



The value of multinationality and business group for Japanese firms



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ABSTRACT

We provide evidence for the combined value impacts of corporate multinationality and business group affiliation, incorporating the effect of endogeneity of diversification decisions. The results for Japanese industrial firms indicate that multinational firms have a statistically significant 2.3% value premium during FY1995–2011 relative to comparable domestic firms; however, the multinationality premium is moderated by the nature of business group as well as the characteristics of the host country. Specifically, the multinationality premium is negatively associated with both keiretsu membership and main bank ownership of group firms. Main bank ownership as well as vertical keiretsu affiliation positively impact the value of multinationality for firms operating in developing countries. These results hold even during the later part of the sample period, when the keiretsu and main bank systems have been under pressure. The implication is that corporate multinationality is a substitute for business group and for inadequate indigenous institutional infrastructure.

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1. Introduction

A puzzling phenomenon in international business is that while firms (along with markets and economies) undoubtedly have become more internationalized in the past decades, the value of multinational operations as such is not clearly recognized at the firm level in international finance and strategy literature. In parallel with the domestic industrial diversification literature,¹ Denis et al. (2002) report a valuation discount for U.S. firms that are internationally diversified versus domestic firms. However, Fauver et al. (2004) find no value impact of international diversification for German and U.K. firms. While the multinational premium of U.S. firms has been reported in recent work after controlling for endogenous choice of diversification decisions (Dastidar, 2009; Gande et al., 2009), it remains an open question as to whether that is also true in other large economies such as Japan. A study of

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¹ The great debate regarding the value of corporate industrial diversification has stalled with a draw. Berger and Ofek (1995), Lang and Stulz (1994) and others find value discounts for industrially diversified U.S. firms compared with single-segment firms. Lins and Servaes (1999) report industrial diversification discounts for Japan and the U.K. but no discount for Germany, while Fauver et al. (2003), based on an international sample of firms, show that the value of industrial diversification depends on legal and regulatory environments. As Campa and Kedia (2002) and others note, however, take diversified and focused firm samples as given without incorporating the effect of endogeneity of the firm's decision to be diversified. Villalonga (2004a,b), on the other hand, using a propensity score approach that endogenizes a firm's diversification decisions, reveals an industrial diversification premium for U.S. firms.

international operations of Japanese firms, in particular, raises an additional issue of how the value of multinational operations is affected by group affiliation — a prominent feature of Japanese industrial organization.

Since the Japanese keiretsu firms are actively involved in international business, they are well-suited to examine the interaction between multinationality and business group, and what that means for firm valuation. The keiretsu firms come with diverse characteristics, including both horizontal and vertical integration types, as well as main bank involvement which may have a positive information effect within the group (Morck and Nakamura, 1999). Still, the keiretsu firms are devoid of family ownership controls that accompany most business groups in other countries. The Japanese firms thus provide a “pure” business group sample unencumbered by family ownership and control issues, and enable us to focus on the impact of main banks as well as vertical and horizontal integration as moderating variables that influence the relationship between corporate international diversification and valuation. Finally, we note that, even though Japan is among the world's largest economies, to our knowledge no comprehensive study has been published regarding the valuation effect of international diversification for Japanese keiretsu firms (Horiba and Yoshida, 2003).

Theoretically, international operations can create both positive and negative value effects. The resource based view (Wernerfelt, 1984; Barney, 1991) suggests that a firm is a collection of firm-specific, heterogeneous resources and competitive advantages. Applied internationally where firm heterogeneity and resource immobility, as well as institutional constraints, are greater, a multinational firm with greater corporate resources throughout its international network would be valued more highly than a comparable domestic firm (Tseng et al., 2007). Variants of transaction cost theory (Williamson, 1996) also suggest the value of internalization, as well as the value of flexibility and risk management capability through multinational networks (Morck and Yeung, 1991; Tong and Reuer, 2007; Choi and Jiang, 2009). Agency theory (Jensen, 1986), however, indicates a valuation discount for an internationally diversified firm due to the costs of agency and control stemming from a complicated organizational structure and stakeholders as well as informational and/or cultural asymmetry (e.g., Denis et al., 2002).

Regarding the effects of a business group, it is also possible, theoretically, that the group affiliation by itself can produce a positive or a negative value impact. Group membership can help the firm by facilitating sharing of information and resources in foreign markets, by reducing transaction costs due to internalization, or by creating internal capital markets (e.g., Stein, 1997); these benefits are likely to be greater in emerging markets where groups in effect substitute for underdeveloped local institutional infrastructure (Khanna and Palepu, 2000). However, group firms can also create inefficiencies by tunneling resources toward unproductive projects (Joh, 2003; Baek et al., 2006) or by inducing overinvestment (Walker, 2005; Ferris et al., 2003).²

In this paper, we examine the valuation effect of multinationality for Japanese firms. We adapt a propensity score (PS) method commonly used in medical and experimental studies, and also used by Villalonga (2004a) in her study of domestic industrial diversification. This approach is superior to the conventional size-and-industry based imputed value method (e.g., Berger and Ofek, 1995; Lang and Stulz, 1994) of matching “comparable” international and domestic firms, or to the use of group dummies or unadjusted subsamples in multiple regressions — this is because the PS method incorporates the effect of endogeneity of diversification. We use a logit model to determine a firm's propensity to be multinational and construct comparable multinational and domestic firm samples based on propensity scores. We then derive the value of multinationality as the difference in value between the two samples, sort out the effect of business group membership, and finally relate the value difference to group industrial organization characteristics and other variables.

We find that Japanese multinational firms are valued at a statistically significant 2.3% mean premium relative to domestic firms during our 17 year sample period of FY1995 to 2011. This contrasts with mixed evidence for U.S. firms in existing work. However, the valuation premium associated with multinationality is reduced in the case of keiretsu affiliation, suggesting that multinational firms and business groups may be substitutes. Notably, the multinationality premium decreases, turning to a slight discount in means (although not so in medians) in the later part of our sample period, a time during which the keiretsu and main bank systems have been under attack and reportedly “withering.” It is also interesting that keiretsu affiliation (especially with the vertical type) positively affects the value of multinationality in developing countries. Khanna and Palepu (2000) argue that business groups can create value by augmenting inadequate local infrastructure and institutional arrangements. An interesting new finding here is that multinational firms can perform similar functions in emerging markets by bringing their unique corporate resources to the host country — indicating a substitutive relation of multinational corporations with local institutional structure, as well as with group affiliation.

Our findings have significance in the following ways. First, Chakrabarti et al. (2007) report the moderating influence of horizontal and vertical business groups in the value impact of *domestic* industrial diversification in six Asian countries, including Japan, in a framework that does not control for endogenous choice of diversification decisions. Our results provide new evidence for a significant *multinationality* premium for Japanese firms, and, by utilizing the propensity score matching method that accounts for endogeneity of diversification. Second, we provide new evidence that multinational firms and business groups may be institutional substitutes with each other — as well as each being a substitute with local institutional infrastructure. Third, we show that the *multinationality* premium is a function of some key characteristics of business groups, such as main bank and vertical versus horizontal integration. Finally, in contrast to existing work that examines the impact of business groups and the impact of diversification separately, we examine the combined effects of both on the firm — which provides an implication that the effect of international diversification on a firm depends on the industrial organization structure in the home country as well as on the level of institutional infrastructure in the host countries.

² While Walker (2005) and Joh (2003) find evidence of inefficient internal capital markets in the Japanese and Korean business groups, respectively, Khanna and Palepu (2000) find evidence of efficient internal capital markets within Indian business groups.

The rest of the paper is organized as follows. Section 2 develops the research questions. Section 3 describes estimating framework and data. Section 4 presents the results of empirical work, which proceeds in three steps: (a) the logistic regression and matching method to determine the value of multinationality; (b) estimating the value of multinationality as a function of keiretsu and other variables; and (c) conducting Heckman's two-step regression for selection bias and tests of longitudinal effects. Section 5 discusses sub-period results given fundamental changes in keiretsu structure in the latter part of the sample period. Section 6 concludes.

2. Development of research questions

In the traditions of transaction cost theory and resource-based view, there are at least two major sources of potential benefits that may be derived from multinationality. The first pertains to the ability to exploit firm-specific assets: Specialized knowledge, technology and other intangible assets may have value but are difficult to sell in the open market due to the imperfect external markets stemming from price uncertainty and the public-good nature of these assets. Global diversification allows the firm to bypass such market imperfections by internalizing the transactions for these specialized assets within the firm (Buckley and Casson, 1976). The second pertains to enhanced operational flexibility afforded by a multinational network: Multinational firms allow cost savings through economies of scale and scope in global marketing and manufacturing, as well as facilitate access to low cost inputs, global financing and new product markets. In effect, international diversification enables the firm to arbitrage institutional restrictions (i.e., tax codes, financial limits, anti-trust rules, etc.) between home and host countries (Kogut, 1985).

From the standpoint of agency cost and governance, there are at least two potential costs associated with global operations: (a) an increase in the costs of coordination, control and monitoring due to increased complexity and information asymmetry between corporate headquarters and overseas division managers (Myerson, 1982); and (b) increased agency costs due to increased CEO power and prestige, as well as disparity between personal and corporate risks, associated with managing a large multinational firm. To the extent that CEOs' private benefits dominate their private costs, they may thus engage in value-reducing global diversification (Jensen, 1986).

Empirical studies on the value consequences of geographic diversification have focused mainly on U.S. MNCs and the evidence has been mixed. Allen and Pantzalis (1996) argue that MNCs should have a positive value premium due to operational flexibility inherent in their multinational networks, with the maximum value creation when transnational networks have high breadth (subsidiaries in many countries) and low depth (few subsidiaries in any one country). Pantzalis (2001) finds that MNCs present in developing markets have significantly higher excess Tobin's q than MNCs operating only in advanced markets. Doukas and Travlos (1988) also find positive abnormal returns when U.S. acquirers expand into new geographic areas and when target firms are in developing countries. Consistent with multinational network theory, they demonstrate that simultaneously engaging in geographic and industrial diversification produces the greatest wealth benefits to bidders' shareholders. However, Gande et al. (2009) find a premium for global diversification for U.S. firms during 1994–2002 after controlling for endogenous choice of diversification decisions, but no such evidence for industrial diversification.

