

Online Appendices for Partial ownership, financial constraint, and FDI

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Appendices

A TFP estimation

We estimate the parent firms' production functions based on the DBJ data. Using the methods of [Levinsohn and Petrin \(2003\)](#) and [Akerberg et al. \(2015\)](#) to estimate the production functions, we obtained insignificant coefficients for the production functions in major industries. Therefore, we employ the method of [Wooldridge \(2009\)](#) to estimate production functions, using the approach of [Rovigatti and Mollisi \(2018\)](#), namely "prodest" add-on of Stata. We find that the method of [Wooldridge \(2009\)](#) works well with our data. We estimate industry-specific production functions for large industries, whereas we had to estimate the production function for the economy as a whole for small industries because we obtained insignificant coefficients of the production function for these small industries owing to the small number of observations. We use value-added as the output variable, the number of workers, and total fixed assets as inputs. Moreover, we utilize intermediate inputs as proxy variables. We deflated nominal variables, such as the value added by the GDP deflator from the World Bank's *World Development Indicators*. Following [Pavcnik \(2002\)](#), we subtract the reference firm's log productivity in the base year from that of each firm. This satisfies the transitivity and insensitivity of the measurement unit.

B List of host countries

Table O1: N. of Newly established subsidiaries in OECD Countries

Code	Name	1989–1993	1994–2003	2004–2016	Total
AUS	Australia	8	10	1	19
AUT	Austria	0	0	1	1
BEL	Belgium	9	3	5	17
CAN	Canada	11	9	7	27
CHE	Switzerland	1	1	3	5
COL	Colombia	0	0	1	1
CZE	Czech Republic	0	14	10	24
DEU	Germany	18	11	22	51
DNK	Denmark	1	0	0	1
ESP	Spain	4	6	3	13
FIN	Finland	1	0	0	1
FRA	France	13	13	10	36
GBR	United Kingdom	41	29	8	78
HUN	Hungary	3	7	2	12
IRL	Ireland	2	3	2	7
ISL	Iceland	1	0	0	1
ISR	Israel	3	0	0	3
ITA	Italy	8	7	8	23
KOR	Korea, Rep.	22	57	45	124
LUX	Luxembourg	1	1	0	2
MEX	Mexico	7	4	46	57
NLD	Netherlands	7	5	5	17
NOR	Norway	1	1	0	2
NZL	New Zealand	3	2	1	6
POL	Poland	0	6	8	14
SVK	Slovak Republic	0	1	2	3
SWE	Sweden	1	4	1	6
TUR	Turkey	0	3	5	8
USA	United States	120	131	58	309
ALL	All (29)	286	328	254	868

Note: This table tabulates the number of FDI projects only where both the Japanese parent firm and their foreign subsidiary are in the manufacturing sector.

Table O2: N. of Newly established subsidiaries in Non-OECD Countries

Code	Name	1989–1993	1994–2003	2004–2016	Total
ARG	Argentina	1	3	0	4
BGD	Bangladesh	0	0	2	2
BHR	Bahrain	0	0	1	1
BRA	Brazil	4	14	21	39
CHN	China	124	778	606	1508
EGY	Egypt, Arab Rep.	0	0	1	1
IDN	Indonesia	44	97	88	229
IND	India	7	37	71	115
IRN	Iran, Islamic Rep.	1	1	0	2
KAZ	Kazakhstan	0	0	1	1
KEN	Kenya	0	0	2	2
KHM	Cambodia	0	0	4	4
LAO	Lao PDR	0	0	1	1
MAC	Macao SAR, China	0	1	0	1
MMR	Myanmar	0	0	3	3
MYS	Malaysia	69	55	25	149
PAK	Pakistan	1	0	1	2
PAN	Panama	2	0	0	2
PHL	Philippines	17	56	15	88
ROU	Romania	0	0	1	1
RUS	Russian Federation	1	2	8	11
SAU	Saudi Arabia	0	0	7	7
SGP	Singapore	17	29	12	58
SLB	Solomon Islands	0	0	1	1
THA	Thailand	87	176	131	394
TWN	Taiwan	27	49	26	102
VEN	Venezuela, RB	1	1	0	2
VNM	Vietnam	1	47	97	145
ZAF	South Africa	0	3	1	4
ALL	All (29)	404	1349	1126	2879

Note: This table tabulates the number of FDI projects only where both the Japanese parent firm and their foreign subsidiary are in the manufacturing sector.

