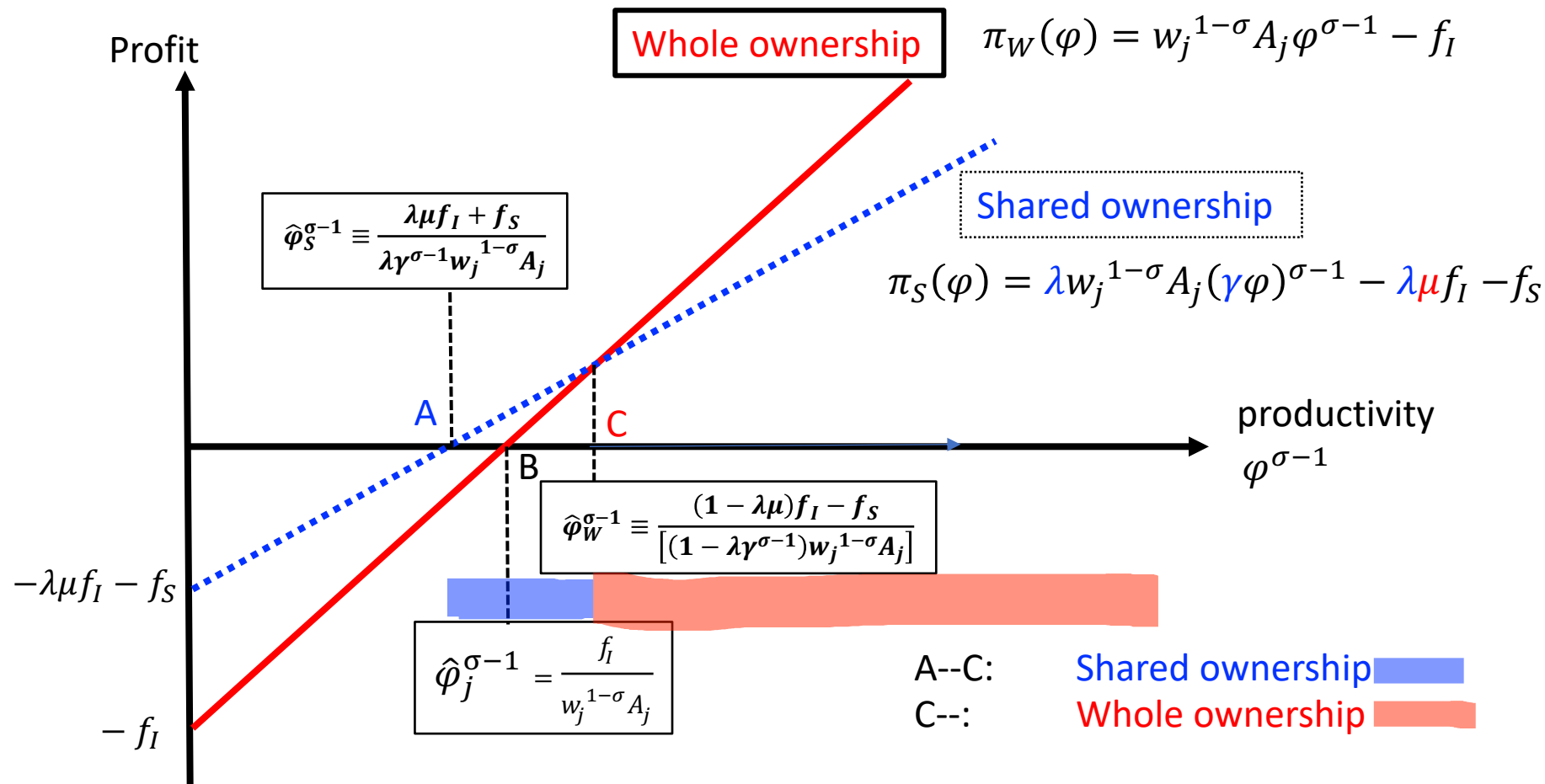
- The above Figure shows a profit from FDI as the function of firm productivity.
- The cutoff productivity for the shared ownership is lower than that for whole ownership.
- Firms that choose shared ownership are less productive than those that choose whole ownership.