There is also substantial evidence indicating a geographic diversification discount for U.S. firms. Denis et al. (2002) find that excess values are significantly lower for globally diversified firms (18% discount) versus single-segment firms. Click and Harrison (2000) report significant negative relations between the foreign asset ratio and Tobin's q, suggesting a "foreign asset channel" of value destruction, and managerial "empire building" as a likely motive for multinationality. Fauver et al. (2004) find that U.S. MNCs trade at a discount relative to domestic-only U.S. firms, but international diversification has no effect on the value of firms from Germany and the U.K. These results suggest lower costs of international diversification for firms from integrated European markets relative to U.S. firms, or possibly greater agency costs for U.S. firms engaged in global operations due to cross-country differences in legal, regulatory and corporate governance environments. For instance, if a firm under a shareholder model crosses into a country where a stakeholder model is the norm, the agency cost is likely to increase.

In line with the preceding discussion regarding the ex ante ambiguity in the effect of being multinational relative to domestic-only, we posit the following baseline research question concerning whether the value of multinationality is a premium or a discount³:

Q1. Is the value of multinationality for Japanese firms a premium or a discount?

Regarding the impact of business group, it is unclear a priori what influence keiretsu membership should have on the value of multinationality. On the positive side, group affiliation provides access to an internal capital market (Stein, 1997; Khanna and Palepu, 2000), offers potential mitigation of agency costs (Ferris et al., 1995), reduces information asymmetry (Dewenter and Warther, 1998), and provides risk sharing and mutual insurance benefits (Morck and Nakamura, 1999).⁴ An alternative, negative view of the impact of group affiliation sees divergent power and unequal asset distribution among group members as producing an

³ Alternatively, a null for Q1 is that the value of multinationality is zero because the positive and negative effects of international diversification may offset with each other or because the effect is not there in the first place. In principle, a null of a zero impact should apply to the effect of keiretsu membership (Q2) and of main bank (Q3) as well.

⁴ Concerning a more detailed consideration of the potential positive influence of group membership on the value of multinationality, Li and Li (1996) argue that "keiretsu organizations are not fundamentally different from conglomerates." According to Stein (1997), hierarchical conglomerate control from headquarters to division units reduces the total cost of agency problems and information asymmetries. The headquarters does this by successful "winner-picking," as funds are actively shifted from lower to higher positive NPV projects, including foreign direct investments, thereby creating value even when the firm is subject to overall financial constraints.

inefficient internal capital market (Scharfstein and Stein, 2000; Rajan et al., 2000). In addition, groups can increase bonding costs arising from interlocking ownership and induce an opportunistic behavior against minority shareholders.

Empirically, Khanna and Palepu (2000) report evidence of efficient internal capital markets within Indian business groups, where the efficiency of capital allocation improves with the level of diversity. In an environment where formal capital markets are underdeveloped, industrial business groups can create effective internal capital markets that substitute for external capital markets. Dewenter and Warther (1998) and Ferris et al. (1995) show that the practice of reciprocal equity ownership, and reliance on a common financier, such as a main bank, can work toward producing more effective ways of exchanging information between members, which mitigates agency conflicts within firms. Also, main banks may arguably act in the long-term interests of a wide range of group stakeholders by “propping up” distressed group firms (Morck and Nakamura, 1999; Dow and McGuire, 2009). Additionally, there are risk sharing and mutual insurance benefits that firms derive from keiretsu membership, which are especially beneficial in a multinational context.

On the negative impact of group membership, Scharfstein and Stein (2000) regard conglomerate control from headquarters to division units as increasing the total cost of agency problems and information asymmetries, as rent-seeking behavior by division managers subverts the proper functioning of internal capital markets. Rajan et al. (2000) find that when divisions are similar in their resources and investment opportunities, funds will be diverted from divisions with poor opportunities to those with good opportunities. But, given high diversity among divisions in resources and investment opportunities, resources can also flow to less efficient divisions resulting in more inefficient investment overall (Ferris et al., 2003). Baek et al. (2006) and Joh (2003) document evidence of tunneling of resources to more inefficient firms within Korean chaebols.⁵ Since multinationality increases diversity and complexity in resources and investment prospects, it may foster rent-seeking behavior of divisional managers or group member firms, thereby leading to more inefficient internal capital markets for MNCs.

Regarding the empirical evidence specific to Japan, Walker (2005) provides evidence of inefficient internal capital markets within keiretsu. He documents that the investment patterns of keiretsu firms are more insensitive to growth prospects than those of independent firms, resulting in relative reduction in firm values, especially for horizontal keiretsu firms. Ang and Constand (2002) show the presence of significant bonding costs for keiretsu firms due to their interlocking shareholdings. Dewenter et al. (2001) investigate returns on IPOs of keiretsu member firms and independent firms, and conclude that information problems due to complexity provide scope for “tunneling” or opportunistic behavior by member firms against minority shareholders. Greenwood et al. (2012) document that subsidiaries with greater scope for expropriation by parent firms are more overpriced by listing and minority shareholders suffer as mispricing corrects. Finally, in a study of industrial diversification in Japan, Lins and Servaes (1999) and Chakrabarti et al. (2007) find a significant diversification discount, but it applies only to conglomerates that are also keiretsu members.⁶

Based on the foregoing discussion of the potentially positive and negative effects of keiretsu membership on the value of multinationality, we posit the following research question:

Q2. Does keiretsu membership have a positive or a negative impact on the value of multinationality?

An important feature of keiretsu is the role of main bank, which monitors group firms through ownership as well as creditorship. As with keiretsu membership, the impact of main bank ownership on the value of multinationality, a priori, is ambiguous. On one hand, it is plausible that main bank would have a positive effect on firm value because of its role as a provider of “patient capital” (Abegglen and Stalk, 1985). Main bank ownership promotes intensive monitoring, enabling banks to be well-informed about their client firms’ operations. The resulting reduction in information asymmetry alleviates short-term performance pressures and allows client firms to adopt long-term investment horizons (Yafeh, 2000; Aoki et al., 1994). Main bank ownership can also reduce potential agency conflicts between MNCs’ debt-holders and equity-holders, permitting reduction in the firm’s cost of capital (Prowse, 1990).

Furthermore, main bank ownership also provides a mechanism for effective corrective intervention when client firms perform poorly. Kang and Shivdasani (1997) find that for firms experiencing poor performance, the frequency of asset downsizing, layoffs, top management turnover, and removal of outside board members increases with main bank ownership. Finally, client firms with foreign operations have easier access to capital and to foreign market knowledge by virtue of their main bank ownership. The main banks’ overseas branches act as a bridge for client MNCs to host countries’ governments and institutions, which can be especially helpful in developing countries.

On the other side of the argument, the effect of main bank ownership on the value of multinationality may be negative for several reasons. First, for client firms perceived as having a high propensity to pursue risky policies, the banks may raise their equity stakes to be able to influence corporate policy. In the typical case where main banks’ debt-holder positions dominate their shareholder positions, wealth appropriation would aid debt-holders at the expense of equity-holders (Weinstein and Yafeh, 1998). Similarly Morck et al. (2000) find a significant negative relation between main bank ownership and Tobin’s q for firms with low levels of main bank ownership. Moreover, Kang and Liu (2007) find that as they move into the securities business, Japanese banks significantly under-price in corporate bond underwritings. Second, main bank ownership may also promote relaxed financial constraints and

⁵ Gedajlovic and Shapiro (2002) find that tunneling from more to less profitable activities also increases with concentrated ownership for Japanese firms during 1986–1991. Almeida and Wolfenzon (2006) show that internal capital allocation bias – characteristic of business group companies – can create, in a developing economy setting, capital shortages for the economy as a whole and for independent firms particularly. This phenomenon occurs regardless of whether group companies have efficient internal capital markets. By extension, Japanese keiretsu members in developing countries, to the extent that they are funded via local sources, can exacerbate such a capital shortage, making it more difficult for indigenous firms as well as for independent, locally-funded Japanese MNCs to obtain the needed capital.

⁶ However, these studies do not analyze international diversification or main banks.

inefficient investment spending for client firms. Easy access to capital afforded by moderate main bank ownership permits client firms to accept more marginal projects or to engage in more cross-subsidization of weaker foreign operations by stronger ones. Finally, given the complexity of MNCs and the added difficulty of monitoring distant foreign operations, it is plausible that the negative impact of main bank ownership on firm value would be exacerbated in an international setting.

In accord with the above discussion of the potentially positive and negative influences of main bank ownership on the value of multinationality, we ask the following research question:

Q3. Does main bank ownership have a positive or a negative impact on the value of multinationality?

3. Estimating framework and data description

The empirical analysis proceeds in three parts. The first part involves estimation of the value of multinationality, $MNCq - DCqMean$, which is the difference in the mean of Tobin's q of multinational versus domestic firms, using the propensity score method (PS) and a matching algorithm following Villalonga (2004a). A propensity score, based on the predicted probability of being multinational, is derived for each multinational company and domestic company observation in the sample from a logistic regression model that incorporates 11 firm-specific factors and one industry factor that are expected to influence the probability of a firm being multinational. The propensity scores derived from the logistic regression Eq. (1) are used to match multinational firms (MNCs) with "similar" domestic corporations (DCs) via the algorithm devised by Dehejia and Wahba (2001).

$$\text{Prob}(MNC_i = 1 | \text{Firm-specific factors}_i) = f(\text{Firm-specific factors}_i). \quad (1)$$

The second part of the analysis investigates how the value of multinationality is influenced by key MNC organizational factors such as keiretsu membership and main bank ownership. Representing the research questions posed earlier, a regression model of Eq. (2) is estimated using panel data of firms during the period, and controls including firm characteristics, industry dummies and year dummies.

$$MNCq - DCqMean = f(\text{Keiretsu membership, Main bank ownership, Controls}). \quad (2)$$

The last part of the empirical analysis consists of a series of robustness tests, specifically Heckman's two-stage method to account for endogeneity of the decision to be MNC, and tests for longitudinal effects from diversifying internationally (i.e., transitioning from DC to MNC), refocusing (i.e., from MNC to DC) and increasing host countries (i.e., increasing breadth). In a separate section, we also conduct analysis of sub-samples comprising FY1995–2002 and FY2003–2011, to examine whether the results on the impacts of keiretsu membership and main bank ownership on the value of multinationality hold during the later period when Japanese banks and corporations were experiencing a wave of M&A activity and the keiretsu system came under pressure.