Table O3: Average ownership ratio in OECD Countries

Code	Name	1989–1993	1994–2003	2004–2016	Average
AUS	Australia	.81	.78	.76	.79
AUT	Austria			.5	.5
BEL	Belgium	.71	1	1	.85
CAN	Canada	.83	.74	.98	.84
CHE	Switzerland	1	.51	.84	.8
COL	Colombia			.7	.7
CZE	Czech Republic		.91	.86	.89
DEU	Germany	.72	.83	.92	.83
DNK	Denmark	1			1
ESP	Spain	.56	.67	.57	.61
FIN	Finland	.42			.42
FRA	France	.81	.7	1	.82
GBR	United Kingdom	.72	.78	1	.77
HUN	Hungary	.36	.84	.75	.7
IRL	Ireland	1	1	1	1
ISL	Iceland	.5			.5
ISR	Israel	.53			.53
ITA	Italy	.53	.62	.92	.7
KOR	Korea, Rep.	.51	.62	.75	.65
LUX	Luxembourg	.5	.5		.5
MEX	Mexico	.62	.73	.86	.82
NLD	Netherlands	.75	.8	.9	.81
NOR	Norway	.33	.2		.27
NZL	New Zealand	.63	.76	.5	.65
POL	Poland		.84	.92	.89
SVK	Slovak Republic		1	1	1
SWE	Sweden	.45	.58	1	.63
TUR	Turkey		.63	.62	.63
USA	United States	.73	.81	.94	.8
ALL	All (29)	.7	.76	.87	.77

Note: This table tabulates the number of FDI projects only where both the Japanese parent firm and their foreign subsidiary are in the manufacturing sector.

Table O4: Average ownership ratio in Non-OECD Countries

Code	Name	1989–1993	1994–2003	2004–2016	Average
ARG	Argentina	.25	.51		.44
BGD	Bangladesh			.55	.55
BHR	Bahrain			.49	.49
BRA	Brazil	.58	.8	.84	.8
CHN	China	.52	.63	.77	.68
EGY	Egypt, Arab Rep.			1	1
IDN	Indonesia	.53	.65	.73	.66
IND	India	.39	.62	.74	.68
IRN	Iran, Islamic Rep.	.5	.44		.47
KAZ	Kazakhstan			1	1
KEN	Kenya			.8	.8
KHM	Cambodia			.92	.93
LAO	Lao PDR			.86	.86
MAC	Macao SAR, China		.5		.5
MMR	Myanmar			.72	.72
MYS	Malaysia	.77	.76	.81	.77
PAK	Pakistan	.51		.35	.43
PAN	Panama	.5			.5
PHL	Philippines	.68	.86	.85	.83
ROU	Romania			1	1
RUS	Russian Federation	.25	.47	.83	.71
SAU	Saudi Arabia			.48	.48
SGP	Singapore	.76	.84	.97	.84
SLB	Solomon Islands			1	1
THA	Thailand	.52	.61	.84	.66
TWN	Taiwan	.57	.76	.84	.73
VEN	Venezuela, RB	.25	1		.63
VNM	Vietnam	.6	.67	.91	.83
ZAF	South Africa		.57	.85	.64
ALL	All (29)	.58	.66	.79	.7

Note: This table tabulates the number of FDI projects only where both the Japanese parent firm and their foreign subsidiary are in the manufacturing sector.

C Variance of ownership ratios

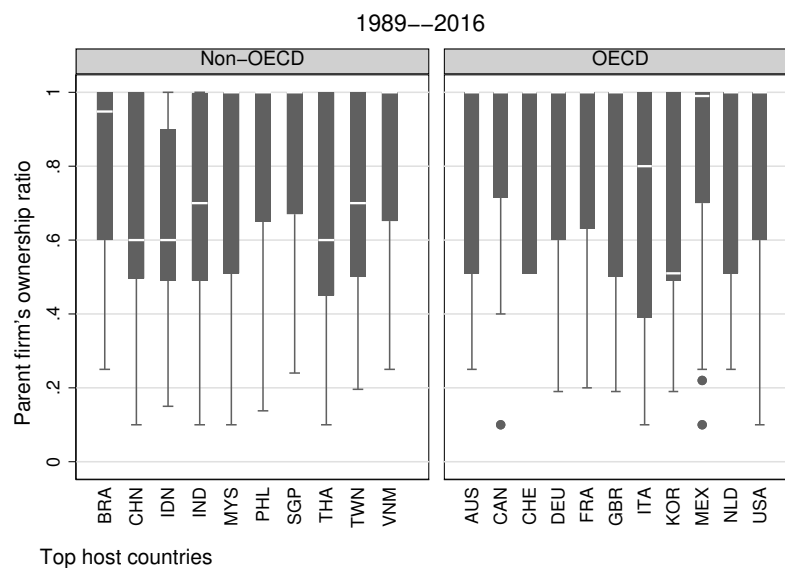


Figure O1: Parent firms' ownership ratio by the host country: 1989–2016.

Notes: The white line inside the box indicates the median values. The upper and lower hinges of the box indicate the 75th and 25th percentile, respectively. The upper and lower adjacent lines outside the box indicate the maximum and minimum values among observations, excluding the outside values. The dots are outside values.

Source: Authors' compilation based on the OJC data of Toyo Keizai Inc.

A large variation exists between the median ownership ratios of the foreign subsidiaries of Japanese firms by the host country, as shown in Figure O1. Moreover, Figure O1 shows that the median ownership ratio equals one in several countries, including both OECD and non-OECD countries. In addition, it reveals that the 25th percentile goes above 0.5 in several countries, including Brazil, the Philippines, Singapore, Vietnam, Canada, Germany, France, Mexico, and the USA, indicating smaller variations in our dependent variables when we estimate parent firms' decisions regarding the ownership structure of their foreign subsidiaries in these host countries.

