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Partial Ownership, Financial Constraint, and FDI*

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Abstract

Using matched firm-bank-FDI data, this study explores the possibility that firms with stricter financial constraints tend to choose joint ventures with a lower ownership ratio for their foreign subsidiaries. In addition, this study tests the hypothesis that parent firms with banks as their largest shareholders have a lower stake in their foreign subsidiaries because banks are risk averse. The empirical analysis confirms that foreign subsidiary ownership ratios are negatively associated with parent firms' debt ratios. Moreover, this study finds that the greater the degree to which the parent firm has bank shareholders, the lower the parent firm's ownership share in its subsidiaries. However, this tendency weakens when a bank has an overseas subsidiary in the host country, presumably because the information asymmetry is mitigated.

Keywords: Foreign direct investment, financial constraint, multinational enterprise
JEL classification: F21, F23, G32, L24.

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1 Introduction

This study examines how financial constraints affect a multinational enterprise's (MNE) decision regarding the ownership structure of its foreign subsidiaries. As is conventional in the literature, the MNE borrows to pay for a portion of the newly established subsidiary. This creates two channels through which financial frictions arise that affect the firm's ownership structure decision; a demand-side, or "borrowing channel" that constrains the MNE's ability to borrow, and a "lending channel" through which frictions facing banks and other lending institutions impact their ability to provide loans to MNE borrowers. This study differs from the previous studies in how we model the lending channel. Rather than making assumptions about loan-investment links or lenders' financial health, this study explores lending constraints through a key characteristic of Japanese firm-level data that identifies the degree to which these lenders serve as shareholders of their investing clients. By identifying where these relationships exist and the extent to which the lender can regulate its client's behavior, we can explore a different line of heterogeneity among investing firms while more accurately characterizing the lending-channel constraints faced by investing firms.

The financial constraints literature assumes that some firms must borrow to finance at least part of their foreign investments (Buch et al. 2014, Bilir et al. 2019, Yan et al. 2018). However, for many investors, a joint venture arrangement may be the only possible method of establishing a foreign subsidiary, as discussed below.[1] Investors face borrowing-channel constraints because they typically collateralize the amount borrowed. Difficulties in doing so or other balance sheet-related issues (e.g., high debt) raise the cost of borrowing, limiting the firm's ability to finance its investment projects.[2]. By contrast, lending-channel frictions arise from weak credit markets, typically resulting from decreased institutional health.[3] In most cases, both theoretical and empirical research shows that financial frictions in both the lending and borrowing channels negatively impact investment totals and affect ownership choice decisions.[4]

However, one drawback is that assumptions must be made regarding the firm–lender

[1]This is in contrast to earlier ownership choice studies that assumed the parent could establish a wholly owned subsidiary (WOS) and that the ownership choice decision was based on other factors, such as solving ex-post incentive problems and contractual issues. See Asiedu and Esfahani (2001), Grossman and Hart (1986), Raff et al. (2009a), and Raff et al. (2009b).

[2]Many firms use the land to collateralize investment loans, and decreases in real estate prices have been shown negatively impact both total investments (e.g., Gan 2007a and Chaney et al. 2012) as well as FDI (Raff et al. 2018).

[3]Gibson (1995), Klein et al. (2002) and Alba et al. (2007) illustrated that declining bank health decreases outward Japanese FDI. Regarding overall investment, Gan (2007b) found that Japanese firms borrowed less from banks with greater exposure to real estate markets.

[4]Host-country financial constraints are also often at focus (see Matsuyama 2005, Desbordes and Wei 2017b, Desbordes and Wei 2017a, and Bilir et al. 2019). Appendix C discusses the impact of the host nation's financial development on the ownership structure.

relationship. Contracts between these parties are incomplete, and we cannot typically observe individual contracts or data that tie individual loans and collateral requirements to FDI projects.[5] To ease these identification issues, assumptions are made as to who serves as the firm's main lending institution ("main bank")[6] and the firm limits its borrowings to this institution.[7] However, the power of the main reference bank as the sole lender is generally limited, contrary to the norm.[8] In fact, the Nikkei NEEDS "Corporate Borrowings from Financial Institutions Database" of matched bank-firm loan data indicates that approximately 70% of Japanese firms borrowed from more than one bank between 1985–2019.

As a result, this study takes a different view of the firm–lender relationship. Japanese firm behavior serves as our focus for several reasons, partly because of its prominent role as a major FDI source. More importantly, the available Japanese firm-level FDI and balance sheet data tie individual firms' financial health to their investment activities. These data allow us to identify each parent's primary shareholder. In contrast to the U.S. and other major FDI source countries, many Japanese firms have banks or other lending institutions as their major owners.[9] Additionally, unique to Japan, serving as major shareholders, they often have personnel sit on the firm's board of directors and (to varying degrees) participate in operational decisions.[10] In these ways, among others, the main bank as a top shareholder can not only exert power over a firm but also serve as a conduit of investment information (see, for example, Inui et al. 2015 and Degryse et al. 2009). As the shareholding bank's profit is directly related to the firm's profit, the main bank has the incentive to provide financial and informational support for the firm's profitable FDI project. Aoki and Patrick (1994) argue that close ties between banks and firms in Japan have helped solve agency problems and asymmetric information between banks and firms. Hoshi et al. (1991) find that for investment, firms with close ties to

[5]This is in contrast to Amiti and Weinstein (2018) who, while utilizing data on individual bank-firm loan arrangements, cannot tie these loans to individual investment projects. In contrast, this study does not examine individual loan arrangements but rather the actual ownership relationships of these banks. For the role of incomplete contracts and the organization of multinational enterprises (MNEs), see Antràs (2003) and Antras and Helpman (2004).

[6]In Japan, a "main bank" refers to a financial institution that serves as the primary relationship bank for a firm. Main banks provide a range of financial services to their clients, including lending, investment advice, foreign exchange, and trade finance. Main banks typically hold a significant share of the clients' equity and monitor their activities closely by appointing personnel to senior positions on their boards (Weinstein and Yafeh 1998). Thus, the Japanese main banks play a dual role as creditors and shareholders (Prowse 1992).

[7]See, among others, Raff et al. (2018).

[8]The dramatic deregulation and liberalization of the financial system in the 1980s significantly improved the non-financial firms' access to corporate borrowing from bond markets and raising of equity in capital markets (Weinstein and Yafeh 1998). This process renders the main reference bank less important for manufacturing firms.

[9]Unlike the Anglo-Saxon countries, Japan and Germany have employed long-term close ties between main banks and their client firms to accelerate their industrial development (Weinstein and Yafeh 1998).

[10]See Kaplan and Minton (1994) and Morck and Nakamura (1999), among others.

their main bank are much less sensitive to their liquidity than firms raising their capital through more arms-length transactions. They posit that this finding implies that the main banking system can minimize agency and information problems.

However, information asymmetries between a firm and its main owner bank still exist and can be larger for outward FDI. Therefore, the main bank's risk aversion can lower a firm's ownership ratio of its foreign subsidiary.[11] Similarly, subsidiaries established in countries where the parent's main bank shareholder already operates banking subsidiaries should see information asymmetries alleviated, resulting in higher ownership percentages. This situation mimics those found in the "follow the customer" literature, where FDI information issues regarding the host country are less prominent, and thus the bank sees these investments as a better lending risk.[12] Here, the main bank's foreign branches serve to reduce the fixed cost of FDI as the branch has information on the local branch and works to reduce cost/uncertainty in the local market, allowing the firm to more likely establish a WOS.

This study contributes to the literature on firm heterogeneity and the ownership structure of FDI. The standard FDI theories of Helpman et al. (2004) assume wholly owned foreign subsidiaries. However, in reality, there are a substantial number of partially owned foreign subsidiaries. The variation in parent firms' ownership ratios of foreign subsidiaries is quite large, as discussed below. What factors determine parent firms' ownership ratios of their foreign subsidiaries in host countries? Several studies (Raff et al. 2009a,b, 2012; Cieślik and Ryan 2009; Ito and Tanaka 2022) explore this question and reveal that parent firms' productivity is a crucial factor in determining the ownership ratio of their foreign subsidiaries in host countries. Meanwhile, this study highlights the less-explored role of parent firms' financial constraints on the ownership structures of their foreign subsidiaries.

Following the studies discussed above, this study examines whether more productive parent firms tend to have a higher share of ownership in their foreign subsidiaries. In addition to firm productivity, we investigate how parent firms' financial constraints relate to their overseas subsidiaries' ownership structures. We hypothesize that financially healthy firms obtain financing from financial institutions and establish wholly owned subsidiaries. By contrast, financially constrained firms, even if they are productive enough to invest abroad, may find it difficult to obtain financing from financial institutions and tend to choose joint ventures with other firms. In other words, the more

[11] Japanese banks are traditionally known for their conservative lending and risk management. Konishi and Yasuda (2004) show that 1993's capital adequacy requirement implementation further reduced Japanese bank risk-taking behavior. Limpaphayom et al. (2019) find that bank ownership incentivizes Japanese firms to reduce risk exposures. Sakawa and Watanabel (2021) present evidence that close bank ties drove publicly listed Japanese firms to take fewer risks between 2007–2016.

[12] See, among others, von der Ruhr and Ryan (2005) who find that Japanese MNEs choose foreign hosts in which their main bank has already established subsidiaries.

financially constrained a firm is, the more likely it will choose to establish a foreign subsidiary in the form of a joint venture instead of using indirect financing. Generally, we expect firms with higher debt ratios to have a lower stake ownership ratio in their foreign subsidiaries.

In addition, this study contributes to the emerging literature on FDI and corporate finance.[13] The standard FDI theory of Helpman et al. (2004) assumes that FDI entails higher fixed costs than export and predicts that FDI firms require higher productivity than export firms. While numerous studies support the findings of Helpman et al. (2004), research on how firms finance the fixed costs of FDI is scarce (Foley and Manova 2015). Buch et al. (2014), Bilir et al. (2019), and Yan et al. (2018) are exceptional studies that explore the role of financial constraints on FDI. As Manova (2013) extends Melitz (2003) to analyze the role of financial constraints on exports, the studies above extend Melitz-type models to study the impact of financial constraints through the borrowing channel on firms' FDI decisions. In contrast to exports, JVs are an alternative corporate finance method in the case of FDI, but the above studies do not take JVs into account. Hence, this study aims to address this gap by conducting further research.