To the extent that the international diversification decision is endogenous, diversifying firms are likely to be systematically different from focused firms. As such, any analysis comparing the values of diversified and focused firms that fails to control for these differences suffers from a selection bias problem. Prior research into the value of geographic diversification that utilizes imputed values based on size and industry-matched firms (Denis et al., 2002; Fauver et al., 2004) inadequately controls for a multitude of firm-specific differences and is subject to selection bias. In this paper, we control for selection bias by matching MNCs with DCs based on propensity score and also on each of the 11 firm-specific characteristics in logistic regression Eq. (1), including firm size, growth opportunities, R&D intensity, return on assets, current ratio, debt ratio, beta, number of business segments, main bank lending ratio, insider ownership and foreign ownership. An industry MNC ratio is also included in the logit model specification.⁷

The proxy for Tobin's q used here is the sum of the market value of common stock and the book value of preferred stock, short-term liabilities net of short-term assets and long-term debt divided by the book value of total assets. The key explanatory variables are keiretsu membership and main bank ownership. Control variables are factors common to multinational firms that have been shown in the literature to impact firm value.⁸ These include foreign sales ratio (Denis et al., 2002), international Herfindahl index (Denis et al., 2002), cultural distance (Shenkar, 2001), institutional distance (Xu and Shenkar, 2002), and wholly-owned foreign subsidiary ratio (Kogut and Zander, 1993). In addition, Asian financial crisis and global financial crisis dummies are also included to account for the impacts of the 1997–1999 Asian financial crisis and the more recent (2008–2010) global financial melt-down. See Table 1 for definitions of the variables used in the empirical analysis.

The sample period for our investigation covers the 17 years from FY1995 to 2011 (ending March 31, 2012). This period is interesting because the earlier years include both boom and stagnation for the Japanese economy, followed by the wave of mergers and acquisitions of main banks across keiretsu groups after 2002, which witnesses the effects of the mega-bank mergers on dismantling of the main bank system and the consequent weakening of the traditional ownership-based keiretsu system.

The main source for firm financial data is *Nikkei Financial QUEST*, whereas foreign subsidiary and domestic corporate ownership relations data are from Tokyo Keizai, which includes data from *DataBank Series 2012* in two disks for domestic group formation and

⁷ Many of these variables have been included in existing work on multinational firms. See, for instance, Doukas and Pantzalis (2003), Denis et al. (2002), Lins and Servaes (1999), and Pantzalis (2001).

⁸ Other factors common to both multinational and domestic firms that have been shown to impact firm value, such as firm size, R&D intensity, capital structure, and ownership structure, etc., are already accounted for as part of the derivation of the dependent variable, $MNCq - DCqMean$ in the logit model (1).

Table 1
Descriptive statistics.

Variable	Multinational companies (MNCs)				Domestic companies (DCs)					
	Mean	Med	SDev	Skew	Kurt	Mean	Med	SDev	Skew	Kurt
Keiretsu membership	0.48	0.00	0.51	0.21	−1.64	0.39	0.00	0.49	0.46	−1.71
Horizontal keiretsu mem.	0.25	0.00	0.44	1.20	−0.43	0.06	0.00	0.23	3.87	12.99
Vertical keiretsu mem.	0.27	0.27	0.44	1.04	−0.92	0.26	0.00	0.44	1.12	−0.75
Multiple keiretsu mem.	0.09	0.00	0.28	2.95	6.70	0.03	0.00	0.16	5.89	32.69
Keiretsu group inclin.	1.40	1.00	1.28	0.65	−0.66	1.01	1.00	1.08	0.88	−0.15
Main bank ownership	0.04	0.03	0.04	1.82	3.48	0.03	0.03	0.02	−0.23	−1.36
Foreign sales ratio	0.33	0.31	0.16	0.68	−0.14	0.07	0.08	0.02	−0.98	0.18
International Herfindahl	0.71	0.80	0.24	−1.82	2.89	−	−	−	−	−
Cultural distance	3.49	3.44	0.50	0.81	2.04	−	−	−	−	−
Institutional distance	1.89	1.83	0.71	0.54	0.53	−	−	−	−	−
Wholly-owned foreign sub.	0.70	0.75	0.26	−0.85	0.12	−	−	−	−	−
Asian financial crisis	0.12	0.00	0.32	2.39	3.69	−	−	−	−	−
Global financial crisis	0.15	0.00	0.36	1.96	1.85	−	−	−	−	−
Sub-sample dummy	0.64	1.00	0.48	−0.61	−1.63	−	−	−	−	−
Developing country ratio	0.39	0.39	0.22	0.37	0.59	−	−	−	−	−
Firm size	8.66	8.13	2.81	0.38	−0.86	8.22	9.17	2.65	−0.12	−1.33
R&D intensity	0.03	0.03	0.05	2.83	14.17	0.02	0.01	0.03	3.78	21.64
Return on assets	0.05	0.04	0.05	−0.07	6.79	0.03	0.03	0.05	0.20	7.58
Growth opportunities	0.03	0.02	0.11	1.08	13.97	0.01	0.00	0.09	4.40	85.06
Current ratio	1.96	1.55	1.39	3.51	19.54	1.80	1.45	1.28	4.24	33.29
Debt ratio	0.15	0.14	0.10	0.54	−0.16	0.13	0.11	0.10	0.95	0.97
Beta	0.87	0.89	0.41	−0.73	11.09	0.54	0.50	0.43	0.58	0.80
Firm age	4.07	4.09	0.34	−2.38	14.87	3.98	4.03	0.40	−2.41	12.40
No. of business segments	2.67	3.00	1.41	0.83	0.77	2.37	2.00	1.18	0.83	1.59
Main bank lending ratio	0.29	0.30	0.24	0.64	0.42	0.33	0.33	0.24	0.50	0.22
Insider ownership	0.46	0.43	0.14	0.37	−0.25	0.52	0.51	0.15	0.17	−0.34
Foreign ownership	0.12	0.09	0.11	1.29	1.87	0.04	0.01	0.07	3.09	13.87
Industry MNC ratio	0.43	0.43	0.16	−0.34	−0.70	0.29	0.27	0.18	0.32	−0.82

Definition of variables

Keiretsu membership	A dummy variable to indicate whether a firm belongs to keiretsu groups in Japan.
Horizontal keiretsu membership	A dummy variable to indicate whether a firm belongs to one of the eight (six) horizontal keiretsu groups in Japan for the FY1995–2002 (FY2003–2011) period.
Vertical keiretsu membership	A dummy variable to indicate whether a firm belongs to one of the thirty-five vertical keiretsu groups in Japan during FY1995–2002. For FY2003–2011, most of the vertical keiretsu core firms have restructured and integrated their manufacturing subsidiaries. A value of one is given to the core firms and their publicly traded subsidiaries in FY2003–2011.
Multiple keiretsu membership	The number of different keiretsu groups to which a firm belongs, where independent firms have a value of 0 and keiretsu members have a value of either 1 or 2 depending on whether they belong to one or two keiretsu groups, respectively.
Keiretsu group inclination	A 5-point scale variable indicating strength of a company's ties to its keiretsu group for FY1995–2002 (4 = nucleus company, 3 = strong ties, 2 = moderate ties, 1 = weak ties, and 0 = independent company), as obtained from Industrial Groupings in Japan, Brown & Co., 1996 and 2001 eds. For the period of FY2003–2011, no such data is available from a single source. We developed a similar 5-point scale variable, where 4 = horizontal keiretsu member with at least one public manufacturing subsidiary; 3 = vertical keiretsu core (i.e., parent) firm with horizontal relationship through its main bank; 2 = non-core (i.e., subsidiary) member of a vertical keiretsu with horizontal relationship through its main bank; 1 = neither horizontal nor vertical keiretsu member, but with a mega-bank as a formal main bank; and 0 = independent company.
Main bank ownership	The percentage of equity ownership held by a firm's main bank.
Foreign sales ratio	The ratio of a firm's sales from its foreign operations to total sales.
International Herfindahl	A Herfindahl-type index measuring dispersion of a firm's foreign subsidiaries over the foreign host countries in its multinational network. A higher (lower) index number indicates more dispersion (concentration) of foreign operations.
Cultural distance	Cultural distance between Japan and each host country is derived via the method of Kogut and Singh (1988) using cultural index measures adapted from Hofstede (1983). The country-level measure is converted into a firm-level variable using a weighting scheme wherein the weights are the ratios of the MNC's number of subsidiaries in each host country in its multinational network to the total number of its foreign subsidiaries in a given sample year.
Institutional distance	Institutional distance between Japan and each host country is derived using country institutional dimension, the first principal component of the World Bank's 6 Aggregate Governance Indices for each country. Institutional distance is the absolute value of the difference in institutional dimension between Japan and each host country in a given sample year. The country-level measure is converted into a firm-level variable using a weighting scheme wherein the weights are the ratios of the MNC's number of subsidiaries in each host country in its multinational network to the total number of its foreign subsidiaries in a given sample year.
Wholly-owned foreign subsidiary ratio	The ratio of the number of wholly-owned foreign subsidiaries to total foreign subsidiaries, where total foreign subsidiaries is number of wholly-owned foreign subsidiaries plus number of foreign majority joint ventures. A wholly-owned foreign subsidiary has parent firm ownership of more than 95%, while a foreign majority joint venture has parent firm ownership of more than 50% up to 95% (inclusive).
Asian financial crisis	A dummy variable to indicate the Asian financial crisis period of fiscal year 1997–1999.
Global financial crisis	A dummy variable to indicate the global financial crisis period of fiscal year 2008–2010.
Developing country ratio	The ratio of the number of developing countries to the total number of foreign countries in which a firm has subsidiary operations. Subsidiary operations include wholly-owned subsidiary or majority joint venture manufacturing operations.
Firm size	The natural log of the firm's total sales in Japanese yen (millions).