Discussion on exogeneous variables

- The role of partners (μ)
  - How large μ is in a host country is an empirical question.
  - In developing countries, μ might be small, since the role of a partner is important.
- The decrease in realized productivity (γ)
  - The decrease in realized productivity can be large in developing countries.
- Market size (A)
  - The effect of market size on the number of shared ownership is ambiguous since the larger market attracts both types of FDI.
- The wage in a host country (w)
  - The effect of wage on the number of shared ownership is ambiguous since lower-wage attracts both types of FDI.

(iii) Endogenous ownership ratio

- We have so far assumed a constant ownership ratio as exogenously given. In reality, there are various ownership ratios as a result of the firms' choice.

- We, therefore, now consider the situation where a firm can choose its ownership ratio, λ.

- To relate ownership ratio and firm profit, we assume that the extent of decrease in the fixed cost of FDI, μ, depends on the ownership ratio (λ):

$$\mu = \lambda^{\delta}, \qquad \delta > 0.$$

- The rationale for this assumption comes from local partners' incentives. When the parent company's ownership ratio λ is high, the ownership ratio of the local partner will be low. Given the lower participation rate, there is less incentive for the local partner to exert much effort to reduce the fixed FDI cost, thus μ will be high.

The optimal ownership ratio

- This assumption leads to the following profit function for shared ownership.
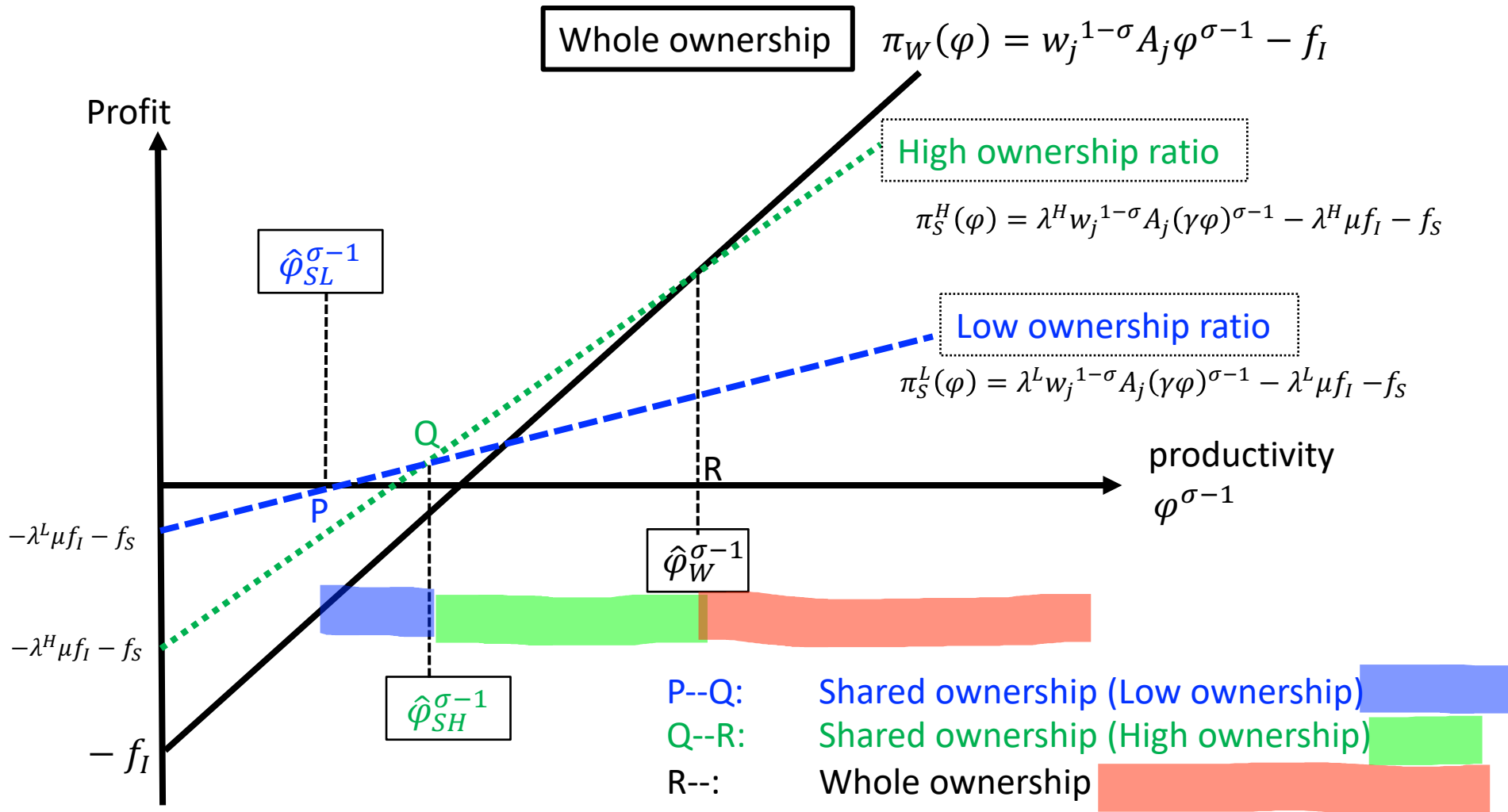
$$\pi_S(\varphi) = \lambda w_j^{1-\sigma} A_j (\gamma\varphi)^{\sigma-1} - \lambda^{1+\delta} f_I - f_S$$