This study begins with the foreign subsidiary ownership decisions of Japanese firms from 1989 to 2016 and examines the role of financial constraints in these decisions. From the firm's perspective, we examine the firm's total factor productivity (TFP), intangible assets, and debt ratio, finding that both influence ownership. We confirm that foreign subsidiary ownership ratios are negatively associated with parent firm debt ratios. In addition, as the standard Melitz-type theory predicts, we find evidence that more productive parent firms tend to have higher ownership ratios of their foreign subsidiaries. Next, we turn our attention to the MNE parent-bank-owner relationship. We examine how a bank's shareholder status affects its subsidiary ownership structure using various methods. In general, we find that the larger the bank holding the share of an MNE parent, the greater the likelihood of JV and the lower the ownership share of the main MNE parent controls.

The remainder of this paper is organized as follows. Section 2 provides an overview of FDI and firm balance sheet data. Next, Section 3 details our empirical methodology. Section 4 presents the empirical results. Finally, Section 5 concludes and highlights the relevant policy implications of this study.

[13] Foley and Manova (2015) concisely survey the literature on FDI and corporate finance.

2 The data and overview

2.1 The FDI data

The Japanese firm-level FDI data are taken from Toyo Keizai Inc.'s *Overseas Japanese Companies Data* (hereinafter, OJC data) to investigate foreign subsidiary ownership structures. The OJC data are based on the annual questionnaire survey Toyo Keizai, which has been conducted for 50 years and is widely recognized as providing the most comprehensive coverage of Japanese parents' overseas subsidiaries.[14] On average, the OJC lists 19,957 foreign subsidiaries held by 4,108 Japanese parent firms per year during the 1990–2016 period, representing the vast majority of Japanese foreign subsidiary holdings. Owing to these distinct advantages, many previous studies (Head and Ries, 2001; Raff et al., 2009a,b, 2018) have employed OJC data. The OJC provides a wealth of information on its overseas subsidiaries. For each foreign subsidiary, the OJC lists the firm's name, geographic location, year of establishment, industry affiliation, capital stock, number of employees, and investment objectives. Essentially, this study also provides the names of all parent firms, whether Japanese, local, or third-country, as well as their ownership percentages.[15] Similar to this study, several previous studies (Head and Ries, 2001; Raff et al., 2009a,b, 2018) have employed the OJC data. As is standard in the empirical FDI literature, we follow the OECD's definition of FDI and restrict our sample to subsidiaries in which Japanese firms maintain at least a 10% ownership share. Note that this does not eliminate many firms from the OJC sample.[16]

2.2 The DBJ data

To acquire detailed information on parent firms, we employ the Development Bank of Japan's *Corporate Financial Data Bank* (DBJ data), published by the Japan Economic Research Institute Inc.[17] The DBJ data provide more than 60 years of non-consolidated corporate financial records for our investing firms, a timeframe that considerably exceeds our study period. This enables us to explore the relationship between parent firms' characteristics and their foreign subsidiary ownership decisions during the 1989–2016 period. The DBJ data cover all listed firms in Japan except those in the finance and

[14] The OJC data is also known in its book format as *Japan Overseas Investment: A Complete Listing by Firms and Countries* or *Kaigai Shinshutsu Kigyo Soran* in Japanese. See the detail at https://biz.toyokeizai.net/en/data/service/detail/id=860.

[15] The Toyo Keizai files on the investing Japanese parent firms are limited, and for that reason, we use Development Bank of Japan data as discussed in Section 2.2.

[16] https://www.oecd.org/daf/inv/investment-policy/2487495.pdf.

[17] Officially, this is the *Kigyo-Zaimu-Data-Bank*. The DBJ does not provide data description in English. Detailed information is provided in Japanese on the following page. https://www.jeri.co.jp/about/data_develop/data. The information on the aggregated version of the DBJ data, *Industrial Financial Data* is provided in English on the following page: https://www.dbj.jp/ricf/en/databank/index.html

insurance industries.[18] The DBJ data, used in numerous previous studies (e.g., Abe 2002), include numerous balance sheet and income statement variable standards.

2.3 Debt ratio

We employ DBJ data to calculate the parent firm's *Debt_Ratio*, a measure we use to examine the severity of a firm's financial constraints. We adopt a commonly used definition of debt ratio. This is calculated as the ratio of a firm's total debt to its total assets.[19] The higher the firm's *Debt_Ratio*, the more severe its financial constraints. For instance, firms whose debt ratios exceed 1 (= 100%) are insolvent and financially at risk. Firms in this extreme debt position accounted for only 0.3% of the listed firms in the 2016 sample. In contrast, firms with a debt ratio of more than 0.5 (= 50%) find themselves in a financially undesirable position of having debt greater than their equity. In 2016, approximately 40% of the listed firms in Japan had debt ratios above 0.5, suggesting that financial constraints affect a substantial portion of Japanese listed firms. In fact, the median debt ratio for our sample was greater than 0.5 between 1994 and 2004.

2.4 Investment-level FDI data

We employ OJC establishment year data to create yearly investment-level FDI data for the 1989–2016 period. The OJC and DBJ provide subsidiary and parent industry affiliations, allowing us to isolate the establishment of foreign manufacturing subsidiaries by parent manufacturing firms. Between 1989 and 2016, 5,182 new overseas manufacturing subsidiaries were established across the globe. We match parents to their subsidiaries using the parents' unique four-digit stock code, allowing us to combine Toyo Keizai's OJC data with the DBJ data at the parent firm level. For subsidiaries with more than one Japanese owner, we consider the firm with the largest ownership ratio as the primary Japanese parent and use their DBJ-located firm-level data in our regression analysis. Listed firms account for 43.71% of all parent firms, whereas their foreign subsidiaries account for 74.52% of all foreign manufacturing subsidiaries listed in the OJC. The matched parent-subsidiary data cover 3,747 manufacturing FDI projects of listed manufacturing firms between 1989 and 2016. As shown in Figure 1, there is substantial

[18] The DBJ data cover firms listed on the First and Second Sections of the Tokyo (including the former Osaka) and Nagoya stock exchanges, regional stock exchanges (Sapporo, Fukuoka including the former Hiroshima, Niigata, and Kyoto), JASDAQ (including the former Hercules and JASDAQ NEO), Mothers, Centrex, Ambitious and Q-Board.

[19] Todo (2011) uses fixed liabilities over total assets, $\frac{\text{fixed liabilities}}{\text{total assets}}$, as his measure of debt ratio. However, it is unclear why he ignores current liabilities. One problem with this definition is that it does not correspond to the equity ratio calculated as a proportion of the total assets financed using the capital provided by shareholders. Our definition of the debt ratio, $\frac{\text{total debt}}{\text{total assets}}$, is close to Todo (2011), but we depart from Todo (2011) in our use of total debt as the numerator instead of fixed liabilities.

variation in the ownership ratio among FDI projects in our merged sample.

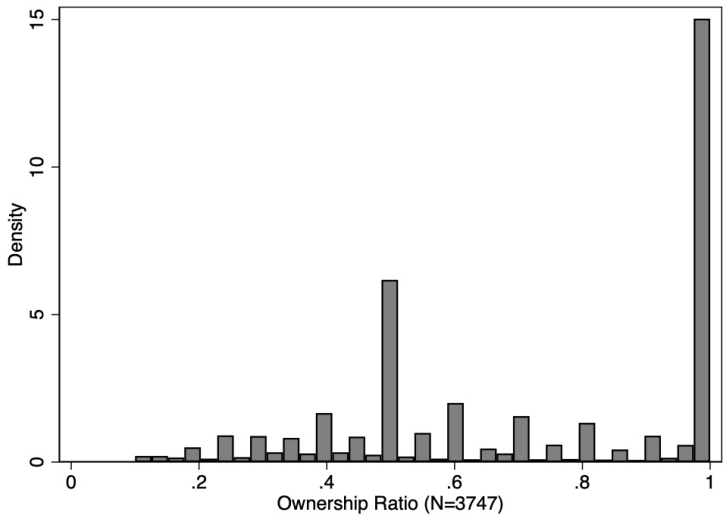


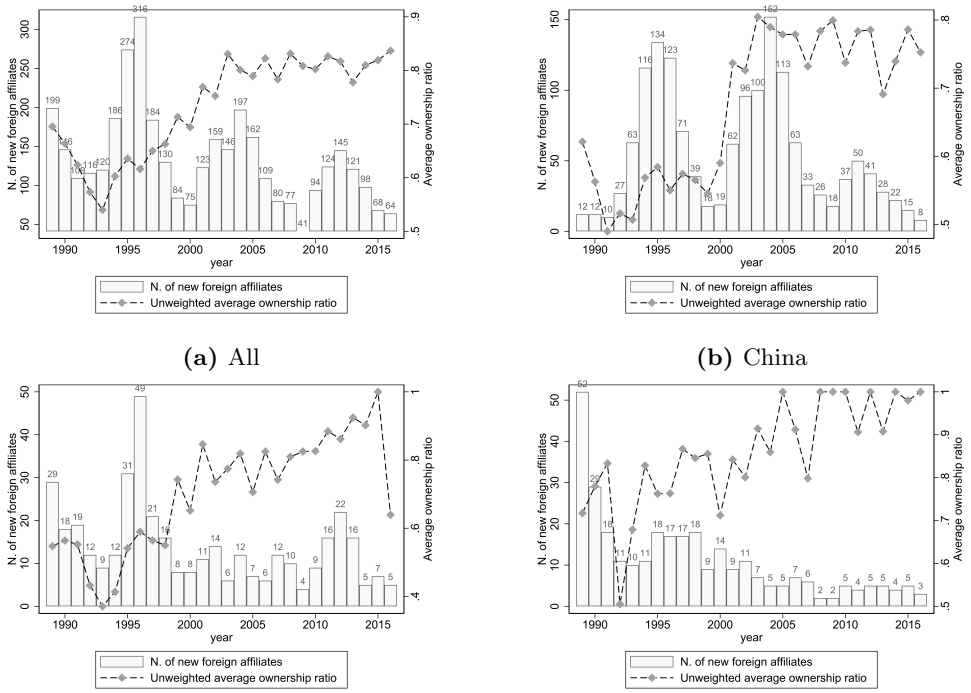
Figure 1: Distribution of Japanese firms' ownership ratio of new overseas subsidiaries in manufacturing from 1989 to 2016.
Source: Authors' compilation based on the OJC data of Toyo Keizai Inc.

2.5 Stickiness of ownership ratio

This study analyzes the decisions of parent firms when foreign direct investment occurs, particularly the foreign subsidiary's ownership ratios at the establishment date. We note that ownership ratios generally appear sticky and typically remain unchanged over the years when the firm is listed in the OJC data. For example, 84% of foreign subsidiaries did not experience a change in their largest shareholders between 1989 and 2016. In addition, during this period, 53.4% of foreign subsidiaries did not experience a change in the largest shareholder's ownership ratio. The median frequency of changes in the largest shareholder's ownership ratio during the first 17 years is zero. Consequently, more than 97% of wholly owned foreign subsidiaries remained wholly owned during the analysis period. Similarly, more than 98% of the majority-owned foreign subsidiaries remained majority-owned during the analysis period.