Table 1 (continued)

Definition of variables	
R&D intensity	The ratio of the research and development expenditures to total sales.
Return on assets	The ratio of earnings before interest and taxes (EBIT) to total assets.
Growth opportunities	The three-year compounded annual growth rate in sales.
Current ratio	The ratio of current assets to current liabilities.
Debt ratio	The ratio of long-term debt to total assets.
Beta	The beta coefficient of the market model, estimated from daily returns of individual stocks and the broad market TOPIX index for the year.
Firm age	The natural log of the number of years since the firm's establishment.
Number of segments	The number of business segments reported for the firm in <i>The Japan Company Handbook</i> and <i>Nikkei Financial QUEST</i> .
Main bank lending ratio	The ratio of main bank lending to the firm's total bank borrowings.
Insider ownership	The percentage of equity ownership held by a firm's insiders (i.e., management and related parties) for FY1995–2002. This figure is more strictly measured as the percentage ownership held by company's directors and largest stable shareholders for FY2003–2011.
Foreign ownership	The percentage of equity ownership held by foreign investors.
Sub-sample dummy	A dummy variable to indicate fiscal years from 2003 to 2011 to capture the effect of the shift in the Japanese keiretsu system.
Industry MNC ratio	The ratio of the number of multinational corporations to the sum of domestic and multinational companies for a given industry.

The sample period is FY1995 to 2011. The full sample consists of 16,007 manufacturing firms remaining after screening for availability of logit variables so that they can be assigned scores for propensity to be MNC. All variables are measured at the end of the fiscal year. The mean (Mean), median (Med), standard deviation (SDev), skewness (Skew), and kurtosis (Kurt) of each variable are reported. Firm financial data are from *Nikkei Financial QUEST* unless otherwise specified. Foreign subsidiary and domestic corporate ownership relations data are from Tokyo Keizai, including data from *DataBank Series 2012* in two different data disks, for domestic group formation and foreign direct investment data of all listed Japanese firms. Tokyo Keizai data are compiled by Financial Data Solutions Co. Ltd. in Yokohama, Japan, for our use.

foreign direct investment data of all listed Japanese firms. Tokyo Keizai data were compiled by Financial Data Solutions Co. Ltd. in Yokohama, Japan for our use. Keiretsu data up until FY2002 is from *Industrial Groupings in Japan* (1996 and 2001 editions, Brown & Company); however, as keiretsu data is not uniformly available from a single source beyond that year, we collected such information for FY2003–2011 from Tokyo Keizai's *Corporate Relationship Database, 2012*, supplemented by verification of individual corporate financial statements and other sources on the internet. As for key international control variables, cultural distance is derived from data in Hofstede (1983), while institutional distance is constructed from *Aggregate Governance Indices* data from The World Bank. Table 1 includes description of how these data were constructed.

The initial sample for the logistic regression model of Eq. (1) consists of observations of publicly traded Japanese manufacturing firms (SIC code 2000 to 3899), such that the intersection of the datasets for FY1995 to 2011 results in 15,849 firm-year observations (fyos), consisting of 7844 fyos of MNCs (49.5%) and 8005 fyos of DCs (50.5%). After the PS and SI matching exercises we end up with 3176 firm-year observations of MNCs that are successfully matched with comparable DCs.

Finally, we note that correlation analysis was performed on the explanatory variables and showed that the Pearson correlation coefficients for pairs of these variables were generally low. Further investigation using the condition index number method suggested by Belsley et al. (1980) indicated no multicollinearity problems among the variables.⁹

4. Empirical results

We discuss the main empirical results in 6 sub-sections. The first sub-section presents the results of the logistic regression for the probability for a firm being multinational and the determination of the value of multinationality in a controlled setting. The second sub-section investigates influences on the value of multinationality of keiretsu membership, main bank and other firm-specific variables. The third sub-section examines the differing effects on the value of multinationality depending on the types of keiretsu and host country, while the fourth sub-section explores the effects of keiretsu group inclination and main bank by firm type. The fifth sub-section presents a further test of MNC endogeneity using Heckman's two-stage method, and the sixth sub-section tests for longitudinal effects of changes in MNC status and expanded breadth of international operations.

4.1. The propensity to be MNC and the value of multinationality

The logistic regression of Eq. (1) estimates the propensity of a firm to be multinational. The result of this estimation yields the propensity scores used to match multinational companies with similar domestic companies. The dependent variable is one for multinational company (MNC) and zero for domestic company (DC). MNCs are defined as firms with 10% or higher foreign sales ratio and wholly-owned subsidiaries in two or more foreign countries for the full sample (FY1995–2011). Table 2 presents results for the fully specified logistic estimation for the full sample period.

The logistic regression model is assessed for goodness-of-fit using the Hosmer–Lemeshow (HL) chi-square statistic, wherein the null hypothesis (H_0 : HL = 0) implies no significant difference in the observed and expected partitioning of the sample between multinational and domestic firms. The highly insignificant p-value (0.45) for the HL statistic indicates that this model fits the data

⁹ We do not present these results in the paper in the interest of space. They are available upon request.

Table 2

Logistic regression for the propensity to be multinational.

	Coefficient	p-Value	Marginal effect
Firm size	0.584	(0.00)	0.134
Growth opportunities	−0.074	(0.30)	−0.018
R&D intensity	6.082	(0.00)	0.014
Return on assets	1.877	(0.00)	0.216
Current ratio	0.086	(0.00)	0.022
Debt ratio	2.083	(0.00)	0.205
Beta	0.943	(0.00)	0.190
Number of business segments	−0.013	(0.46)	−0.003
Main bank lending ratio	0.358	(0.00)	0.087
Insider ownership	−0.059	(0.17)	−0.015
Foreign ownership	3.745	(0.00)	0.084
Industry MNC ratio	3.198	(0.00)	0.121
Maximum rescaled R-squared	0.515		
Hosmer and Lemeshow (HL) statistic	7.843		
p-Value (HL statistic)	(0.45)		
Likelihood ratio statistic	7739.0		
p-Value (LR statistic)	(0.00)		
Observations	15,849		

The sample period is FY1995 to FY2011. After screening marginal MNC and DC cases out from the 16,007 total firm-year observations, 15,849 observations are used for the logistic regression analysis. The full sample consists of 7844 MNC firm-year observations and 8005 DC firm-year observations from fiscal years 1995 to 2011 (ending March 31, 2012). All variables are measured at the end of the fiscal year. A logistic regression model is used to derive the propensity to be multinational. The dependent variable is one for MNC and zero for DC. As logistic regression estimates the natural log of the odds of the event (being MNC), Marginal effect shows the change in event probability for a unit change in the particular independent variable. Maximum rescaled R^2 adjusts for the fact that R^2 achieves a maximum of less than one in discrete models. The Hosmer and Lemeshow (HL) statistic is a goodness-of-fit measure. The null hypothesis (H_0 : HL = 0) implies no significant difference in the observed and expected partitioning of the sample between multinational and domestic companies. See Table 1 for definitions of variables.

quite well – there is no significant difference in the observed and expected partitioning of the sample between MNCs and DCs. In terms of specific independent variables, 9 out of 12 variables show significance at the 1% level. Thus, this model is appropriate for deriving the propensity scores for both MNC and DC observations.

Economically, the significant and positive coefficient of R&D intensity speaks of the proclivity of Japanese firms to search for international opportunities to internalize such technology-oriented firm-specific advantages in the face of stagnant home markets. The positive and significant coefficient of main bank lending ratio indicates the contribution of resources and information sharing and coordination, as well as stewardship in keiretsu. Finally, the significant and positive coefficient for foreign ownership points to the tendency of foreign institutional investors to press Japanese firms to pursue internationalization, especially in the face of competitive threats from the Korean, American and rising Chinese MNCs.

The propensity score (PS) method uses the propensity of the firm to be multinational, obtained from the logistic regression model to match MNCs with similar DCs. Following Villalonga (2004a), the matching algorithm employed is that developed by Dehejia and Wahba (2001).¹⁰ The results of PS matching are then compared with those from the size-and-industry (SI) method used in Berger and Ofek (1995), Lang and Stulz (1994) and others. Table 3 summarizes the findings on the value of multinationality, $MNCq - DCqMean$ and $MNCq - DCqMedian$.¹¹

The results in Panel A, which answer Q1, indicate a statistically significant mean premium of 2.3% for being multinational when the measure is estimated by the PS method versus a substantially larger 6.2% premium by the SI method for the full sample period (FY1995–2011). t-Tests indicate that the difference of 3.9 percentage points between the two methods is statistically significant at the 1% level. The multinationality premium is even larger in medians (5.3% by PS method versus 9.6% by SI method). Panel B presents results for the multinationality premium by industry, while Appendix 1 shows the results by fiscal year. The value of multinationality is also measured by the value-to-sales (m) ratio, $MNCm - DCmMean$ and $MNCm - DCmMedian$, which are documented in Appendix 2. The results based on this alternative value measure are generally similar to those reported in Table 3 (and Appendix 1). We conclude that, over the period of fiscal years 1995 to 2011, Japanese MNCs were valued at a significant premium to purely domestic firms, in terms of both means and medians.

That the value of multinationality is smaller when derived by PS method than by SI method, is also evident in the disaggregate analysis by industry. A similar pattern also exists when the value of multinationality is expressed by fiscal year. However, it is apparent that the significant mean premium observed for the full sample period weakens to an extent to become a discount in some later years – the reasons have to do with restructuring of the keiretsu system, which will be examined in detail in the sub-period analysis. Given that the SI method matches MNCs with DCs on only two factors (i.e., size and industry), it is likely to suffer from sample selection bias that stems from the limited matching scheme that may not be sufficient to control for the myriad of firm-specific characteristics that make MNCs systematically different from DCs. In contrast, the PS approach matches MNCs and DCs, within

¹⁰ See Table 3 (also Appendix 2) for details on the procedures for matching by the propensity score (PS) method and the size-and-industry (SI) method.

¹¹ Detailed information about the number of MNCs matched via the PS method by year and industry at each level is shown in Appendix 3. For the full sample period (FY1995–2011), a total of 3176 (40.4%) of the 7844 MNC firm-year observations (fyos) were matched using the PS method; 12.7% and 27.7% at the first level and second level, respectively. Using the SI method, 7%, 6% and 87% of the 3176 MNC fyos were matched at the 4-digit, 3-digit and 2-digit SIC code levels, respectively.

Table 3

The value of multinationality.