- **The optimal ownership ratio ($\widehat{\lambda}$)** is given by

$$\widehat{\lambda} \equiv \left[\frac{w_j^{1-\sigma} A_j (\gamma\varphi)^{\sigma-1} - f_S}{(1+\delta) f_I} \right]^{\frac{I}{\delta}},$$

which is increasing in firm productivity and market size and decreasing in local wage and fixed cost of FDI.

Figure 2: Firm productivity and choice of ownership ratio

Whole ownership: $\pi_W(\varphi) = w_j^{1-\sigma} A_j \varphi^{\sigma-1} - f_I$

High ownership ratio: $\pi_S^H(\varphi) = \lambda^H w_j^{1-\sigma} A_j (\gamma\varphi)^{\sigma-1} - \lambda^H \mu f_I - f_S$

Low ownership ratio: $\pi_S^L(\varphi) = \lambda^L w_j^{1-\sigma} A_j (\gamma\varphi)^{\sigma-1} - \lambda^L \mu f_I - f_S$

Profit

productivity $\varphi^{\sigma-1}$

$\hat{\varphi}_{SL}^{\sigma-1}$

$\hat{\varphi}_W^{\sigma-1}$

$\hat{\varphi}_{SH}^{\sigma-1}$

$-\lambda^L \mu f_I - f_S$

$-\lambda^H \mu f_I - f_S$

$-f_I$

P--Q: Shared ownership (Low ownership)
Q--R: Shared ownership (High ownership)
R--:   Whole ownership

- Figure 2 presents a simple discrete example to illustrate the relationship between firm productivity and ownership ratio. Firms with lower productivity choose a lower ownership ratio, while **firms with higher produc**tivity choose a **higher ownership ratio**. Firms with the highest productivity choose **whole ownership**.

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3. DATA

- Data 1: KIKATSU
  - We use firm-level data from Basic Survey of Japanese Business Structure and Activities (BSJBSA or *Kigyo Katsudo Kihon Chosa in Japanese*) for parent firms' productivity and other characteristics.

- Data 2: KAIJI
  - We also use firm-level data from the Survey on Overseas Business Activities (SOBA or *Kaigai Jigyo Katsudo Kihon Chosa* in Japanese), to investigate the FDI activities of Japanese firms.

- Data 3: Toyo Keizai FDI Data
  - Toyo Keizai Overseas Japanese companies (hereafter, OJC database) are used to identify detailed ownership structures.