2.6 Investment and ownership trends

With the bursting of the Japanese asset price bubble policy in the early 1990s, the Japanese economy experienced a prolonged period of stagnation, known as the "lost 20 years" in the 1990s and 2000s. However, during this period of stagnation, Japanese manufacturing firms continued to establish new subsidiaries abroad as shown in Figure 2. During the 2000 bursting of the IT bubble and the 2009 global financial crisis,



(a) All **(b)** China

(c) Thailand **(d)** USA

Figure 2: Number of new foreign subsidiaries and their average ownership ratio in manufacturing, 1989–2016.
Source: Authors' compilation based on Toyo Keizai Inc.'s OJC data.

the number of new foreign subsidiaries was relatively small. Nonetheless, we observe relatively significant investment increases soon after each collapse.

In addition to the number of new foreign subsidiaries, we also observe a distinctive trend in the ownership ratio. The study period was divided into three parts. In the first period, 1989–1993, the average ownership ratio declined by 15 percentage points, from 69% to 54%, perhaps due to the Japanese recessionary economy. In contrast, the second period (1993–2003) saw the average subsidiary ownership ratio of Japanese parent firms increase by more than 28 percentage points, from approximately 54% to 83%. This sharp rise in the ownership ratio may reflect the relaxation of inward FDI restrictions by developing countries after the Asian financial crisis of 1997 and China's 2001 WTO accession. Since 2003, the average ownership ratio has stagnated at approximately 77–85%. The 77–85% ownership ratio appears to be in equilibrium.

No clear explanations exist as to why new foreign subsidiaries' ownership ratios never significantly approached whole ownership during this period.[20] The persistence of this result suggests that partial ownership is desirable for parent firms. Perhaps these lower ownership totals represent joint ventures through local distribution, logistics, and/or

[20]Typically, 100% ownership indicates a wholly owned subsidiary. However, a 95% ownership threshold is occasionally used as well. In most cases, the use of either threshold does not significantly affect regression outcomes.

marketing companies with better local market knowledge. Alternatively, as we suggest, the combination of financially constrained firms borrowing from risk-averse banks leads to greater joint venture investment likelihood and lower ownership shares.

Finally, we note the similarities between the US and Japanese manufacturing FDI. Desai et al. (2004) report that the US MNEs' tendency to have partially owned subsidiaries relative to wholly owned subsidiaries has declined during the period 1982–1997. This trend is similar to Japan's declining trend in partial ownership from 1993 to 2003.

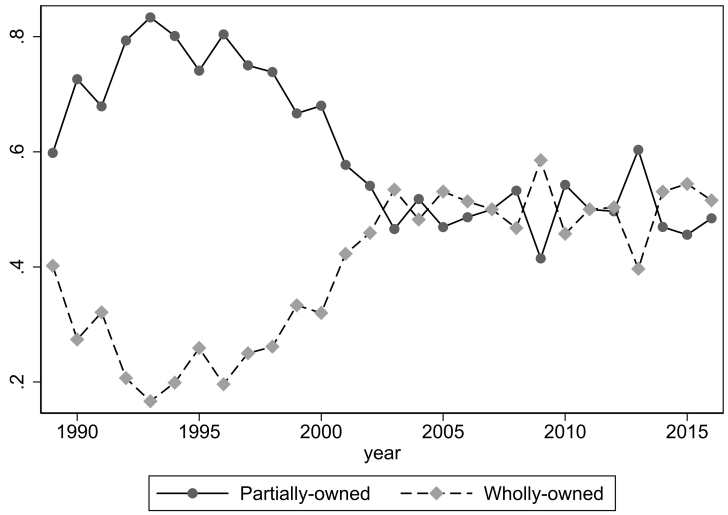


Figure 3: Fractions of wholly and partially owned foreign subsidiaries among all new foreign subsidiaries in manufacturing, 1989–2016.
Source: Authors' compilation based on OJC data of Toyo Keizai Inc.

Figure 3 shows the proportion of wholly and partially owned foreign subsidiaries among all new foreign subsidiaries in the manufacturing sector. During the first period, 1989–1993, the proportion of wholly owned subsidiaries decreased from 40.0% to 16.7%. From 1993 to 2003, the proportion of wholly owned foreign subsidiaries steadily increased from approximately 16.7% to 53.1%. This trend probably reflects the relaxation of inward FDI restrictions in developing countries during the 1990s and the early 2000s. After the remarkable FDI liberalization period in developing countries, the proportion of wholly owned foreign subsidiaries stagnated at approximately 50% in the third period, between 2003 and 2016. During this period, the proportion of wholly owned foreign subsidiaries is almost equal to that of partially owned foreign subsidiaries. This finding indicates that partial ownership remains a vital option for Japanese parent firms even after the FDI liberalization period.

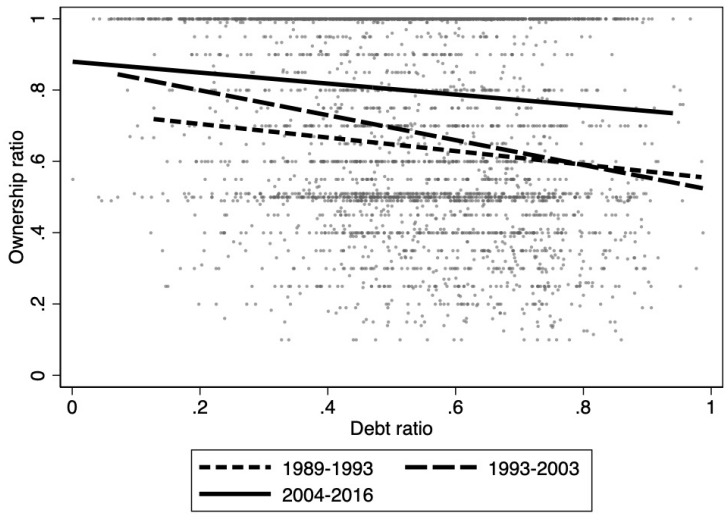


Figure 4: Parent firms' debt ratio and their average ownership ratio of foreign subsidiaries in manufacturing, 1989–2016.
Source: Authors' compilation based on OJC data of Toyo Keizai Inc. and DBJ data of Development Bank of Japan.
Note: Firms with debt ratios exceeding one are excluded.

3 Empirical method

3.1 Fractional logit model

Our key variable of interest is the Japanese firms' ownership ratio of foreign subsidiaries, which takes values between 0 and 1. The linear regression model is inadequate for estimating the fractional variable bounded between 0 and 1 because the predicted values from an OLS regression can never be guaranteed to lie in the unit interval.

Considering the bounded nature of the ownership ratio, we employ a fractional response model. Fractional response models have been used for outcomes, such as rates, proportions, and fractional data, and have been applied to various economic topics.[21] Our objective is to know the relationship between the ownership ratio of foreign subsidiary i, $y_i \in [0, 1]$, and its parent firm's debt ratio, productivity, and other explanatory variables $\mathbf{x_i}$. We assume that

$$E(y_i|\mathbf{x_i}) = G(\mathbf{x_i}\beta),$$

for all i, where $G(\cdot)$ is a known function satisfying $0 < G(\cdot) < 1$ for all $z \in \mathbb{R}$.

We employ the Papke and Wooldridge (1996) quasi-maximum likelihood estimator (QMLE). As Papke and Wooldridge (1996) discussed, we do not need to know the true distribution of $G(\cdot)$ in the quasi-likelihood estimation to obtain consistent

[21] Papke and Wooldridge (1996) analyzed employee participation rates in 401 (k) pension plans and Papke and Wooldridge (2008) applied the models to test pass rates in Michigan.

estimates if we have a correct specification of the conditional mean. We choose the logistic function for $G(\cdot)$, such that $G(z) = \frac{\exp z}{1+\exp z}$.

Following Papke and Wooldridge (1996), we use logit QMLE to estimate the nonlinear model:

$$\begin{aligned} E(Ownership\_Ratio_{it} \mid \mathbf{x}) = G(&\beta_1 + \beta_2 \log(TFP_{i,t-2}) + \beta_3 Debt\_Ratio_{i,t-2} \\ &+ \beta_4 Top\_Bank\_Ratio_{i,t-2} + \beta_5 Intangibles\_Ratio_{i,t-2} \\ &+ Country\_FE_{i,t} + Industry\_FE_{i,t} \\ &+ Year\_FE_t) \end{aligned} \tag{1}$$

where i indicates foreign subsidiaries and t indicates the year of establishment. As some parent firms have more than one foreign subsidiary, we use standard errors clustered at the parent firm level.

Serving as our dependent variable is *Ownership_Ratio*, the primary parent firm's ownership ratio of its foreign subsidiary. Regarding our independent variables, TFP is the parent firm's TFP obtained from the production function estimation using the Wooldridge (2009) method, which Appendix A describes in detail. As discussed previously, *Debt_Ratio* is the parent firm's debt divided by its total assets. *Top_Bank_Ratio* is the largest shareholder bank's ownership ratio of the parent firm's stock. To calculate *Top_Bank_Ratio*, we identify firms whose largest shareholder is a bank and use such bank's ownership of the parent firm, setting this variable to zero for parents whose largest shareholder is not a bank. Following Alimov and Officer (2017), we define *Intangibles_Ratio* as the total intangible fixed assets of parent firms over total fixed assets. The year fixed effects, $Year\_FE$, capture macroeconomic shocks, whereas the host country fixed effects, $Country\_FE$, capture country-specific factors. The parent firm's industry fixed effects, $Industry\_FE$, are also expected to absorb industry-specific factors. Finally, to address reverse causality, all explanatory variables are calculated two years before the establishment of a foreign subsidiary.