MNCq – DCqMean	Tobin's q of an MNC less mean Tobin's q of matching domestic firms						
MNCq – DCqMedian	Tobin's q of an MNC less median Tobin's q of matching domestic firms						
		MNCq – DCqMean			MNCq – DCqMedian		
	Observations	PS	SI	t-Test	PS	SI	t-Test
A. Full sample	3176	0.023	0.062	***	0.053	0.096	***
B. By industry							
Food	137	0.100	0.136	***	0.122	0.153	***
Textiles	61	–0.020	–0.056	***	–0.002	–0.017	
Chemicals & pharma.	675	–0.053	0.009	***	0.012	0.066	***
Glass & ceramics	115	0.133	0.099	***	0.120	0.117	
Oil, coal & rubber	9	0.018	–0.084	***	–0.042	–0.004	
Iron, steel, nonferrous metals	249	0.027	0.092	***	0.071	0.111	***
Metal products	64	0.147	0.138		0.173	0.173	
Machinery	602	–0.010	0.060	***	0.019	0.098	***
Electrical equipment	848	0.074	0.105	***	0.096	0.132	***
Transportation equipment	330	0.034	0.026	*	0.033	0.040	
Precision instruments	86	–0.028	–0.002		–0.017	0.048	***

The sample period is FY1995 to 2011. The propensity score (PS) matching method uses the propensity to be MNC derived from the logistic regression model in Table 2 to match MNCs with similar DCs as follows: (1) within each fiscal year and industry (2-digit SIC code), observations in the MNC and DC groups are sorted from the lowest to the highest propensity score, and DC observations with scores lower (higher) than the minimum (maximum) score for MNCs are discarded; (2) firms are divided into blocks defined by quintiles of the propensity score distribution for MNCs; (3) balancing tests are performed for overall propensity score and 11 firm characteristics – tests of difference in means between the MNCs and DCs within each block; (4) if all blocks are well-balanced, the matching process ends; if not, unbalanced blocks are divided into finer blocks and step 3 repeats. Next, blocks with fewer than five matching DCs are discarded. Thus, the PS method ensures that MNCs and DCs, despite differing in a number of characteristics, are comparable within the blocks defined. Finally, the mean (median) q ratio of the DCs within each block, DCqMean (DCqMedian), is assigned to each of the MNCs within that block to derive the value of multinationality, MNCq – DCqMean (MNCq – DCqMedian), for each MNC firm-year observation. See Appendix 3 for details on PS matching results at each level. In contrast, the size and industry (SI) matching method initially matches each MNC by fiscal year with DCs at the 4-digit SIC code industry level. When fewer than five matching DCs are achieved, matching proceeds to the 3-digit code industry level, and so on. At each level, matches are discarded when the absolute size difference between the MNC and the matched DC exceeds the first quartile of the size difference for the DC sample matched with that particular MNC. Using the SI method 7%, 6% and 87% of the sample are matched at the 4-digit, 3-digit and 2-digit SIC code levels. The sample consists of 3176 commonly matched firm-year observations of multinational firms from fiscal years (ending March 31) 1995 to 2011. All variables are measured at the end of the fiscal year. ***, **, and * denote the significance of differences between the PS and the SI method at the one, five, and ten percent levels (two-sided), respectively.

each 2-digit SIC industry, on 11 firm-specific characteristics associated with the decision to be multinational, as well as on the overall propensity score. This more comprehensive matching system is seen as correcting for sample selection bias due to the endogeneity of the decision to be diversified (Villalonga, 2004a).

It is not obvious why there is a multinationality premium for Japanese MNCs while there may be a multinationality discount for U.S. MNCs (Denis et al., 2002; Fauver et al., 2004). One possibility is that such U.S. studies are method-specific (i.e., SI method). If the PS method were used to examine international diversification as Villalonga (2004a) had done for industrial diversification, the result would have been different. An alternative explanation is that agency costs may be relatively lower in Japanese firms due to the stewardship orientation of management (Prowse, 1990; Yafeh, 2000; Lee and O'Neill, 2003). Also, the management strategy literature shows that Japanese firms favor a long-term rather than short-term view of profits, which may boost valuation via more coordinated management processes and centralized organizational structures (Johansson and Yip, 1994).

4.2. The effects of keiretsu membership and main bank on the value of multinationality

We now examine whether the value of multinationality is affected by keiretsu affiliation and other firm-specific factors. In Table 4, models (1) to (4) employ the propensity score (PS) method, and the size-and-industry (SI) method is used in model (5).

The variable of interest is keiretsu membership, which has a significant and negative impact on the value of multinationality when it is determined via PS method (models 1 and 2). These results suggest that the costs of keiretsu membership – inefficient internal markets (Scharfstein and Stein, 2000; Rajan et al., 2000; Ferris et al., 2003; Walker, 2005), bonding costs (Ang and Constand, 2002), “tunneling” (Dewenter et al., 2001; Joh, 2003) and the like – become sufficiently significant in an international environment as to outweigh the benefits of group membership. That is, while multinationality has a positive value, such value declines in the case of a firm with keiretsu affiliation. This is due to the increased complexity of multinational operations and the difficulty of effectively coordinating, controlling and monitoring numerous operations located in multiple foreign countries. Therefore, the answer to the second research question, Q2, is that keiretsu membership negatively influences the value of multinationality during FY1995–2011.

The coefficients for main bank ownership indicate a significant and negative impact on the value of multinationality in all models in which it appears. This is consistent with the notion that given their dual roles as creditor and shareholder in the same client firms, main banks, on balance, advance the interests of debt-holders at the expense of equity-holders, especially in MNCs perceived to have the ability to manipulate assets (Morck and Nakamura, 1999; Kang and Liu, 2007). An alternative interpretation is that main bank promotes relaxed financial constraints, allowing MNCs to accept more marginal FDI projects (Weinstein and Yafeh, 1998), especially

Table 4

The effect of keiretsu on the value of multinationality.

	(1)	(2)	(3)	(4)	(5)
Matching method	PS	PS	PS	PS	SI
Keiretsu membership	−0.028 (0.02)	−0.033 (0.01)			−0.006 (0.61)
Multiple keiretsu membership			−0.117 (0.00)		
Keiretsu group inclination				−0.011 (0.04)	
Main bank ownership		−1.210 (0.00)	−1.245 (0.00)	−1.160 (0.00)	−1.315 (0.00)
Foreign sales ratio	0.205 (0.00)	0.185 (0.00)	0.189 (0.00)	0.182 (0.00)	0.074 (0.11)
International Herfindahl	0.032 (0.49)	0.073 (0.13)	0.063 (0.19)	0.079 (0.10)	0.021 (0.59)
Cultural distance	−0.016 (0.10)	−0.016 (0.12)	−0.021 (0.04)	−0.017 (0.12)	−0.016 (0.07)
Institutional distance	−0.010 (0.26)	−0.009 (0.33)	−0.008 (0.35)	−0.008 (0.40)	−0.009 (0.21)
Wholly-owned foreign sub. ratio	0.111 (0.00)	0.098 (0.00)	0.095 (0.00)	0.101 (0.00)	0.051 (0.01)
Asian financial crisis	0.044 (0.21)	0.034 (0.33)	0.036 (0.30)	0.034 (0.34)	0.038 (0.25)
Global financial crisis	0.015 (0.60)	0.016 (0.58)	0.013 (0.66)	0.016 (0.58)	0.113 (0.00)
Sub-sample dummy	−0.048 (0.23)	−0.162 (0.00)	−0.156 (0.00)	−0.155 (0.00)	−0.270 (0.00)
<i>Year and industry dummy variables are included in all regressions. Additional firm-specific control variables are included in model (5)</i>					
Adjusted R-squared	0.068	0.094	0.098	0.093	0.326
F-statistic	7.35	8.97	9.33	8.88	34.73
p-Value (F-statistic)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	2512	2512	2512	2512	2512

The sample period is FY1995 to 2011. The dependent variable for specifications (1) to (4) is the value of multinationality, $MNCq - DCqMean$, derived via the propensity score (PS) matching method, while for specification (5) it is the value of multinationality ($MNCq - DCqMean$) derived using the size-and-industry (SI) matching method. The sample consists of 2512 firm-year observations of MNCs from fiscal years (ending March 31) 1995 to 2011. Keiretsu membership and main bank ownership variables are one-year lagged. All other variables are contemporaneous. Sub-sample dummy variable is intended to capture any qualitative differences in keiretsu related variables between the FY1995–2002 and FY2003–2011 periods. See Table 1 for definitions of the variables. Additional controls included in model (5) are firm size, growth opportunities, R&D intensity, ROA, current ratio, debt ratio, beta, firm age, number of business segments, and insider and foreign ownerships. These controls follow from the logit model in Table 2 and are added to make model (5) comparable to (1)–(4), which incorporate these variables in the derivation of $MNCq - DCqMean$ via the PS matching method. See Table 1 for definitions of these variables. Year and industry dummy variables are included in all regressions. The p-values are shown in parentheses, using White heteroscedasticity-consistent standard errors.

for bank-centered, horizontal keiretsu group members. Consequently, the answer to the third research question, Q3, is that main bank ownership has a negative impact on the value of multinationality during the period of FY1995–2011. Interestingly, during the early 2000s when large Japanese banks were being transformed by a series of mega-mergers, their value impacts, via lender and shareholder relationships, on Japanese MNCs were not attenuated, but rather remained strong and significantly negative.

In model (5), the dependent variable is the value of multinationality derived by the SI method. This specification includes additional control variables, such as firm size, growth opportunities, R&D intensity and others, that follow from the logistic model in Table 2. As in models (1) and (2), the effect of keiretsu membership is negative although not statistically significant. However, as before, the impact of main bank ownership on the value of multinationality is significant and negative.

Among the control variables in model (5), the foreign sales ratio becomes insignificant, while the global financial crisis dummy variable turns significant. Moreover, whether the value of multinationality is determined by the PS or SI method, cultural distance is negatively signed and is generally marginally significant, while institutional distance is negative but insignificant.

We alternatively use the median rather than the mean to compute the multinationality premium, $MNCq - DCqMedian$, by the PS method. The results are qualitatively similar to those reported in Table 4. We also endogenously estimated keiretsu membership and main bank ownership along with the value of multinationality by the two-stage least square method. Again, results (available from the authors upon request) are comparable to those reported in Table 4.