4. ANALYSES

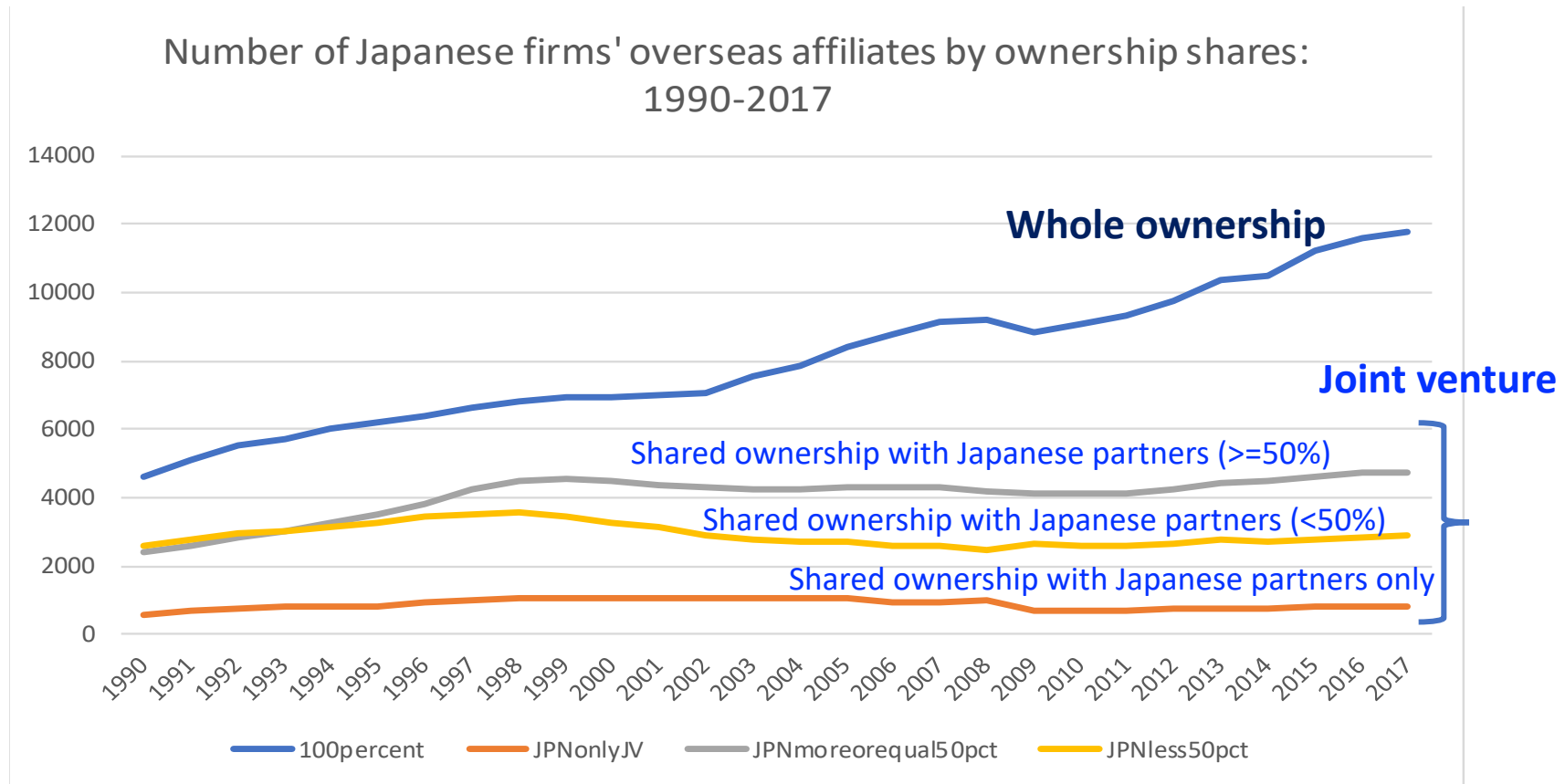**4.1 *Ownership structure of Japanese overseas affiliates***

Table 1: Ownership structure of Japanese multinationals

	Year 2017	Share	
100 percent	11804	58%	← **wholly-ownership**
JPN only JV	810	4%	
JPN more or equal 50 pct	4725	23%	**Joint venture:**
JPN less 50 pct	2903	14%	Shared ownership With various partners
Total	20242		

Note: Out of the total 30,012 observations, 10,000 observations have missing values for the stock share.