3.2 Logit model

Although the ownership ratio is a continuous variable, whole ownership ($= 1$) and majority ownership (> 0.5) have distinct meanings. Whole ownership enables a parent firm to take all decisions on its own and take all profits, whereas majority ownership enables the parent firm to control its foreign subsidiary while sharing the subsidiary's costs and profits. Considering the distinct features of whole and majority ownership, we use a logit model to estimate parent firms' decisions on whole ownership and majority ownership

Table 1: Descriptive statistics

	Mean	SD	Min	Max	N
Ownership Structure					
Ownership ratio (t)	0.716	0.271	0.100	1.000	3747
Wholly owned or not (t)	0.371	0.483	0.000	1.000	3747
Majority-owned or not (t)	0.690	0.462	0.000	1.000	3747
Parent Firm Characteristics					
log TFP (t-2)	0.977	0.035	0.739	1.086	3640
Debt ratio (t-2)	0.532	0.175	0.001	1.325	3662
Intangibles ratio (t-2)	0.010	0.020	0.000	0.472	3612
N of subsidiaries (t-2)	5.496	11.581	0.000	157.000	3747
Parent Firm and Bank Relationships					
Top bank ratio (t-2)	0.016	0.033	0.000	0.300	3529
Bank as top owner (t-2)	0.214	0.410	0.000	1.000	3747
Bank subsidiaries (t-2)	0.065	0.246	0.000	1.000	3548
N of bank subsidiaries (t-2)	0.133	0.614	0.000	8.000	3747
Host Country Characteristics					
log GDP	27.737	1.455	20.646	30.467	3628
log percapita GDP	8.382	1.245	6.228	11.445	3628
IPR protection	3.250	1.010	0.200	4.875	3675
Financial Dev.	4.373	0.557	-0.184	5.276	3631
log Distance	8.240	0.674	7.053	9.819	3746
FDI restrictiveness	0.400	0.185	0.004	0.821	2687

of their foreign subsidiaries as follows:

$$\begin{aligned}\Pr\left(Ownership\_Type_{it}=1 \mid \mathbf{x}_i\right) &= \frac{\exp\left(\mathbf{x}_i\beta\right)}{1+\exp\left(\mathbf{x}_i\beta\right)} \\ &= F(\beta_1+\beta_2\log(TFP_{i,t-2})+\beta_3 Debt\_Ratio_{i,t-2} \\ &+\beta_4 Top\_Bank\_Ratio_{i,t-2}+\beta_5 Intangibles\_Ratio_{i,t-2} \\ &+Country\_FE_{i,t}+Industry\_FE_{i,t} \\ &+Year\_FE_t)\end{aligned} \tag{2}$$

where $Ownership\_Type$ is a dummy variable for the ownership type. When estimating the whole ownership decision, we use a dummy variable that takes the value of one if the parent firm wholly owns a foreign subsidiary. Similarly, we use a dummy variable that takes the value of one if the parent firm has the majority of a foreign subsidiary when estimating the decision on majority ownership. The explanatory variables are the same as those in the fractional logit model.

4 Results

4.1 Baseline results

Table 2: Baseline fractional logit results

	(1) All	(2) OECD	(3) Non-OECD
log TFP (t-2)	2.242**	2.788	2.174**
	[0.914]	[2.055]	[0.966]
Debt ratio (t-2)	-0.952***	-1.268***	-0.919***
	[0.184]	[0.424]	[0.196]
Top bank ratio (t-2)	-2.103***	-2.518	-2.065**
	[0.808]	[1.931]	[0.900]
Intangibles ratio (t-2)	2.334	8.706*	1.695
	[2.425]	[5.063]	[2.682]
Observations	3480	802	2678
Mean of Dep. Var.	0.715	0.771	0.698
Country FE	YES	YES	YES
Parent Industry 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).
* $p<0.1$, ** $p<0.05$, *** $p<0.01$

Table 2 presents the baseline fractional logit results. Column (1) shows the results using all host countries, while columns (2) and (3) show the results using samples from OECD and non-OECD countries. As expected, the coefficient of TFP is positive, and the

coefficient of the debt ratio is negative; both are statistically significant. By separately estimating the sample for OECD and non-OECD countries in columns (2) and (3), we confirm that the results do not qualitatively change. Table 2 also shows that a bank's ownership ratio as the largest shareholder is negatively related to the foreign subsidiary's ownership ratio. The intangible asset ratios are not statistically significant in non-OECD countries. In a sample restricted to relatively technologically advanced OECD countries, the intangible asset ratio is positive and statistically significant.

Table 3: Wholly-owned and majority-owned decision: logit model

	Wholly-owned			Majority-owned		
	(1) All	(2) OECD	(3) Non-OECD	(4) All	(5) OECD	(6) Non-OECD
log TFP (t-2)	3.744**	2.455	4.387**	1.319	4.067	0.796
	[1.714]	[3.173]	[2.011]	[1.681]	[3.401]	[1.875]
Debt ratio (t-2)	-1.016***	-1.553**	-0.943***	-1.382***	-1.520**	-1.431***
	[0.319]	[0.638]	[0.353]	[0.335]	[0.707]	[0.377]
Top bank ratio (t-2)	-2.473*	-3.562	-2.428	-3.615**	-2.466	-4.088**
	[1.498]	[2.904]	[1.678]	[1.681]	[3.732]	[1.815]
Intangibles ratio (t-2)	-0.134	2.401	-0.683	11.917***	7.410	12.700**
	[3.234]	[5.804]	[3.996]	[4.586]	[10.097]	[5.217]
Observations	3420	764	2650	3438	760	2658
Mean of Dep. Var.	0.372	0.492	0.335	0.689	0.732	0.675
Country FE	YES	YES	YES	YES	YES	YES
Parent Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors are clustered by parent firm.
Dep. var. in (1)–(3): Dummy variable for whole ownership (t).
Dep. var. in (4)–(6): Dummy variable for majority ownership (t).
Columns (1)–(6) are estimated by logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3 shows the estimation results of the logit models. The debt ratios are significantly but negatively associated with selecting whole ownership or majority ownership in both OECD and non-OECD countries, suggesting that financial constraints force firms to choose partially owned or minority-owned foreign subsidiaries rather than wholly owned ones. The coefficients of TFP are positively significant for all ownership types in all countries, including non-OECD countries, in line with the standard heterogeneity model of FDI, but not in OECD countries. They are positively significant for majority ownership decisions in OECD and non-OECD countries but not significant in non-OECD countries. Finally, our other variables remain insignificant.

4.2 Financial development in host countries

We presume that financial constraints become more stringent in host countries with low levels of financial development. To test this hypothesis, we construct a country-level

Table 4: Financial Development and Ownership Structure

	Share		Whole		Majority	
	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low
log TFP (t-2)	3.163**	1.983*	3.360	0.352	4.961**	1.977
	[1.309]	[1.150]	[2.176]	[2.394]	[2.184]	[2.387]
Debt ratio (t-2)	-0.935***	-0.939***	-1.281***	-1.490***	-1.225***	-0.668
	[0.258]	[0.213]	[0.444]	[0.437]	[0.399]	[0.479]
Top bank ratio (t-2)	-1.771	-1.503	-1.937	-3.590	-2.117	-0.617
	[1.084]	[1.196]	[2.012]	[2.885]	[1.854]	[2.307]
Intangibles ratio (t-2)	-0.952	9.098***	8.628	20.832***	-3.769	11.972**
	[2.584]	[3.418]	[5.352]	[7.916]	[3.052]	[5.480]
Observations	1696	1784	1648	1749	1680	1735
Mean of Dep. Var.	0.759	0.674	0.736	0.639	0.456	0.290
Country FE	YES	YES	YES	YES	YES	YES
Parent Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors are clustered by parent firm.
Dep. var. in (1)–(2) : Parent firms' ownership ratio of foreign subsidiaries (t).
Dep. var. in (3)–(4) : Dummy variable for whole ownership (t).
Dep. var. in (5)–(6) : Dummy variable for majority ownership (t).
Columns (1)–(2) are estimated by fractional logit model.
Columns (3)–(6) are estimated by logit model.
The level of financial development of each country is classified as High or Low
based on the median ratio of private sector lending by financial institutions to GDP.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

measure of financial development. Bilir et al. (2019) used the total amount of bank credit extended to the private sector as a share of GDP from Beck et al. (2010) as their measure of host-country financial development. Following Bilir et al. (2019), we use private credit from deposit money banks and other financial institutions for GDP (%) as an indicator of financial development.[22] We compute the median level of financial development and categorize countries below the median of the financial development variable as "Low" and those above as "High."

We examine whether differences in host countries' financial development affect parent firms' decisions on the ownership ratio in columns (1) and (2) and the whole and majority ownership choices in columns (3)–(6) of Table 4. The average ownership ratio, share of the whole ownership, and share of the majority ownership are all lower in host countries with low levels of financial development. However, we find no systematic differences in the estimation results for the debt ratio between host countries with high and low levels of financial development. The estimated coefficients are qualitatively similar between host countries with high and low levels of financial development. The debt ratio is significantly negative in all columns, suggesting that financial constraints affect ownership choices, even in host countries with a high level of financial development.

The unexpected difference is that parent firms' TFP is not significant in host countries with a high level of financial development, whereas it is positively significant for the ownership ratio in host countries with a low level of financial development. TFP is insignificant for all and majority ownership decisions, even in these countries. It may be interesting to examine the interactions between the host countries' financial development and industry-level financial dependency. However, the DBJ data provide incomplete coverage of internal cash flows from operations, which prevents us from constructing a measure of industry-level financial dependency based on Rajan and Zingales (1998).

4.3 FDI experience and first FDI at a host country

Firms may be able to learn how to set up foreign subsidiaries through their past FDI experience, thereby reducing their fixed cost for FDI. Experienced parent firms can easily obtain external financing by providing existing foreign subsidiaries with collateral. In such cases, the experienced parent firms' financial constraints and productivity can become less important determinants of their foreign subsidiaries' ownership structures.

Considering this possibility, we create a subsample covering the first FDI projects in each host country for each parent firm. To capture the global experience of FDI, we also construct a measure of global FDI experience, $N\_of\_subsidiaries$, which is the total

[22] More specifically, we employ "private credit by deposit money banks and other financial institutions to GDP (%)" ("pcrdbgdp") from Beck et al. (2010)'s *Financial Development and Structure Dataset* available at https://www.worldbank.org/en/publication/gfdr/data/financial-structure-database.

number of foreign subsidiaries in all industries worldwide.

$$
\begin{aligned}
E(Ownership\_Ratio_{it} \mid \mathbf{x}) = G(&\beta_1 + \beta_2 \log(TFP_{i,t-2}) + \beta_3 Debt\_Ratio_{i,t-2} \\
&+ \beta_4 Top\_Bank\_Ratio_{i,t-2} + \beta_5 Intangibles\_Ratio_{i,t-2} \\
&+ \beta_6 N\_of\_subsidiaries_{i,t-2} + Year\_FE_t \\
&+ Country\_FE_{i,t} + Industry\_FE_{i,t})
\end{aligned} \tag{3}
$$

Table 5 presents the estimation results using the subsample in columns (1)–(3) and the results using the measure of global FDI experience in columns (4)–(6). The results are essentially similar to the baseline results in Tables 2 and 3 in that parent firms' debt ratio is significantly and negatively associated with ownership ratio, whole ownership, and majority ownership. The parent firms' TFP is positive but insignificant in all columns except column (4).

A notable feature of Table 5 is that the number of foreign subsidiaries in other countries is negative and significant for all the ownership choices, suggesting that global FDI experience leads parent firms to lower their ownership ratio in a new host country and avoid owning a foreign subsidiary.