We also reran the full specification – model (2) where the dependent variable is derived using the PS method – replacing the keiretsu membership dummy alternatively with variables for multiple keiretsu membership (model 3) and keiretsu group inclination (model 4). The results for model (3) are very similar in all respects to those in model (2), except that the magnitude of multiple keiretsu membership is larger and its significance higher than for the keiretsu membership dummy, further substantiating the notion that keiretsu membership negatively influences a firm's value of multinationality. Finally, keiretsu group inclination (model 4) also exerts a similar influence – however, its negative impact is somewhat reduced in size and significance.

4.3. The effects of keiretsu type and host country on the value of multinationality

In the industrial organization literature, the distinction between vertical and horizontal integration is important. Similarly, vertical and horizontal keiretsu firms can have differing impacts on firm value. A horizontal keiretsu is a bank-centered group of firms in generally unrelated industries, where the group's main bank owns shares in member firms and provides financing to them. A vertical keiretsu, in contrast, is a core firm-centered group of firms in a related industry, such as the automotive, machinery and electrical equipment sectors, where group firms are upstream component suppliers to the downstream core firm. Cross shareholdings are common in both types of keiretsu groups. Independent firms are those that are not members of either a horizontal or vertical keiretsu. During the full sample period (FY1995–2011), horizontal keiretsu members, vertical keiretsu members, and independent firms, respectively, comprise 15.3%, 15.7% and 69.0% of firm-year observations.

Dunning (1988) emphasizes the importance of location factors along with ownership and internalization advantages of a firm as determinants of its foreign direct investment. Various authors such as La Porta et al. (1998, 2002) also argue that firm valuation depends on host country institutional factors such as the degree of economic development, capital market development, and governance or the extent to which the country provides legal protections to investors. As a parsimonious proxy for these host country factors, we now include the firm-specific developing country ratio (the ratio of the number of developing countries to the total number of foreign countries in which a firm has subsidiary operations) as an additional explanatory variable.¹²

Table 5 captures the effects of both firm types and host country types for the full sample period. In effect, it replicates model (2) in Table 4, except that the undifferentiated keiretsu membership dummy is replaced by dummy variables representing horizontal and vertical keiretsu group memberships (zero indicates independent firms), and the developing country ratio is added. The interaction terms between firm types and the developing country ratio are also included. The dependent variable in all models is $MNCq - DCqMean$ determined by the PS matching method.

The results show that both types of keiretsu affiliation have consistently negative and highly significant impacts on the value of multinationality. For horizontal keiretsu members this is attributable to the over-investment problem discussed above, inefficient internal capital markets and tunneling as well as to significant bonding costs that characterize such group firms. As for vertical keiretsu members, this reflects the tight control that the core firm exerts over them. The core firm possesses managerial, technical and financial resources that enable it to dominate the group. Vertical keiretsu firms also rely on the core firm for direct transfers of R&D capabilities, and they may make capital investments specific to the core firm's products (Hackett and Srinivasan, 1998). Also, while the vertical keiretsu members typically sell the majority of their output to the core firm, the core firm – aiming to undermine potential supplier opportunism – has multiple suppliers within and outside of its group for key components (Tabeta, 1998). Moreover, it is not uncommon for member firms to have begun as divisions of the core firm and subsequently carved out, but with partial ownership control still retained by the core firm. Thus, the core firm has substantial leverage to pressure its vertical keiretsu group members to continually lower component prices and/or to absorb cost increases (Sambharya and Banerji, 2006; Greenwood et al., 2012). Finally, core firms can dictate FDI decisions to their member firms that may not be optimal for the individual members, but that are aimed at improving the performance of the core firms' foreign operations. The upshot is that to the extent that there is a desire by a core firm to exploit its leverage at the expense of group member firms, it might be easier to do so within the vertical keiretsu structure.¹³

As before, the coefficients for main bank ownership are highly significant and negative across the board – in fact, the size of the negative impact on the value of multinationality appears to have more than doubled (compared to Table 4). Here the difficulties of coordination, communication and control in the international setting may provide the main banks with an increased scope to advance the interests of debt-holders (versus equity-holders), especially for vertical keiretsu and independent MNCs, as well as enabling the approval of marginal FDI projects, especially for horizontal keiretsu members.

The developing country ratio reflects both the benefits of internalization and flexibility from operating in segmented foreign markets (Pantzalis, 2001; Doukas and Travlos, 1988) as well as the costs arising from the liabilities of newness and foreignness (Lu and Beamish, 2004) and the hurdles resulting from cultural and institutional distances from Japan (Tihanyi et al., 2005). The consistently highly significant and negative coefficients for the developing country ratio clearly demonstrate that, for Japanese MNCs, the liabilities of newness and foreignness, and cultural and institutional distances dominated the benefits from internalization and operating flexibility. It does not seem surprising that having developing host countries operations would involve increased governance costs – directly detrimental to the value of multinationality – for Japanese MNCs, given the homogeneous nature of Japan's society, and its advanced country status and highly developed institutional environment.

Further insight is gained by examining the interaction terms. The interaction terms of horizontal keiretsu membership with developing country ratio are positive but statistically insignificant (models 2 and 5). Moreover, the interactions involving vertical keiretsu membership are also positive, but significant in the fully specified model (5), at the 10% level. This latter result indicates that vertical keiretsu membership does provide some valuable benefits to subsidiaries in developing host countries. These can include access to internal capital markets where host country capital markets are underdeveloped, and use of core firm and group infrastructure

¹² The host country sample spans 55 countries, including 33 developing countries and 22 developed countries. Developing countries include those classified as Middle or Low Income, and Developed countries include those classified as High Income, by the World Bank for each year from 1995 to 2011.

¹³ Almeida et al. (2011) study the Korean chaebol firms and show that: (a) chaebols grow vertically as the controlling family uses well-established group firms ("central firms") to set up or acquire younger firms with low profitability and high capital requirements – this may be considered akin to "core firm" and secondary/tertiary supplier relationships in vertical keiretsu; and (b) chaebols grow horizontally (via direct family ownership) when high profitability or low capital intensity firms are acquired by the family – this is analogous to horizontal keiretsu membership involving established companies over a wide range of sectors. Almeida et al. (2011) find that central firms have lower profitability and trade at a discount relative to horizontal firms, which is likely due to a selection effect. This result parallels the significant negative valuation effects of vertical and horizontal keiretsu membership for Japanese MNCs.

Table 5
Keiretsu types and host country impacts on the value of multinationality.

	(1)	(2)	(3)	(4)	(5)
Horizontal keiretsu membership (HKM)	−0.057 (0.00)	−0.072 (0.01)	−0.057 (0.00)	−0.054 (0.00)	−0.067 (0.01)
Vertical keiretsu membership (VKM)	−0.042 (0.00)	−0.042 (0.00)	−0.067 (0.02)	−0.040 (0.00)	−0.082 (0.00)
Main bank ownership (MBO)	−2.667 (0.00)	−2.650 (0.00)	−2.655 (0.00)	−3.694 (0.00)	−3.872 (0.00)
Developing country ratio (DCR)	−0.124 (0.00)	−0.131 (0.00)	−0.137 (0.00)	−0.210 (0.00)	−0.254 (0.00)
HKM * DCR		0.048 (0.39)			0.038 (0.49)
VKM * DCR			0.058 (0.27)		0.098 (0.09)
MBO * DCR				2.710 (0.04)	3.270 (0.02)
<i>Firm characteristic, year and industry dummy variables are included in all regressions</i>					
Joint F-statistic	–	0.67	1.12	4.25	2.35
p-Value (joint F-statistic)	–	(0.42)	(0.29)	(0.04)	(0.07)
Adjusted R-squared	0.095	0.095	0.095	0.096	0.096
F-statistic	11.66	11.24	11.27	11.39	10.71
p-Value (F-statistic)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	2649	2649	2649	2649	2649

The sample period is FY1995 to 2011. Horizontal (vertical) keiretsu membership is a dummy variable to indicate whether a firm belongs to keiretsu groups in Japan. The developing country ratio is the ratio of the number of developing countries to the total number of foreign (developing plus developed) countries where a firm has subsidiary operations. The dependent variable is the value of multinationality, $MNCq - DCqMean$, determined via propensity score matching method. All samples consist of 2649 firm-year observations of multinational firms from fiscal years 1995 to 2011. Horizontal keiretsu membership, vertical keiretsu membership, main bank ownership and developing country ratio are one-year lagged. All other variables are contemporaneous. See Table 1 for definitions of the variables. Joint F-tests investigate the combined effect of level and interaction terms and their incremental explanatory power. The p-values are shown in parentheses, using White heteroscedasticity-consistent standard errors.

(e.g., R&D centers, component supplies, just-in-time delivery systems, etc.) in countries where indigenous infrastructure is lacking. This is consistent with the idea that internal capital markets created by membership in industrial groups or large non-management block-holders can serve as a substitute for missing governance mechanisms in emerging markets (Khanna and Palepu, 2000; Lins, 2003).

The effects of keiretsu taken together are also interesting. While the direct negative effect of both types of business group membership appears similar, it is also plausible that vertical keiretsu can be more effective in assisting member firms with regard to their overseas operations in developing countries. However, the effect of keiretsu also depends on the host country situation, including business and institutional environment. In developed host countries where basic infrastructure is well established, the negative effect of vertical keiretsu membership dominates the positive effect. With respect to operations in developing countries where indigenous infrastructure is insufficient and resources of MNCs are more valuable, vertical keiretsu are more effective than horizontal keiretsu due to their tighter group-wide control and industrial relatedness.¹⁴

4.4. The effects of group inclination on the value of multinationality by firm type

Table 6 replicates the main specification – model (2) of Table 4 – but replaces the keiretsu membership dummy with the keiretsu group inclination variable (a 5-point scale variable indicating strength of a company's ties to its keiretsu group) and estimates the multinationality premium by keiretsu firm types. The dependent variable in all models is the value of multinationality, $MNCq - DCqMean$, derived via the PS matching method.

The signs of the coefficients for keiretsu group inclination (although not significant statistically) are consistent with expectations (negative for horizontal keiretsu firms and positive for vertical keiretsu firms). For horizontal keiretsu members, the notion was that the stronger the firm's ties (i.e., the closer to the “core firm”), the more susceptible the firm would be to over-investment, inefficient internal capital markets, tunneling and bonding costs.