Table 1 shows the 2017 ownership structures of **wholly-owned affiliates** (58%), **joint ventures (JVs) with other Japanese firms** (4%) only, i.e., without non-Japanese partners, **joint ventures with Japanese firms with the Japanese firms' combined share being more than or equal to 50 percent** (23%), and **joint ventures with Japanese firms with the Japanese firms' combined share being less than 50 percent** (14%).

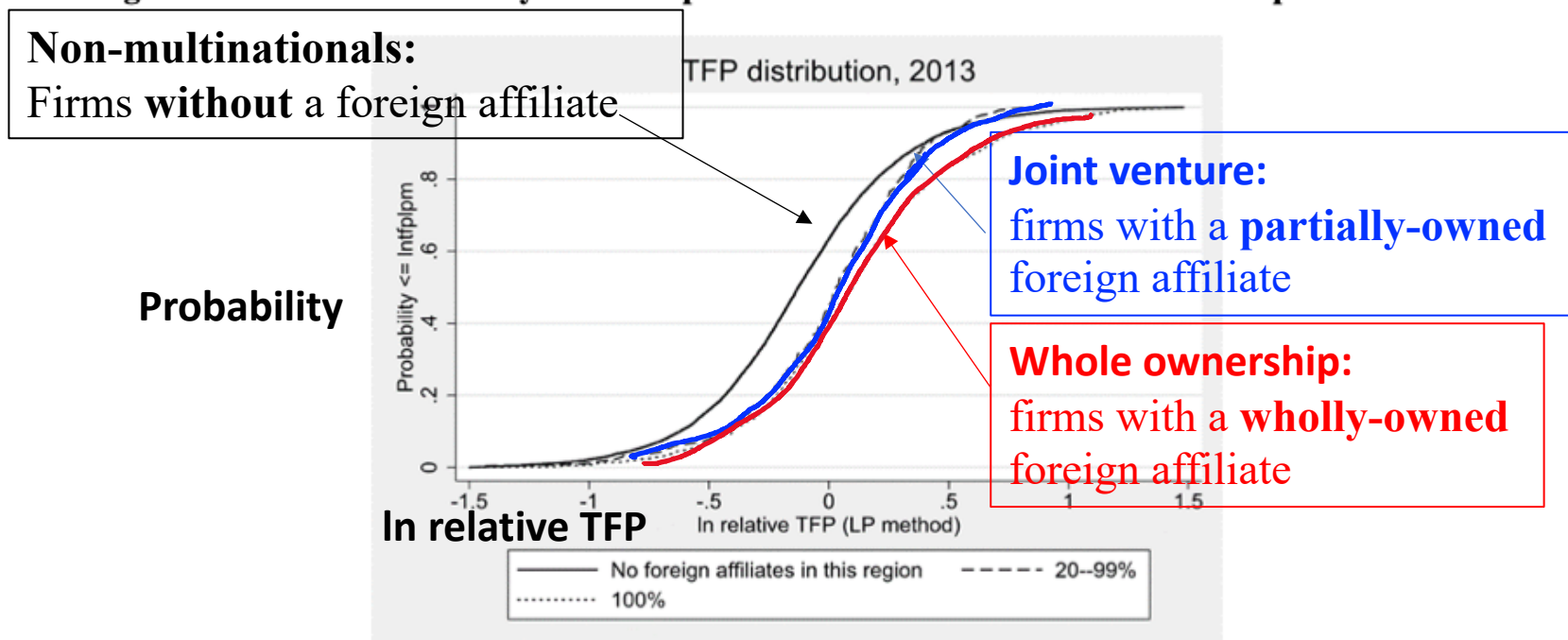# Figure 3: Number of Japanese firms' overseas affiliates by ownership share: 1990–2017

Number of Japanese firms' overseas affiliates by ownership shares: 1990-2017

Labeled on chart:
- **Whole ownership**
- **Joint venture**
- Shared ownership with Japanese partners (>=50%)
- Shared ownership with Japanese partners (<50%)
- Shared ownership with Japanese partners only

Legend: 100percent — JPNonlyJV — JPNmoreorequal50pct — JPNless50pct

Source: OJC

Figure 3 shows the number of firms over time, with whole ownership showing a steady increase over 27 years. JVs with local or third country partners increased until 1999 and has stayed almost constant since then. All other types are stable.