Table 5: First FDI at a host country and FDI experience

	First FDI			Global experience		
	(1) Share	(2) Whole	(3) Majority	(4) Share	(5) Whole	(6) Majority
log TFP (t-2)	0.876	1.189	-0.187	1.466	2.250	0.398
	[1.001]	[1.801]	[1.969]	[0.925]	[1.673]	[1.763]
Debt ratio (t-2)	-0.993***	-1.167***	-1.384***	-0.946***	-0.993***	-1.379***
	[0.190]	[0.343]	[0.364]	[0.182]	[0.316]	[0.331]
Top bank ratio (t-2)	-1.782*	-2.565	-4.240**	-1.584*	-1.836	-2.982*
	[1.065]	[1.814]	[2.139]	[0.819]	[1.520]	[1.694]
Intangibles ratio (t-2)	4.290	4.997	16.139***	2.512	0.043	12.251***
	[3.601]	[4.883]	[6.108]	[2.464]	[3.304]	[4.636]
N of subsidiaries (t-2)				-0.009***	-0.013**	-0.011*
				[0.003]	[0.005]	[0.006]
Observations	2069	2015	2031	3480	3420	3438
Mean of Dep. Var.	0.721	0.387	0.685	0.715	0.372	0.689
Country FE	YES	YES	YES	YES	YES	YES
Parent Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

Robust standard errors are clustered by parent firm.
Dep. var. in (1) and (4) : Parent firms' ownership ratio of foreign subsidiaries (t).
Dep. var. in (2) and (5) : Dummy variable for whole ownership (t).
Dep. var. in (3) and (6) : Dummy variable for majority ownership (t).
Columns (1) and (4) is estimated by fractional logit model.
Columns (2)–(3) and (5)–(6) are estimated by logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.4 Variance of ownership ratios

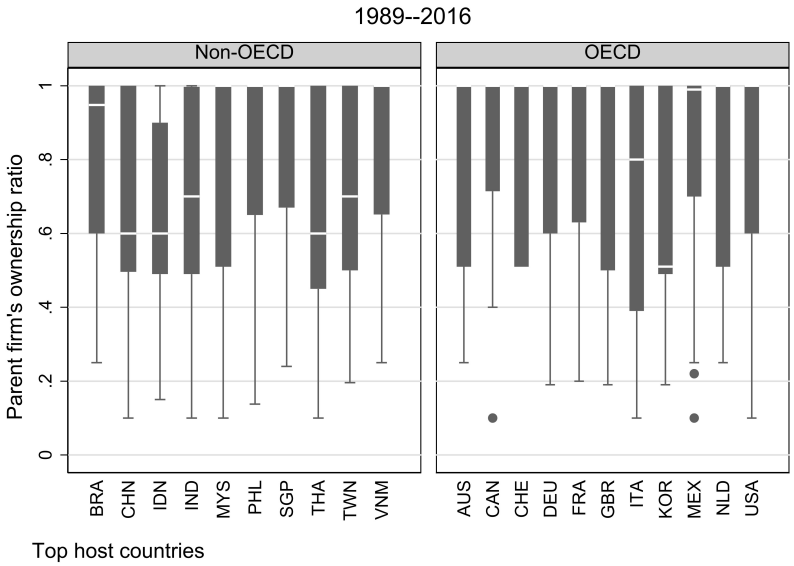


Figure 5: Parent firms' ownership ratio by the host country: 1989–2016.
Notes: The white line inside the box indicates the median values. The upper and lower hinges of the box indicate the 75th and 25th percentile, respectively. The upper and lower adjacent lines outside the box indicate the maximum 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 5. Moreover, Figure 5 shows that the median ownership ratio equals one in several countries, including both OECD and non-OECD countries. In addition, it reveals that the 25^{th} 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 6 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 6: Host countries with the median ownership ratio less than one

	(1) Share	(2) Wholly-owned	(3) Majority-owned
log TFP (t-2)	2.618***	5.375***	1.779
	[0.940]	[1.964]	[1.796]
Debt ratio (t-2)	-0.919***	-0.913***	-1.392***
	[0.182]	[0.341]	[0.350]
Top bank ratio (t-2)	-1.889**	-2.175	-3.014*
	[0.824]	[1.599]	[1.730]
Intangibles ratio (t-2)	3.714*	2.340	13.164***
	[2.226]	[2.973]	[4.632]
Observations	2942	2895	2921
Mean of Dep. Var.	0.697	0.335	0.672
Country FE	YES	YES	YES
Parent Industry FE	YES	YES	YES
Year FE	YES	YES	YES

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 fractional logit model.
Columns (2)–(3) are estimated by logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.5 Top host countries

Next, we analyze the ownership structures of foreign subsidiaries in the selected countries. We do so because Japanese foreign subsidiaries are unevenly distributed worldwide and are concentrated in several countries. The top three host countries in our sample period are China, Thailand, and the United States. Estimating the equations separately for each host country makes country-fixed effects unnecessary at the cost of fewer observations. Table 7 presents the estimation results. As expected, the debt ratio is significantly negative in all three countries. Parent firms' TFP is positively significant for foreign subsidiaries in China but not for those in Thailand or the US. Firms investing in Thailand often do so in conjunction with the expansion of their business partners. Meanwhile, firms investing in the U.S. tend to establish wholly owned subsidiaries. These country-specific factors may have contributed to the insignificance of TFP.

4.6 Period

Figure 3 shows that the share of partial ownership fluctuated during the sample period. The proportion of partial ownership increased during the first period, 1989–1993. In the next period, 1994–2003, the proportion of partial ownership is decreasing. From 2004 to 2016, the proportion of partial ownership is steady at nearly 50%. Therefore, we perform a regression analysis for each of the three time periods. The results in columns (1)–(3)

Table 7: Parent ownership ratio in top host countries

	(1) CHN	(2) THA	(3) USA
log TFP (t-2)	4.004***	-2.837	5.647
	[1.224]	[2.307]	[3.997]
Debt ratio (t-2)	-0.836***	-0.746*	-1.922***
	[0.256]	[0.395]	[0.738]
Top bank ratio (t-2)	-2.603**	-2.949	5.054
	[1.077]	[2.455]	[4.478]
Intangibles ratio (t-2)	0.523	10.256	-0.674
	[2.764]	[8.060]	[14.571]
Observations	1412	365	290
Mean of Dep. Var.	0.680	0.665	0.800
Parent Industry 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).
Columns (1)–(3) is estimated by fractional logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

of Table 8 reveal that, in the first period (1989–1993), when partial ownership increases, the intangible asset ratio matters rather than the debt ratio and productivity of the parent firm. Table 8 exhibits that in the next period (1994–2003) and the last period (2004–2016), the debt ratio and productivity of the parent firm, and not the intangible assets ratio of the parent firm, are important. A comparison of these period-specific estimates suggests that the liberalization of FDI in host countries reinforced the role of the parent firm's financial constraints and productivity in determining the ownership structure of its foreign subsidiaries.

After Krugman (2000) investigated the reason for the surge in FDI into a host country during a crisis, several studies have found that the nature of FDI is different during financial crises than during normal times (Raff et al. 2018, Alquist et al. 2019, and Desbordes and Wei 2017b). Our sample period covers both crisis and normal times. In Columns (4) and (5) of Table 8, we compare normal times with crisis times. For crisis times, we include the 1997–1998 Asian financial crisis and the 2008–2010 global financial crisis. As for normal times, we include 1989–1996, 2000–2007, and 2012–2016. We exclude 2011, the year of the Great East Japan Earthquake and the resulting Fukushima nuclear plant accident from both periods since the earthquake and the nuclear accident were unique in that they caused exogenous shocks to the Japanese economy but did not result in a financial crisis. The estimation results show that the parent firm's debt ratio is still significant, but productivity is not significant in times of crisis, whereas both are significant in normal times. The main bank ownership ratio is significant in normal times but not in crisis times. In times of crisis, the intangible assets ratio is significant.

Comparing crisis and normal times, we conclude that parent firms' debt ratios matter in both crisis and normal times, whereas their productivity and main banks do not matter in crisis times.

Table 8: Estimation by period

	Period			Normal versus Crisis	
	(1) 1989–1993	(2) 1994–2003	(3) 2004–2016	(4) Crisis	(5) Normal
log TFP (t-2)	-0.094	3.712***	3.444**	2.310	2.042**
	[1.694]	[1.194]	[1.449]	[2.054]	[0.980]
Debt ratio (t-2)	-0.343	-1.226***	-0.889***	-0.622*	-0.970***
	[0.383]	[0.251]	[0.296]	[0.374]	[0.201]
Top bank ratio (t-2)	0.593	-2.661*	-2.439**	-3.438	-2.139**
	[2.347]	[1.485]	[0.995]	[2.168]	[0.866]
Intangibles ratio (t-2)	16.988**	-0.618	2.021	9.189*	1.187
	[6.944]	[6.220]	[2.645]	[5.024]	[2.517]
Observations	646	1526	1308	470	2816
Mean of Dep. Var.	0.627	0.674	0.807	0.715	0.710
Country FE	YES	YES	YES	YES	YES
Parent Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Robust standard errors are clustered by parent firm.
Dep. var. : Parent firms' ownership ratio of foreign subsidiaries (t).
Columns (1)–(5) are estimated by fractional logit model.
The crisis times include the 1997-1998 and 2008–2010 financial crises.
The normal times include the years 1989–1996, 2000–2007, and 2012–2016.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.7 Joint venture partners

We now examine how Japanese parent firms choose their partners for a joint venture. There are at least three cases in our data:

1. Whole ownership. A Japanese parent firm has no partner because it chooses to establish a wholly owned subsidiary. It consists of 37.1% of all FDI projects.

2. JPN-only. All partners of a Japanese parent firm are Japanese firms. It consists of 8.2% of all FDI projects.

3. Non-JPN. Some of the partners of a Japanese parent firm are local/third-country firms. It consists of 54.8% of all FDI projects.

We use a multinomial logit model to simultaneously estimate parent firms' decisions on whole ownership and join venture (JV) partners. We explore the type of partner a more productive and less financially constrained company would choose. We set whole

ownership as the base category for the estimation.[23] We do not include host country and industry fixed effects because they prevent convergence. Table 9 presents the estimation results. Compared with whole ownership, JV with local and non-Japanese partners tend to be associated with a lower TFP of Japanese parent firms in Columns (1) and (2). We do not find a similar tendency when comparing JV with Japanese partners with whole ownership. This indicates that less productive firms tend to choose JV with foreign partners.

Moreover, we also find that JV tends to be associated with higher debt ratios for Japanese parent firms. In other words, firms with tighter financial constraints tend to choose JV over whole ownership. This suggests that firms with strict financial constraints are forced to choose JV.