For vertical keiretsu members, the idea was that the stronger the firm's links (the closer to the “core manufacturer”), the more benefits it would reap in terms of access to group technology, financing and infrastructure. Our assumption here is that the negative effect likely applies more fully to the group's second and tertiary-tier suppliers who would be expected to have weaker ties to the core manufacturer and, therefore, would accrue fewer benefits from the core company and would also be more susceptible to pressure

¹⁴ The interaction terms involving the developing country ratio and main bank ownership are also highly significant and positive (models 4 and 5), suggesting that main bank ownership offers important benefits to Japanese subsidiaries operating in developing countries. For example, main banks' local branches can provide access to financing, foreign currency risk management services, local “market knowledge,” and entrée to key government officials as well as other important business contacts in the developing host country.

Table 6
Keiretsu inclination and main bank impacts on the value of multinationality by firm types.

	(1) Horizontal keiretsu	(2) Vertical keiretsu	(3) Independent firm
Keiretsu group inclination	−0.014 (0.29)	0.006 (0.65)	− −
Main bank ownership	−0.819 (0.32)	−2.287 (0.00)	−1.667 (0.00)
Foreign sales ratio	0.125 (0.20)	0.012 (0.90)	0.048 (0.31)
International Herfindahl	0.243 (0.01)	0.145 (0.06)	0.042 (0.29)
Cultural distance	−0.051 (0.00)	−0.006 (0.77)	−0.009 (0.33)
Institutional distance	−0.023 (0.15)	0.015 (0.33)	−0.001 (0.88)
Wholly-owned foreign sub. ratio	0.075 (0.08)	0.168 (0.00)	0.077 (0.00)
Asian financial crisis	0.090 (0.00)	−0.035 (0.42)	0.056 (0.01)
Global financial crisis	0.066 (0.12)	−0.062 (0.11)	−0.033 (0.07)
<i>Year and industry dummy variables are included in all regressions</i>			
Adjusted R-squared	0.135	0.198	0.137
F-statistic	4.12	6.97	14.34
p-Value (F-statistic)	(0.00)	(0.00)	(0.00)
Firm-year observations	501	604	2022

The sample period is FY1995 to 2011. The dependent variable is the value of multinationality, MNCq – DCqMean, determined via the propensity score matching method. Keiretsu group inclination is a 5-point scale variable indicating strength of a company's ties to its keiretsu group, where 4 = nucleus company; 3 = strong ties; 2 = moderate ties; 1 = weak ties; and 0 = independent company for FY1995 to 2002. Source is Industrial Groupings in Japan (Brown & Co., 1996 and 2001 eds.). A similar 5-point scale variable is developed using new criteria for sample firms from FY2003 to 2011, where 4 = horizontal keiretsu member with at least one public manufacturing subsidiary; 3 = vertical keiretsu core (i.e. parent) firm with loose horizontal relationship through its main bank; 2 = non-core (i.e. subsidiary) member of a vertical keiretsu with loose horizontal relationship through its main bank; 1 = neither horizontal nor vertical keiretsu member, but with a mega-bank as a formal main bank; and 0 = independent company. Main bank ownership is one-year lagged. All other variables are contemporaneous. See Table 1 for definitions of the variables. Year and industry dummy variables are included in all regressions. Sample size for each model reflects the availability of lagged international variables as well as non-exclusive entry for type of keiretsu. The p-values are shown in parentheses, using White heteroscedasticity-consistent standard errors.

from it. It is possible that this effect becomes less significant during the “withering” of the keiretsu system and corporate M&A wave that occurred later in the sample period; we will examine this in a separate sub-period analysis.

As for the influence of main bank ownership by firm type, the coefficients are all negative and significant as expected, except for horizontal keiretsu membership. Throughout the sample period the main banks retain their abilities to extract rents from client MNCs in favor of debt-holders at the expense of equity-holders, as well as to promote relaxed financial constraints and inefficient investment, such as MNCs' cross-subsidization of weaker foreign operations by stronger ones. Moreover, the complexity of MNCs and the difficulty of monitoring dispersed overseas subsidiary networks amplify the negative impact of main bank ownership on the value of multinationality in an international setting.

4.5. Further test of MNC endogeneity and the influence of international Herfindahl

Although we estimated the logit regression to address the likelihood of a firm being an MNC earlier, we now use Heckman's two-stage method in Table 7 to further account for endogeneity of the firm's decision to be multinational (MNC), similar to that utilized in Campa and Kedia (2002). Implementation of Heckman's two-stage method, using the raw sample of MNCs and DCs, begins with a first-stage probit estimation by the maximum likelihood method of firm characteristics that may lead a company to “self-select” to be multinational (where the dependent variable is 1 for MNC and 0 for DC). The inverse Mills ratio or lambda, which captures unobserved firm characteristics that steer a firm to be multinational, is estimated for each firm-year observation in the first stage. Lambda plus an MNC dummy are then used as additional explanatory variables, along with the variables from the first stage, in a second-stage regression where the dependent variable is the firm's industry-adjusted (excess) q ratio or excess m ratio (the value-to-sales ratio).

The second-stage results are shown in Panel A. Coefficients for the MNC dummy are negative and significant for both value measures (−0.027 for excess q and −0.204 for excess m) seemingly indicating that being MNC may impair firm value. However, this finding is in line with earlier results in Table 5, where we found that individual effects of keiretsu type, main bank, or developing host country environment can be negative on the value of multinationality; notably, the interactions of vertical keiretsu membership and main bank were found to positively influence MNCs' value, and especially in developing countries. The negative MNC dummy in Table 7 suggests that this positive interaction of keiretsu membership and main bank with host country environment on MNC value

Table 7

Alternative self-selection model: Heckman's two-stage estimates.

Panel A. Second-stage estimates		Coefficient	p-Value	Coefficient	p-Value
Dependent variable		FIRMq — INDqMean		FIRMm — INDMMean	
Firm size		0.000	(0.73)	−0.013	(0.00)
Growth opportunities		0.019	(0.30)	−0.001	(0.82)
R&D intensity		0.568	(0.00)	1.059	(0.00)
Return on assets		2.457	(0.00)	1.531	(0.00)
Current ratio		−0.022	(0.00)	0.060	(0.00)
Debt ratio		0.548	(0.00)	1.088	(0.00)
Beta		0.132	(0.00)	0.200	(0.00)
Firm age		−0.100	(0.00)	−0.079	(0.00)
Number of business segments		−0.008	(0.00)	−0.013	(0.00)
Main bank lending ratio		0.016	(0.15)	−0.019	(0.25)
Insider ownership		−0.006	(0.04)	−0.038	(0.12)
Foreign ownership		0.655	(0.00)	1.211	(0.00)
Industry MNC ratio		0.006	(0.90)	−0.086	(0.23)
Multinationality Dummy (MNC)		−0.027	(0.05)	−0.204	(0.00)
Lambda (inverse Mills ratio)		0.026	(0.00)	0.159	(0.00)
<i>Year and industry dummy variables are included</i>					
Adjusted R-squared		0.296		0.260	
F-statistic		182.66		152.96	
p-Value (F-statistic)		(0.00)		(0.00)	
Observations		16,007		16,007	
Panel B. First-stage estimates by probit model		Coefficient	p-Value	Marginal effect	
Firm size		0.348	(0.00)	0.089	
Growth opportunities		−0.038	(0.39)	−0.010	
R&D intensity		1.151	(0.00)	0.293	
Return on assets		1.101	(0.00)	0.275	
Current ratio		0.049	(0.00)	0.012	
Debt ratio		1.097	(0.00)	0.280	
Beta		0.539	(0.00)	0.138	
Firm age		0.018	(0.61)	0.004	
Number of business segments		−0.013	(0.22)	−0.003	
Main bank lending ratio		0.217	(0.00)	0.055	
Insider ownership		−0.040	(0.07)	−0.010	
Foreign ownership		1.888	(0.00)	0.484	
Industry MNC ratio		1.427	(0.00)	0.363	
<i>Year and industry dummy variables are included</i>					
Maximum likelihood		−7250			
Likelihood index		0.346			
Likelihood ratio		7686.1			
p-Value (LR statistic)		(0.00)			
Observations		16,007			
% of MNC firms		49.2			

The sample period is FY1995 to 2011. The second-stage estimates are shown in Panel A, where the dependent variable is FIRMq — INDqMean in Panel A's left-half. The alternative second-stage dependent variable is FIRMm — INDMMean in Panel A's right-half, where m is a firm's value-to-sales ratio. Lambda (the inverse Mills ratio) is used in the second stage regression as an additional explanatory variable along with those used in the first stage, and is estimated for each firm-year observation via the maximum likelihood method in the first stage. The reported second-stage regression results in Panel A are based on contemporaneous explanatory variables as the use of lagged explanatory variables has a negligible effect on the results. The dependent variable for the first-stage estimates by probit model shown in Panel B is a dummy variable for the firm's multinationality status (1 for multinational firm, MNC, and 0 for domestic firm, DC). The first-stage probit regression uses 12 firm attributes, industry MNC ratio, and year and industry dummy variables. The p-values, in parentheses, are based on heteroscedasticity-consistent standard errors both in the first and second-stage regressions.

may have diminished in later years due to the weakening of the keiretsu structure, and mega-bank mergers (Schaede, 2006; Lincoln and Shimotani, 2009). We will examine the effects of the changing keiretsu scene in more detail later.

Another possible explanation for the negative impact of MNC dummy is the increasing concentration of foreign subsidiaries in firms' multinational networks, indicated by a decline in the international Herfindahl variable. In line with the multinational network theory, an increase in concentration of foreign subsidiaries in a host country network (i.e., greater depth as opposed to breadth) may represent a level of redundancy and hence less value for the firm (Allen and Pantzalis, 1996; Lee and Makhija, 2009).

It is noteworthy that the coefficient of the inverse Mills ratio is statistically and economically significant and positive (0.026 for excess q and 0.159 for excess m), suggesting that unobserved firm characteristics which lead a firm to be MNC do indeed have a positive impact on industry-adjusted firm values. Thus, this result of Heckman's two-stage estimation analysis, which controls for self-selection bias in the decision to be an MNC, provides supportive evidence for a multinationality premium over the entire sample period of FY1995–2011.

Table 8
Longitudinal effects of changes in multinationality status.