4.2. *Parent firms' productivity and ownership share in their affiliates*

- TFP
  - Levinsohn and Petrin (2003)
  - Basic survey of Japanese business structures and activities Panel 2001--2013
  - Estimation by 2-digit industry level
  - Due to time constraint, Ackerberg-Caves-Frazer method (acfest) is yet to come.
    - Ackerberg, D. A., K. Caves, and G. Frazer. 2015. Identification properties of recent production function estimators. *Econometrica* 83: 2411-2451.

TFP Distribution by ownership type

Figure 6: TFP distribution by ownership structure in North America and Europe

Non-multinationals:
Firms **without** a foreign affiliate

TFP distribution, 2013

Probability

Joint venture:
firms with a **partially-owned** foreign affiliate

Whole ownership:
firms with a **wholly-owned** foreign affiliate

In relative TFP

In relative TFP (LP method)

Probability <= lntfplpm

— No foreign affiliates in this region   ----- 20--99%
·········· 100%

Source: BSJBSA (METI)

The TFP distribution of **firms without a foreign affiliate** lies entirely to the left (lower-productivity) side of the other types of firms. The distribution of firms with a partially-owned foreign affiliate lies between the distribution of firms without a foreign affiliate and of firms with a wholly-owned foreign affiliate. These support the theoretical prediction of productivity ranking.

5. ESTIMATION ANALYSES

- We conduct the estimation analyses for the above-mentioned testable hypotheses:
  - whether high productivity firms are likely to have a higher ownership share in their affiliates;
  - and whether high productivity firms are likely to choose whole ownership.
- As ownership share is basically determined at the time of investment, analyses are carried out with the information of affiliates that appear first in the dataset.
  - For example, an affiliate of a Japanese automobile producing company in Thailand is recorded from 2001 onwards. The ideal would be to have the information at the time of establishment in 1962, but there is no data available at that point. Hence, we use the information from 2001.

Empirical strategy

- For multiple affiliates in the same country by the same parent firm, affiliates with the maximum share ratio are used for the estimation because the theory suggests that the constraint is on the maximum ownership.

- We confine the data for the analyses to those firms that are not considered financially constrained by using the debt-stock ratio.

- Following Yeaple (2009), we take a reduced-form approach since it is difficult to find an empirical analog for every variable in the model.
    - For instance, it is challenging to specify the difference in γ and fixed cost of FDI. Instead, we include country-industry fixed effects as well as country-year fixed effects into the estimation equation.

The first estimation equation

The first estimation equation is

- $Ownership\ Share_f = \beta_0 + \beta_1 Productivity_f + u_{ci} + u_{it} + u_{ct} + \varepsilon_f,$

- where $Ownership\ Share_f$ is the percentage of ownership share of the largest shareholder (parent firm), $Productivity_f$ is the productivity of the parent firm. $u_{ci},\ u_{it},\ u_{ct}$ are country-industry fixed effects, industry-year fixed effects, and (host) country-year fixed effects, respectively. ε_f is i.i.d. error.

Table 4: Productivity and ownership shares of the largest shareholder (parent) firm

VARIABLES	(2) AllCountry_2 parent1_share	(5) ExcludingChina_2 parent1_share	(8) OECD_2 parent1_share
lnlp	**The more productive firms tend to have higher ownership share in their foreign affiliates.**		
lntfplpn TFP	4.963*** (1.174)	6.159* (2.844)	3.696* (1.563)
lntfpindex			
Country-Industry fixed effects	✓	✓	✓
Industry-Year fixed effects	✓	✓	✓
Year-Country fixed effects	✓	✓	✓
Observations	1,013	590	271
Adjusted R-squared	0.158	0.212	0.432