However, the bank's role remains unclear. The percentage owned by the largest shareholder bank can be associated with a higher percentage of Japanese ownership of FDI projects if the banks are risk-averse and tend to avoid communication problems with foreign partners. This would mean a lower percentage of foreign (local or 3rd country) ownership. Alternatively, because local firms have better knowledge of the host market, the percentage owned by the largest shareholder bank may be associated with JVs involving local firms. Table 9 rejects both hypotheses and refutes the statistically significant relationship between the main bank and the choice of a partner.

Table 9: Multinominal Logit (Base category= Whole ownership)

	Joint venture partners	
	JPN-only	Non-JPN
log TFP (t-2)	-1.145	-3.807**
	[2.822]	[1.613]
Debt ratio (t-2)	0.813*	1.365***
	[0.440]	[0.299]
Top bank ratio (t-2)	-3.112	2.310
	[2.595]	[1.407]
Intangibles ratio (t-2)	-12.098**	-4.067
	[6.058]	[2.833]
Observations	3479	
Mean of Dep. Var.	2.181	
Country FE	NO	
Parent Industry FE	NO	
Year FE	YES	

Robust standard errors are clustered by parent firm.
Dep. var. : Nationality of joint venture partners (t).
All results are estimated by multinomial logistic regression.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[23] Nested logit models can also be considered here because a two-level decision tree might exist if Japanese firms (1) choose whole ownership or JV, and then if JV, (2) pick their partner/ownership level. However, we fail to use the nested logit model because it requires explanatory variables for the second stage (partner decision) that are different from those for the first stage (JV or whole ownership decision).

4.8 The role of the banks

Several Japanese companies have a substantial percentage of their shares held by banks. Banks are the largest shareholders in some firms. Therefore, banks play an important role in Japan's outward FDI. As the largest shareholders, main banks can increase profits by supporting Japanese firms' FDI projects. There is the possibility that firms with higher bank ownership are less susceptible to more severe financial constraints. If so, then these firms optimize their FDI with the help of their main banks, even if they are financially constrained.

Nevertheless, there is a principal-agent problem. Information asymmetries between firms and banks are greater for foreign than domestic investments. How banks influence firms' ownership decisions of foreign subsidiaries cannot be determined without empirical analysis. We create an indicator variable, *Bank_as_top_owner*, which takes the value of 1 if the largest shareholder of the parent firm is a bank.[24] Table 10 shows that parent firms whose largest owners are banks tend to have a lower ownership ratio of their foreign subsidiaries and tend to choose minority rather than majority ownership of foreign subsidiaries. The results suggest that banks, as shareholders, prefer risk-averse FDI with a lower ownership ratio of foreign subsidiaries.[25]

Table 10: Bank as the largest shareholder

	(1) Share	(2) Whole	(3) Majority
log TFP (t-2)	2.440***	4.003**	1.852
	[0.896]	[1.654]	[1.640]
Debt ratio (t-2)	-0.971***	-1.057***	-1.391***
	[0.183]	[0.314]	[0.330]
Bank as top owner (t-2)	-0.131**	-0.170	-0.251*
	[0.064]	[0.118]	[0.130]
Intangibles ratio (t-2)	2.417	0.592	10.961**
	[2.424]	[3.235]	[4.424]
Observations	3592	3532	3549
Mean of Dep. Var.	0.715	0.371	0.689
Country FE	YES	YES	YES
Parent Industry FE	YES	YES	YES
Year FE	YES	YES	YES

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).
Columns (1) is estimated by fractional logit model.
Columns (2)–(3) are estimated by logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

[24] For simplicity, we ignore the ownership ratio of banks that are not the largest shareholder.

[25] See Betschinger (2015) for Japanese banks' behavior.

If the information asymmetry problem is eased, banks may become less risk-averse and more willing to support foreign investments.[26] To test this, we identify Japanese banks' overseas networks worldwide. Using Toyo Keizai's OJC data, we identify the number of foreign subsidiaries owned by Japanese banks in the host country h in year $t-2$. As explained previously, we can also identify the largest shareholder bank for each parent firm. We now create a dummy variable that takes the value of 1 if the bank owner of a Japanese parent firm has a foreign subsidiary in host country h of the FDI project at $t-2$, $Bank\_subsidiaries_{i,t-2,h}$. These variables were included in the regression as follows:

$$\begin{aligned} & E(Ownership\_Ratio_{i,t,h} \mid \mathbf{x}) \\ & = G(\beta_1 + \beta_2 \log(TFP_{i,t-2}) + \beta_3 Debt\_Ratio_{i,t-2} \\ & + \beta_4 Intangibles\_Ratio_{i,t-2} \\ & + \beta_5 Bank\_as\_top\_owner_{i,t-2} + \beta_6 Bank\_subsidiaries_{i,t-2,h} \\ & + Country\_FE_{i,t,h} + Industry\_FE_{i,t} \\ & + Year\_FE_t) \end{aligned} \tag{4}$$

Furthermore, we create the number of foreign subsidiaries of the bank in the host country of the FDI project at $t-2$, $N\_Bank\_subsidiaries_{i,t-2,h}$, and include this in the regression as well.

Table 11 presents the estimation results. Accordingly, Japanese parent firms whose largest shareholder is a bank tend to prefer lower ownership and higher non-Japanese ownership of foreign subsidiaries. However, in the host countries where their main banks have foreign subsidiaries, they tend to increase their ownership and lower their non-Japanese ownership of their foreign subsidiaries. The number of overseas subsidiaries of their main bank is also associated with higher ownership of Japanese parent firms and lower ownership of non-Japanese partners.

[26] von der Ruhr and Ryan (2005) reveal the importance of banking FDI in Japanese manufacturing firms' FDI.

Table 11: Overseas subsidiaries of the largest shareholder bank

	Top JPN ownership		Non-JPN ownership	
	(1)	(2)	(3)	(4)
log TFP (t-2)	2.936***	2.390***	-2.997***	-2.467***
	[0.892]	[0.889]	[0.935]	[0.932]
Debt ratio (t-2)	-0.940***	-0.989***	0.812***	0.858***
	[0.182]	[0.181]	[0.199]	[0.196]
Intangibles ratio (t-2)	2.620	2.477	-2.446	-2.268
	[2.465]	[2.439]	[2.668]	[2.623]
Bank as top owner (t-2)	-0.225***	-0.219***	0.267***	0.257***
	[0.078]	[0.070]	[0.085]	[0.078]
Bank subsidiaries (t-2)	0.262**		-0.320***	
	[0.106]		[0.120]	
N of bank subsidiaries (t-2)		0.120***		-0.148***
		[0.041]		[0.046]
Observations	3399	3592	3398	3591
Mean of Dep. Var.	0.716	0.715	0.233	0.234
Country FE	YES	YES	YES	YES
Parent Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust standard errors are clustered by parent firm.
Dep. var. in (1)–(2) : Japanese firms' ownership ratio of foreign subsidiaries (t).
Dep. var. in (3)–(4) : Non-Japanese firms' ownership ratio of foreign subsidiaries (t).
Columns (1)–(4) are estimated by fractional logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5 Concluding remarks and remaining issues

This study's results reveal that a parent firm's debt ratio and productivity are related to the ownership structure of its foreign subsidiaries. The empirical analysis shows that firms with stricter financial constraints tend to choose lower ownership ratios for their foreign subsidiaries. This implies that firms tend to seek JV partners when borrowing from banks are limited. Furthermore, we find suggestive evidence that the main banks—the bank that is the largest shareholder of the parent firm—play a role in determining the ownership structure of their customer's foreign subsidiaries. The percentage of ownership of a bank as the largest shareholder of an MNE parent is negatively correlated with the percentage of ownership of its foreign subsidiary. However, an MNE's ownership of FDI projects tends to be higher in host countries where the bank, as its largest shareholder, has an overseas subsidiary. This suggests that if information asymmetries between investing firms and banks are reduced, the financial constraints on firms investing in foreign subsidiaries may be eased.

This study analyzes the FDI of listed firms but does not consider the possibility that they cover FDI fixed costs through equity finance. How firms use equity finance to cover fixed costs of FDI is a topic for future research. Unlike listed firms, non-listed firms that have insufficient access to equity finance and are more reliant on debt finance may have more severe financial constraints on their FDI. This may result in making JVs a better option for non-listed firms. The impact of financial constraints on FDI by non-listed firms is another topic for future research.

Our analysis did not control for the size of overseas subsidiaries and focused on Japanese parent firms' ownership ratios of their subsidiaries. This is because the capital stocks of overseas subsidiaries are recorded in various currencies even in the same host country—for example, the Japanese yen, the US dollar, and local currencies—in the OJC data. Some capital stocks are recorded in old currencies (e.g., Italian lira), which were used before but are not currently used. Converting capital stock into, for example, the current Japanese yen is extremely difficult. This prevented us from controlling for the size of FDI projects when estimating the ownership structures of Japanese firms' overseas subsidiaries.

Policy implications

Recent events provide excellent examples of policy prescriptions in our results. For example, the ongoing COVID-19 pandemic has taught us that global supply chains are fairly fragile. Consequently, many firms are looking to vertically integrate their supply chains to minimize the bottleneck issues that arise with the use of contract suppliers. However, this requires MNE parents to branch out and create or acquire subsidiaries in new sectors outside of their traditional competencies. Broadening the scope of subsidiary

activities leads to greater risk-taking by the firm than continual investment in the main business lines. Given the risk-averse nature of main banks, these investments are likely to face significant funding scrutiny from main banks, creating sizeable roadblocks to these supply chain reorganizations. Recognizing the importance of these supply chains to national welfare, the Japanese government could assist by creating an agency to help fund riskier investments. This would alleviate potential roadblocks for shareholding banks by reducing their risk. It would also allow many of these new subsidiaries to be wholly owned and not joint ventures, eliminating many of the contractual and supply issues that helped create these supply chain bottlenecks. This also safeguards innovation and minimizes negative technology and other IPR-related informational spillovers to local firms, which often arise through joint ventures with local companies.

Similarly, it is well known that the Japanese government has set aside significant funding to support efforts by Japanese firms to strengthen their supply chain resilience. The Japanese government's "Program for Promoting Investment in Japan to Strengthen Supply Chains" is designed to support firms' relocation to Japan.[27] In addition, the Japan External Trade Organization (JETRO) supports efforts by Japanese firms to diversify production bases in Southeast Asian countries.[28] Consequently, some of the funds were designated to promote location diversification, with firms moving to Laos, Malaysia, and Vietnam.[29] For those moving to new investment hosts, this would require many MNEs to explore more distant and unfamiliar investment locations. Unfamiliarity with the host and the difficulties in operating increasingly geographically diverse subsidiaries only add to the risk of this investment. The Japanese government funding agency should increase funding to assist firms in choosing to relocate their foreign affiliates, not just because of the cost of relocation but also because of the increased riskiness of subsidiary success in their new location.