Unfortunately, we cannot meaningfully estimate the relationship between financial constraints and the ownership structure of foreign subsidiaries in host countries with low variations in ownership ratios. Therefore, we conduct estimations using a sample that excludes countries where the median ownership ratio of Japanese firms is greater than one. Table O5 presents the estimation results using a sample of foreign subsidiaries in host countries with higher variation in ownership ratios. Results are similar to the baseline results in Tables 2 and 3.

Table O5: Host countries with the median ownership ratio less than one

	(1) Share	(2) Wholly-owned	(3) Majority-owned
log TFP (t-2)	2.598*** [0.956]	5.138** [2.002]	1.933 [1.854]
Debt ratio (t-2)	-0.911*** [0.184]	-0.903*** [0.347]	-1.397*** [0.361]
Top bank ratio (t-2)	-2.132** [0.843]	-2.380 [1.602]	-3.255* [1.794]
Intangibles ratio (t-2)	3.560 [2.190]	2.065 [2.867]	13.466*** [4.737]
Observations	2828	2789	2812
N of Subsidiaries	2594	2556	2579
N of Parent firms	876	873	874
N of Banks	34	34	34
N of Countries	32	16	22
Mean of Dep. Var.	0.698	0.334	0.674
Country FE	YES	YES	YES
Country-level vars.	YES	YES	YES
Parent Industry FE	YES	YES	YES
Year FE	YES	YES	YES

Notes: Robust standard errors are clustered by parent firm. Dep. var. in (1): Parent firms' ownership ratio of foreign subsidiaries (t). Dep. var. in (2): Dummy variable for whole ownership (t). Dep. var. in (3): Dummy variable for majority ownership (t). Column (1) is estimated by the fractional logit model. Columns (2)–(3) are estimated by the logit model. Host countries' log GDP, log per capita GDP, level of IPR protection, and financial development are included in the estimation. * 10% level, ** 5% level, and *** 1% level.

D Non-manufacturing subsidiaries

In the main text, we analyze only foreign manufacturing subsidiaries owned by Japanese manufacturing firms. However, Japanese manufacturing firms have non-manufacturing foreign subsidiaries. Table O6 describes the sector distribution of foreign subsidiaries owned by Japanese manufacturing firms. Manufacturing subsidiaries account for approximately 60%, whereas wholesale and retail subsidiaries account for approximately 22%. Service subsidiaries account for approximately 12%.

Table O6: Sector Distribution of Subsidiaries

	(1) Freq.	Percent
Agriculture,Mining	44	0.7
Manufacturing	3747	59.6
Wholesale	1330	21.1
Retail	90	1.4
Service,Others	762	12.1
HeadQuarter	318	5.1
Total	6291	100.0

In Table O7, we estimate the equations by sector to which foreign subsidiaries belong. Firm productivity, TFP, is positive and significant for wholesale/retail but insignificant for services. The parent firms' financial constraints and debt ratios are negatively significant for services but insignificant for wholesale/retail. The top bank ratio of the parent firms is insignificant in all non-manufacturing sectors. The intangibles ratio is negatively significant for services but insignificant for wholesale/retail. Overall, we find large sectoral heterogeneity. At the same time, our main results on manufacturing subsidiaries are close to those for all sectors the last column of Table O7 displays.

The results in Table O7 suggest that parent firm TFP affects FDI in wholesale/retail and debt ratios affect FDI in services, similar to manufacturing FDI. However, the top banks' influence on FDI disappears for non-manufacturing investments. This may be because these investments are viewed as less risky than manufacturing subsidiaries. They are typically smaller in size (both in total assets and employment), resulting in lower fixed establishment costs and marginal operational costs while often being established to provide services and facilitate exports. Establishing these subsidiaries may be less costly for the parent firm, requiring less funding and investment from its main lending (and owning) bank.

Table O7: Fractional logit results by subsidiary industry

	Wholesale Retail	Service	Total
log TFP (t-2)	6.020*** [1.944]	-1.537 [2.210]	1.999** [0.873]
Debt ratio (t-2)	-0.191 [0.425]	-1.525*** [0.513]	-0.822*** [0.168]
Top bank ratio (t-2)	2.378 [2.424]	3.408* [2.041]	-0.968 [0.775]
Intangibles ratio (t-2)	2.017 [4.183]	-8.164*** [1.928]	0.960 [2.000]
log GDP (t-2)	-1.636 [1.915]	1.252 [2.648]	-1.815** [0.753]
log percapita GDP (t-2)	2.309 [1.853]	0.384 [2.476]	1.807*** [0.691]
IPR protection (t-2)	-0.441* [0.267]	-0.477 [0.388]	-0.024 [0.090]
log Financial Dev. (t-2)	0.108 [0.270]	0.544 [0.617]	0.364*** [0.111]
Observations	1208	651	5530
Mean of Dep. Var.	0.884	0.866	0.781
Country FE	YES	YES	YES
Parent Induiestry FE	YES	YES	YES
Year FE	YES	YES	YES

Robust standard errors are clustered by parent firm.

Dep. var.: Parent firms' ownership ratio of foreign subsidiaries (*t*).

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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