The results are in Table 4. Column (2) is for the entire sample of all countries, column (5) excludes China because it is an exceptional, and column (8) is for OECD countries only because our theory fits into horizontal FDI rather than vertical FDI. The coefficient estimates of all the variables (lnlp (log of labor productivity), lntfplpn (log of TFP by L.P. method), lntfpindex (log of TFP index) show statistically significant positive signs. **The higher the parent firms' productivity, the higher their ownership share in affiliates.**

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The second estimation equation

- Second, we estimate a binary choice of whole ownership and **partial ownership** with the following linear probability model. The estimation equation is

- $Indicator(0 \; or \; 1) = \beta_0 + \beta_1 Productivity_f + u_{ci} + u_{it} + u_{ct} + \varepsilon_f,$

- where Indicator is 1 when the dependent variable—the indicator of whether the parent firm has chosen whole ownership—is "yes" and 0 otherwise. $Productivity_f$ represents parent firm's productivity and u_{ci}, u_{it}, u_{ct} represents country-industry fixed effects, industry-year fixed effects, and country-year fixed effects, respectively. ε_f is i.i.d. error.

- Estimations using Probit model are also done, which yield very similar qualitative results.

Table 5: Productivity and whole ownership of the largest shareholder (parent) firm (binary choice model: linear)

Whole ownership (1) versus **Joint ventures (0)**

VARIABLES	(2) AllCountry_2 wholly_owned	(5) ExcludingChina_2 wholly_owned	(8) OECD_2 wholly_owned
lnlp			
	More productive firms tend to choose whole ownership rather than joint ventures (shared ownership).		
lntfplpn TFP	0.124***	0.150***	0.107*
	(0.0270)	(0.0342)	(0.0419)
lntfpindex	➕	➕	➕
Country-Industry fixed effects	✓	✓	✓
Industry-Year fixed effects	✓	✓	✓
Year-Country fixed effects	✓	✓	✓
Observations	1,011	587	271
R-squared	0.532	0.597	0.508

The estimation results are in Table 5. As in the last estimations, we estimate for the entire sample (all countries) in column (2), excluding China in column (5), and only for OECD in column (8) . All the coefficient estimates are statistically significant with positive signs.

Table 6: Productivity and propensity to form a joint venture with Japanese wholesalers (binary choice model: linear)

The choice is between whole ownership (0) versus joint venture with wholesalers (1).

VARIABLES	(2) AllCountry_2 No2orNo3ShareWhole	(5) ExcludingChina_2 No2orNo3ShareWhole	(8) OECD_2 No2orNo3ShareWhole
lnlp	**Less productive firms** tend to choose **JV with wholesalers** rather than whole ownership.		
lntfplpn **TFP**	-0.0269	-0.0365+	-0.0453*
	(0.0172)	(0.0197)	(0.0229)
lntfpindex	▬	▬	▬
Country-Industry fixed effects	✓	✓	✓
Industry-Year fixed effects	✓	✓	✓
Year-Country fixed effects	✓	✓	✓
Observations	926	540	251
R-squared	0.558	0.524	0.127

Our theory predicts that the higher the productivity of the parent firm, the more likely the firm chooses whole ownership rather than a joint venture with Japanese wholesalers. Except for the case of log of TFP by L.P. method (lntfplpn) for the entire sample (column 2), all the other cases show statistically significant negative signs as expected.

Table 7: Productivity and propensity to form a joint venture with local or third-country firms (binary choice model: linear)

The choice is between **whole ownership (0)** versus **joint venture with non-Japanese partners (1).**