In addition, our results suggest it would be desirable for the government to assist Japanese shareholding banks' outward FDI and follow the subsidiary relocation. In doing so, they can assist their clients by providing investors with increased host country information. This lowers the riskiness of the new investment, subsequently making these investments cheaper and more desirable for shareholding banks. It also signals future

[27] See the METI's official page on the "Program for Promoting Investment in Japan to Strengthen Supply Chains" in English and Japanese.
https://www.meti.go.jp/english/press/2020/0717_002.html
https://www.meti.go.jp/covid-19/supplychain/index.html

[28] See the JETRO's official page on "Program to Strengthen Overseas Supply Chains" in English and Japanese.
https://www.jetro.go.jp/ext_images/services/supplychain/info-2/2nd_en.pdf
https://www.jetro.go.jp/services/supplychain/

[29] For example, see Nikkei's article, "Japan reveals 87 projects eligible for 'China exit' subsidies" (last accessed 22 December 2022).
https://asia.nikkei.com/Economy/Japan-reveals-87-projects-eligible-for-China-exit-subsidies

bank clients that they can serve their subsidiaries in these host countries as well. Overall, these policy prescriptions suggest changes to the current outward FDI funding policy. However, these changes signal to firms and banks that the Japanese government is willing to take on some of the investment risks and help ensure the future success of the subsidiary relocation process.

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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 Ackerberg 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 A1: 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 A2: 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 A3: 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 A4: 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 Host country characteristics

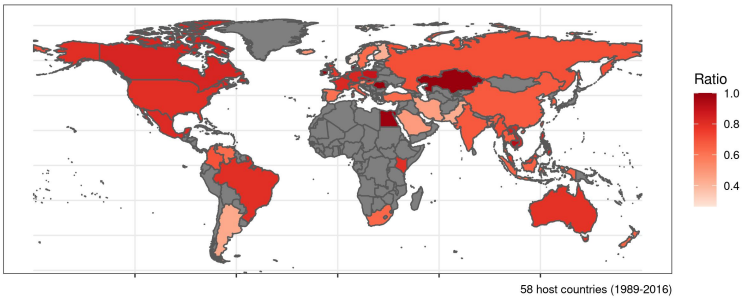

Figure A1: Japanese firms' average ownership ratio of new oversea subsidiaries in manufacturing, 1989–2016.
Source: Authors' compilation based on Toyo Keizai Inc.'s OJC data.

In the main text, we focus on the role parent firm characteristics play in ownership choices. Here, we focus on how host country characteristics affect ownership choices. As Bilir et al. (2019) and others find, a host country's financial development increases inward foreign investment.[30] We control for the host country's characteristics by including fixed effects. However, as shown in Figure A1, there is a large variation in the ownership ratios of foreign subsidiaries in host countries. This Appendix presents the results using various host country characteristics. First, we include the host country's financial development, *Financial Dev.* as explanatory variables in regression analysis. Second, we employ the level of intellectual property protection from Walter G. Park's index, *IPR protection*, because some firms may avoid JVs to avoid infringement on their intellectual property (Alimov and Officer 2017). Third, we use the OECD's FDI restrictiveness index of host countries, *FDI restrictiveness*, because some countries have imposed strict

[30] Bilir et al. (2019) employ the data on the US Multinational Enterprises (MNEs) to assess the impact of the host country's financial development on the US MNEs' strategy. They illustrated that financial development in a host country increases the entry of US MNEs and their sales to the US and third countries. These effects are more pronounced in financially vulnerable sectors. Desbordes and Wei (2017a) use a database on manufacturing FDI projects worldwide and empirically investigates the effects of financial development in source and destination countries on FDI. By exploiting variations in both country-specific financial development and sectoral financial vulnerability, they establish causality and show that both the source and destination countries' financial development have a significant positive impact on greenfield, expansion, and M&A FDI. Desbordes and Wei (2017b) examine the effects that source and destination countries' financial development have on FDI in normal and crisis times. Using a difference-in-differences method, they find that the financial development of source and destination countries has a strong positive impact on the relative volume of FDI in financially vulnerable sectors during normal times. They likewise find that the relative volume of FDI in financially vulnerable sectors fell more in financially developed source and destination countries during the 2008–2010 global financial crisis. Finally, Alquist et al. (2019) model cross-border M&A and test the model prediction using domestic and international M&A data in an emerging market before the global financial crisis from Thompson's International Mergers and Acquisitions Database. They confirm that the share of full foreign acquisitions is higher in sectors dependent on external financing, countries with less-developed finances, and countries with higher-quality institutions.

ownership restrictions on foreign subsidiaries. Fourth, we include host countries' GDP and per capita GDP from the World Bank's *World Development Indicators* to control for the market potential and availability of "good" JV partners. Finally, we include the distance between the host countries and Japan from the CEPII's gravity database because this distance magnifies the principal-agent problem between parent firms and their subsidiaries.

Table A5 presents the estimation results. As expected, the host countries' financial development is positively associated with Japanese firms' higher ownership ratios of their foreign subsidiaries, indicating that financial constraints on FDI projects have become less strict in financially developed countries. Moreover, the level of IPR protection correlates with Japanese firms' higher foreign subsidiary ownership ratios. Although this result is difficult to interpret, the presence of many rival firms in countries with high levels of intellectual property protection may encourage Japanese firms to have high ownership ratios.

The host country's market size, or GDP, is negatively associated with Japanese firms' ownership ratios of their foreign subsidiaries. These results reflect the availability of JV partners in large countries. The host countries' per capita GDP is positively associated with the Japanese firms' ownership ratio of their foreign subsidiaries, as shown in column (3). This may reflect that richer countries tend to have less strict ownership restrictions. Positively significant coefficients of distance imply the need for more robust control over foreign subsidiaries in distant countries. Most notably, the signs of the firm-level variables do not change, even if we include various host country characteristics.

We further include interaction terms of parent firms' characteristics with host country characteristics in the regression in Table A6. Three interaction terms were incorporated. The first is the interaction between the debt ratio and the host country's financial development, $Debt\_Ratio * Financial\ Dev.$. The second is the interaction term between parent firms' intangible assets to total assets and the level of host countries' IP protection, $Intangible\_Ratio * IPR\ protection$. Using the host country-level IP protection rates and parent-firm-level intangible asset data, we test the possibility that IPR-intensive firms may have a higher share of subsidiary ownership in countries with lower IP protection. The third is the interaction between TFP and FDI restriction index $TFP * FDI\ restrictiveness$. Table A6 indicates that there is no interaction between the host country and parent firm characteristics because all interaction terms are insignificant.

Table A5: Host countries' characteristics and ownership ratio

	(1) Share	(2) Share	(3) Share
log TFP (t-2)	2.522***	2.285**	2.387**
	[0.938]	[1.054]	[0.945]
Debt ratio (t-2)	-0.938***	-0.954***	-0.949***
	[0.186]	[0.210]	[0.187]
Top bank ratio (t-2)	-1.986**	-2.224**	-2.313***
	[0.820]	[0.888]	[0.853]
Intangibles ratio (t-2)	2.589	1.896	2.619
	[2.482]	[2.604]	[2.566]
log GDP	-0.138***	-0.169***	-3.812***
	[0.023]	[0.035]	[1.025]
log percapita GDP	-0.060	-0.013	3.140***
	[0.049]	[0.067]	[0.917]
IPR protection	0.325***	0.380***	0.198*
	[0.059]	[0.076]	[0.109]
Financial Dev.	0.120**	0.110*	0.376***
	[0.051]	[0.056]	[0.110]
log Distance	0.328***	0.445***	
	[0.056]	[0.077]	
FDI restrictiveness		0.512	
		[0.360]	
Observations	3294	2442	3294
Mean of Dep. Var.	0.713	0.742	0.713
Country FE	NO	NO	YES
Parent Industry FE	YES	YES	YES
Year FE	YES	YES	YES

Robust standard errors are clustered by parent firm.
Dep. var. in (1)–(3) : Parent firms' ownership ratio of foreign subsidiaries (t).
Column (1)–(3) is estimated by fractional logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A6: Interaction between firm and host country characteristicss

	(1)	(2)	(3)	(4)
log TFP (t-2)	2.251**	0.904	2.350**	1.393
	[0.930]	[2.777]	[0.937]	[2.879]
Debt ratio (t-2)	-1.579	-0.960***	-0.942***	-1.131
	[1.043]	[0.210]	[0.185]	[1.156]
Financial Dev.	0.179			0.294
	[0.166]			[0.180]
Debt ratio (t-2) × Financial Dev.	0.138			0.040
	[0.242]			[0.268]
Top bank ratio (t-2)	-2.235***	-2.579***	-2.046**	-2.494***
	[0.816]	[0.884]	[0.830]	[0.908]
Intangibles ratio (t-2)	2.105	1.629	14.049	12.647
	[2.404]	[2.516]	[10.190]	[11.472]
FDI restrictiveness		-3.122		-1.953
		[5.701]		[5.782]
log TFP (t-2) × FDI restrictiveness		3.003		1.875
		[5.838]		[5.921]
IPR protection			-0.008	-0.021
			[0.080]	[0.113]
Intangibles ratio (t-2) × IPR protection			-3.091	-2.889
			[2.506]	[2.762]
Observations	3377	2512	3411	2442
Mean of Dep. Var.	0.715	0.745	0.713	0.742
Country FE	YES	YES	YES	YES
Parent Industry FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust standard errors are clustered by parent firm.
Dep. var. : Parent firms' ownership ratio of foreign subsidiaries (t).
Columns (1)–(4) are estimated by fractional logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

D The role of the bank as a lender

The matched bank-firm loan data. The DBJ data contain no information on the main reference bank as a lender after 2001. This is because the disclosure of supplementary documents, including the "Schedule of Long-Term Debt" and "Schedule of Short-Term Debt" in non-consolidated financial statements, has been omitted since 2001 due to changes in the accounting system. The DBJ data contain information on parent firms' bank loans prior to 2000. However, loan data are incomplete because they do not cover all listed firms.

Thus, loan data is generally unavailable from the official financial statements in Japan. Instead, Nikkei builds its data on listed firms' loans from individual firms' documents and original research. The coverage of Nikkei's data on loans are still incomplete. However, Amiti and Weinstein (2018) used these data. We likewise use the loan data in the Appendix.