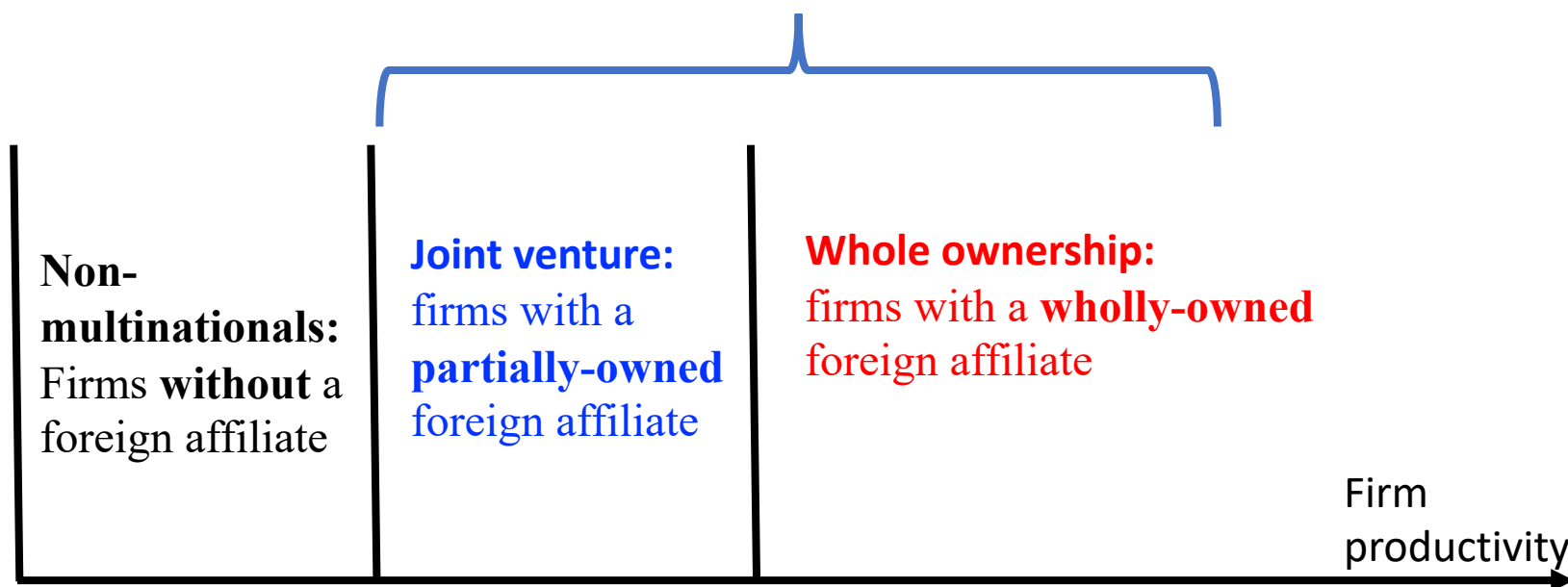| VARIABLES	(2) AllCountry_2 WithLocalor3rdPartner	(5) ExcludingChina_2 WithLocalor3rdPartner	(8) OECD_2 WithLocalor3rdPartner
lnlp			
Intfplpn **TFP**	**Less productive firms** tend to choose **JV with local or third-country partners** rather than whole ownership.		
	-0.108***	-0.139***	-0.107*
	(0.0262)	(0.0351)	(0.0426)
Intfpindex	▬	▬	▬
Country-Industry fixed effects	✓	✓	✓
Industry-Year fixed effects	✓	✓	✓
Year-Country fixed effects	✓	✓	✓
Observations	992	583	273
R-squared	0.500	0.539	0.519

Finally, Table 7 shows the estimation results of the binary variable of joint ventures with local or third country investor. The expected sign for coefficient estimates is negative in this estimation also—the more productive the parent firm, the less likely the affiliate is a joint venture with local and/or third country firms. All the coefficient estimates are statistically significant with negative signs.

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6. CONCLUDING REMARKS AND DISCUSSION

✓ Showed a simple model following Helpman et al. (2004)

✓ Derived testable hypotheses from the model

- Higher productivity firms tend to wholly own their FDI.

- Lower productivity firms tend to invest jointly with partner firms.

✓ Found supportive evidence for the above hypotheses using Japanese firm level data.

Summary: Our study suggests the following productivity ordering.

The standard model of FDI (Helpman et al., 2004) does not distinguish the ownership structure.

Non-multinationals: Firms **without** a foreign affiliate

Joint venture: firms with a **partially-owned** foreign affiliate

Whole ownership: firms with a **wholly-owned** foreign affiliate

Firm productivity

Thank you.