Using the loan data from *the Nikkei NEEDS FinancialQUEST*, we identify the capital ratio of the largest lender for each parent firm. We define capital ratio as a bank's own capital-to-total assets ratio. We create an indicator variable for the healthiness of a bank, $Healthy\_Bank$, which takes the value of one if the capital ratio exceeds four percent.[31] Table A7 presents the estimation results using the indicator variable and its interaction with parent firms' debt ratios. We cannot directly compare Table A7 with the other tables because the number of observations is halved because of missing information on the main banks. However, we find qualitatively similar results in Table A7, that is, positive coefficients of productivity and negative coefficients of the debt ratio. However, the results indicate that the main reference banks' healthiness does not affect the ownership structure of foreign subsidiaries.

Bank type and foreign share. We obtain capital adequacy ratio (CAR) and bad debt ratio (BDR) from *the Nikkei NEEDS FinancialQUEST*. Based on Financial Reconstruction Law, BDR is defined as risky assets over total assets. We calculate the top three main lenders' average CAR and BDR for each parent firm. Table A8 indicates that the main bank's BDRs are not significantly related to the non-Japanese ownership ratio of Japanese firms' foreign subsidiaries. We merge Toyo Keizai's OJC data with the main lender's type from *the Nikkei NEEDS FinancialQUEST*. We identify "city banks" and "regional banks" and create a city and regional bank dummies. We expect city banks to have a richer experience in financing FDI than regional banks. However, Table A8 shows that the bank-type dummies are insignificant. In addition, we identify "mega banks" which means the three biggest banks in Japan after 2006: MUFJ bank, Mitsui Sumitomo bank, and Mizuho bank. Due to the overwhelming financial power of

[31] We choose the four percent as a threshold, following the spirit of the Basel Accord.

Table A7: Main bank's healthiness

	(1) Share	(2) Whole	(3) Majority
log TFP (t-2)	3.686**	5.251*	4.153
	[1.523]	[3.082]	[2.571]
Healthy Bank (t-2)	-0.020	0.343	-0.606
	[0.403]	[0.607]	[0.702]
Debt ratio (t-2)	-1.257***	-0.795	-2.225***
	[0.341]	[0.706]	[0.652]
Debt ratio * Healthy Bank (t-2)	-0.101	-0.781	0.889
	[0.682]	[1.055]	[1.167]
Intangibles ratio (t-2)	6.437	5.316	7.516
	[3.944]	[4.924]	[6.246]
Observations	1437	1410	1410
Mean of Dep. Var.	0.703	0.346	0.676
Country FE	YES	YES	YES
Parent Industry FE	YES	YES	YES
Year FE	YES	YES	YES

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 fractional logit model.
Columns (2)–(3) are estimated by logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

megabanks, we assume that foreign investment by firms whose main bank is a mega bank would be a prominent feature. Table A8 again shows that megabanks do not play a significant role.

Table A8: Banks and non-Japanese partners' ownership share

	Dep. var.: Non-Japanese partners' ownership ratio				
	(1)	(2)	(3)	(4)	(5)
log TFP (t-2)	-3.285*	-3.417*	-3.067**	-2.715**	-4.771**
	[1.827]	[1.848]	[1.334]	[1.345]	[2.346]
Debt ratio (t-2)	1.050**	0.917*	0.937***	0.918***	1.318**
	[0.474]	[0.496]	[0.326]	[0.323]	[0.647]
Top bank ratio (t-2)	2.262*	2.747**	2.353**	2.219**	3.539**
	[1.179]	[1.174]	[1.080]	[1.082]	[1.626]
Intangibles ratio (t-2)	-3.192	-1.993	-4.349	-4.509	-1.212
	[4.428]	[4.627]	[3.507]	[3.448]	[4.877]
Banks' bad debt ratio (t-2)	-4.636				
	[4.252]				
Banks' cap. adeq. ratio (t-2)		-2.245			
		[1.855]			
City bank (t-2)			-0.025		
			[0.088]		
Regional bank (t-2)				-0.238	
				[0.188]	
Mega bank (t-2)					-0.056
					[0.172]
Observations	936	896	1918	1918	531
Mean of Dep. Var.	0.177	0.171	0.248	0.248	0.174
Country FE	YES	YES	YES	YES	YES
Parent Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES

Robust standard errors are clustered by parent firm.
Dep. var. in (1)–(5) : Non-Japanese partners' ownership ratio of foreign subsidiaries (t).
Columns (1)–(5) are estimated by fractional logit model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

E 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 A9 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 A9: 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 A10, 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 A10 displays.

The results in Table A10 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 A10: Fractional logit results by subsidiary industry

	Wholesale Retail	Service	Total
log TFP (t-2)	6.719***	-2.829	1.909**
	[1.935]	[2.106]	[0.871]
Debt ratio (t-2)	0.146	-0.847*	-0.731***
	[0.411]	[0.506]	[0.169]
Top bank ratio (t-2)	3.610	1.798	-0.700
	[2.319]	[2.268]	[0.784]
Intangibles ratio (t-2)	2.635	-6.403***	1.441
	[4.722]	[2.291]	[2.059]
Observations	1310	722	5853
Mean of Dep. Var.	0.882	0.858	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).
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

F Ratio of dividends paid to Japan

Japan's current account surplus depends on dividends from its foreign subsidiaries. The percentage of ownership of foreign subsidiaries would affect the dividends received by the parent firm. Therefore, the ownership ratio of foreign subsidiaries is important for Japan's current account balances. Thus, exploring the ownership structure of foreign subsidiaries could help policymakers.

This section provides a descriptive analysis to explore the link between the percentage of ownership of foreign subsidiaries and the dividends received by the parent firms. We use data on the share of dividends received by Japan and the ownership ratios of the parent firms from *Basic Survey on Overseas Business Activities* conducted by the Ministry of Economy, Trade and Industry (METI).[32] We focus our analysis on pairs where both the parent firm and foreign subsidiary belong to the manufacturing sector.

We calculate the ratio of total dividends that Japanese firms receive.[33] Figure A2 shows that the higher the percentage of stock of foreign subsidiaries Japanese firms own, the higher the percentage of dividends Japanese firms receive.

We further regress the percentage of dividends received by Japanese firms on their percentage of ownership of the foreign subsidiary. We include the parent firm's R&D intensity, log skill intensity, log capital intensity, and labor productivity, as well as industry fixed effects, and host-country fixed effects in our regression analysis. The R&D intensity of the parent firm is defined as R&D expenditure divided by sales. We use METI's *Basic Survey of Japanese Business Structure and Activities* for parent firm variables, such as R&D expenditures, labor, and sales.[34] Hasegawa and Kiyota (2017) point out that Japan's 2009 policy change of moving to a territorial tax system had significant impacts on profit repatriation.[35] Therefore, we conduct a regression analysis before and after the policy change. We employ a fractional logit model for cross-sectional data from 2008 to 2013 and a fixed effects model for panel data from 2008 to 2013. Table A11 confirms the positive relationship between the percentage of foreign subsidiaries owned and

[32] This survey consists of the "Basic Survey" conducted every three years and the "Trend Survey" conducted in other years. The survey covers Japanese parent firms that own or have previously owned overseas affiliates in industries other than finance/insurance and real estate, as well as their foreign affiliates. The survey includes (i) foreign affiliates in which Japanese firms own 10% or more of the capital and (ii) foreign affiliates in which Japanese subsidiaries own 50% or more of the capital. A more detailed description is available at https://www.meti.go.jp/english/statistics/tyo/kaigaizi/index.html.

[33] In our data, dividend includes payment from foreign subsidiaries to Japanese parent firms, such as royalties.

[34] This survey is a mandatory enterprise survey conducted by the Ministry of Economy, Trade and Industry (METI). The targets of this survey are firms with more than 50 employees and more than 30 million yen in capital. The survey is not designed for consolidated firms but for individual firms. Firms are required to provide the previous year's financial and other information. A more detailed description is available at https://www.meti.go.jp/english/statistics/tyo/kikatu/index.html

[35] From April 2009, under the new system, 95% of dividends from a foreign subsidiary shall not be included in the taxable gross income of a Japanese parent firm.

the percentage of dividends received by Japanese firms. Contrary to expectations, R&D intensity and other parent-level variables, except capital intensity, do not play any significant role in the percentage of dividends Japanese firms receive. Overall, we conclude that parent firms' ownership ratio of their foreign subsidiaries is vital to understanding the flow of dividends to parent firms.

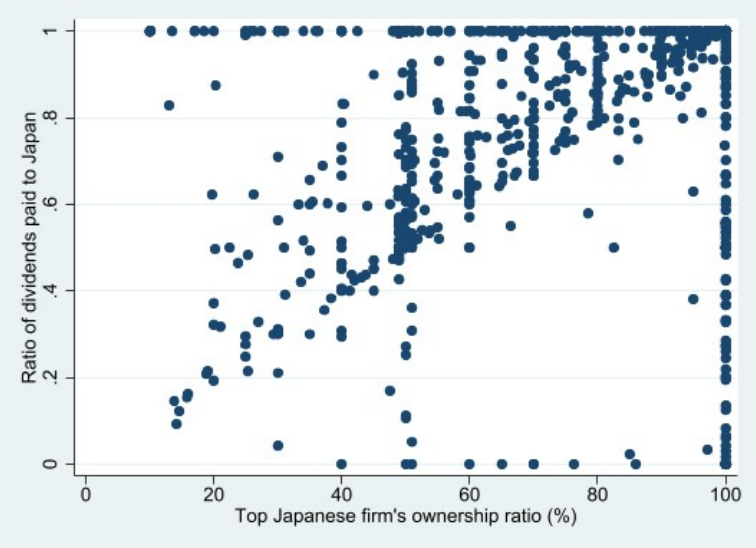

Figure A2: Ownership share of foreign subsidiaries and the ratio of dividends paid to Japan, 2013.
Source: Authors' compilation based on METI's Basic Survey on Overseas Business Activities.

Table A11: Ratio of dividends paid to Japan

	(1) 2008	(2) 2013	(3) 2008–2013
Top JP ownership ratio	0.022***	0.037***	0.001**
	[0.003]	[0.003]	[0.001]
Parent RD intensity	2.425	-3.044	0.284
	[2.507]	[3.601]	[0.186]
log parent labor productivity	-0.095	0.051	-0.000
	[0.125]	[0.164]	[0.008]
log parent Skilled L/L	-0.309	0.576	0.013
	[0.336]	[0.424]	[0.028]
log parent K/L	-0.262**	-0.161	0.024**
	[0.132]	[0.103]	[0.011]
Observations	2248	1362	9884
Mean of Dep. Var.	0.885	0.847	0.879
Country FE	YES	YES	YES
Parent Industry FE	YES	YES	YES
Year FE	NO	NO	YES

Data: METI's Basic Survey on Overseas Business Activities and Basic Survey of Japanese Business Structure and Activities.
Robust standard errors are clustered by parent firm.
Dep. var.: Ratio of dividends paid to Japan (t).
Columns (1)–(2) are estimated by fractional logit model.
Column (3) are estimated by fixed effect model.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$