	A. Change from DC to MNC		B. Change from MNC to DC		*	C. Increase in breadth		
	Adjusted q ratio		Adjusted q ratio			Adjusted q ratio		
EV ₋₁	0.019	(1.03)	0.074	(1.74)	*	0.040	(4.50)	***
EV ₁	0.017	(1.02)	-0.007	(-0.25)		0.052	(6.09)	***
EV ₁ - EV ₋₁	-0.002	(-0.15)	-0.081	(-2.27)	**	0.012	(1.73)	*
N	310		84			1281		

The sample period is FY1995 to 2011. Column A is for the status change event from domestic firm (DC) to multinational firm (MNC). Column B is for the status change event from MNC to DC. Column C is for the event involving an increase in the number of host countries (breadth) where a firm has one or more controlled subsidiaries. Adjusted q is the firm's industry-adjusted q ratio, $FIRMq - INDqMean$. EV₋₁ indicates the firm's industry-adjusted q for the fiscal year preceding the event, while EV₁ indicates the firm's industry-adjusted q for the fiscal year following the event. EV₁ - EV₋₁ shows the change in the firm's industry-adjusted q from the year following the event to the year preceding the event. N is the number of observations in each event category. The t-values are shown in parentheses. *, **, *** indicate statistical significance at the ten, five and one percent levels, respectively. Qualitatively similar results were obtained using adjusted m ratio, where m is the firm's industry adjusted value-to-sales ratio, $FIRMm - INDMMean$.

4.6. Longitudinal effects of changes in MNC status and expanded international breadth

To explore the nature of the multinationality premium further, Table 8 presents findings involving longitudinal effects, as per Villalonga (2004a), tracing changes in the status of firms. Specifically, we investigate the samples of DCs becoming MNCs, and MNCs becoming DCs, as well as the cases of expansion in the breadth of MNCs' overseas networks (i.e., an increase in the number of host countries).

The change in firm status from DC to MNC, over the full sample period of FY1995–2011, shows a decrease in industry-adjusted q ratio after becoming multinational, but the coefficient is statistically insignificant. The reverse change from MNC to DC, however, is negatively and significantly associated with industry-adjusted q ratio (EV₁ - EV₋₁ is -0.081). Since this shows that the firm value decreases when it changes from multinational to domestic, indirectly this is consistent with the notion that firm value increases with the status change from DC to MNC. Finally, we find that, during the entire time period, an expansion in breadth of international operations (i.e., increase in the number of host countries in a firm's multinational network) significantly (at the 10% level) increases industry-adjusted q ratio (EV₁ - EV₋₁ is 0.012). This rise in firm value due to an expansion in breadth of MNCs' subsidiary networks is directly consistent with the multinational network theory (Allen and Pantzalis, 1996; Lee and Makhija, 2009).

5. Sub-period analysis

To explore inter-temporal changes in the value of multinationality further, the full firm sample from FY1995 to 2011 is divided into two sub-periods, with the first sample period being FY1995–2002 and the second sample period being FY2003–2011. This division is based on incidences of the decline of the keiretsu, and the corporate consolidation and mega-bank merger waves, as well as on data availability. As noted previously, keiretsu-related data were no longer published by Brown and Co. after FY2002. Thus, afterwards, such data had to be collected by us from multiple sources. This section includes a description of keiretsu changes as well as difference-in-difference analysis, and the impact of international Herfindahl, measuring breadth of international operations, on the value of multinationality over the two sub-periods.¹⁵

5.1. Changing characteristics of keiretsu structure

Table 9 presents changing characteristics of keiretsu firms as well as multinationality premiums over the two time periods. Panel A displays descriptive statistics for key keiretsu and firm-specific variables for the first sample period (FY1995–2002), and the second sample period (FY2003–2011). Similarly, Panel B shows results for the value of multinationality derived by both the propensity score (PS) matching method and the size-and-industry (SI) matching method for the two sub-sample periods.

Using t-tests for equality of means, Panel A illustrates that mean values of all keiretsu-related variables (except vertical keiretsu membership) are significantly reduced in the second sample period versus the first period. For example, the first period mean values for keiretsu membership, horizontal keiretsu membership, multiple keiretsu membership, and keiretsu group inclination of 0.59, 0.44, 0.68 and 1.70, respectively, drop significantly to 0.38, 0.17, 0.09 and 1.22, in the second time period. While international Herfindahl experiences a reduction in mean value from 0.79 to 0.77, there is a substantial increase in means for institutional distance (from 1.54 to 1.95), as well as an increase in foreign sales ratio (from 0.31 to 0.42) and developing country ratio (from 0.30 to 0.41) over the two sub-sample periods.

The significant reduction in means of business group-related variables reflects the weakening of the keiretsu that reached its zenith during the second sample period (Lincoln and Shimotani, 2009). Faced with weak domestic demand and accelerating

¹⁵ In the sub-period analysis, the same criterion for MNCs is used for the first sub-sample period (FY1995–2002) as that used for the entire sample period (FY1995–2011). However, in the second sub-sample period (FY2003–2011) MNCs are those with 20% or higher foreign sales ratio (rather than 10% or higher) and wholly-owned subsidiaries in two or more foreign countries. The higher foreign sales ratio in the second period is necessitated by the requirement to have sufficiently comparable numbers of multinational and domestic firms in each industry.

Table 9

Changes in the value of multinationality over two sub-periods.

Panel A. Changes in keiretsu and other firm-specific characteristics for multinational firms							
Variable	Mean	t-Test: 1st vs. 2nd periods	Med	SDev	Skew	Kurt	
<i>First sub-sample period (FY1995–2002)</i>							
Keiretsu membership	0.59	***	1.00	0.49	−0.35	−1.88	
Horizontal keiretsu membership	0.44	***	0.00	0.50	0.25	−1.94	
Vertical keiretsu membership	0.19	***	0.00	0.39	1.59	0.54	
Multiple keiretsu membership	0.68	***	1.00	0.57	0.14	2.36	
Keiretsu group inclination	1.70	***	2.00	1.57	0.24	1.52	
Main bank ownership	0.08	***	0.08	0.06	0.33	−0.51	
Foreign sales ratio	0.31	***	0.27	0.16	0.77	−0.33	
International Herfindahl	0.79	*	0.83	0.14	−1.51	2.61	
Cultural distance	3.54		3.51	0.57	0.55	1.35	
Institutional distance	1.54	***	1.49	0.44	0.85	2.01	
Wholly-owned foreign sub.	0.73		0.76	0.23	−0.84	0.30	
Developing country ratio	0.30	***	0.31	0.19	0.24	0.37	
<i>Second sub-sample period (FY2003–2011)</i>							
Keiretsu membership	0.38	–	0.00	0.50	0.67	−1.08	
Horizontal keiretsu membership	0.17	–	0.00	0.38	1.90	1.97	
Vertical keiretsu membership	0.29	–	0.00	0.44	1.07	−0.85	
Multiple keiretsu membership	0.09	–	0.00	0.28	2.95	6.69	
Keiretsu group inclination	1.22	–	1.00	1.08	0.88	0.17	
Main bank ownership	0.02	–	0.02	0.02	0.02	0.00	
Foreign sales ratio	0.42	–	0.40	0.15	0.75	0.18	
International Herfindahl	0.77	–	0.81	0.14	−1.14	0.60	
Cultural distance	3.48	–	3.41	0.47	1.14	3.21	
Institutional distance	1.95	–	1.95	0.72	0.38	1.11	
Wholly-owned foreign sub.	0.73	–	0.78	0.26	−0.95	0.36	
Developing country ratio	0.41	–	0.40	0.21	0.30	0.71	
Panel B. Changes in the value of multinationality							
MNCq – DCqMean	Tobin's q of an MNC less mean Tobin's q of matching domestic firms						
MNCq – DCqMedian	Tobin's q of an MNC less median Tobin's q of matching domestic firms						
	Observations	MNCq – DCqMean			MNCq – DCqMedian		
		PS	SI	t-Test	PS	SI	t-Test
<i>First sub-sample period (FY1995–2002)</i>							
Total	1637	0.030	0.120	***	0.104	0.162	***
<i>Second sub-sample period (FY2003–2011)</i>							
Total	3480	−0.004	0.105	***	0.060	0.163	***
<i>Full sample period (FY1995–2011)</i>							
Total	3176	0.023	0.062	***	0.053	0.096	***

For both Panels A and B, the full sample period from FY1995 to 2011 is divided into two sub-samples: first sub-sample period is FY1995–2002; and the second sample sub-period is FY2003–2011. For Panel A, the first and second sub-sample periods, respectively, consist of 2498 and 4912 firm-year observations of multinational firms. The mean (Mean), median (Med), standard deviation (SDev), skewness (Skew), and kurtosis (Kurt) of each variable are reported. See Table 1 for definitions of variables. The t-test in Panel A tests for differences in means in firm characteristics between the two sub-sample periods. Firm financial data are from *Nikkei Financial QUEST* unless otherwise specified. Foreign subsidiary and domestic corporate ownership relations data are from Tokyo Keizai, including data from DataBank Series 2012 in two different data disks, for domestic group formation and foreign direct investment data of all listed Japanese firms. Tokyo Keizai data are compiled by Financial Data Solutions Co. Ltd. in Yokohama, Japan, for our use. For Panel B, see Table 3 for a description of the propensity score (PS) and the size-and-industry (SI) matching methods. The first and second sub-sample periods consist of 1637 and 3480, respectively, commonly matched firm-year observations of multinational firms. All variables are measured at the end of the fiscal year. ***, **, and * denote significance differences at the one, five, and ten percent levels (two-sided), respectively.

competition in global markets, especially from the Korean and Chinese MNCs, the Japanese government's attempt to “jump-start” the corporate sector out of its malaise of the “lost-decade” of the 1990s took the form of regulatory actions aimed at improving corporate governance which drove the weakening of the keiretsu structure.

On the heels of the establishment of the Financial Services Agency in 1998, starting in 2000 Japanese listed public firms were required to reveal consolidated accounts that included results of affiliates over which they had “de facto” control. This change in accounting rules restricted “tunneling,” a business group hallmark, and restructurings involving non-transparent resource transfers. Additionally, the April 2001 rules requiring corporations to report assets at their market values, rather than book values, plainly revealed the inadequate capital bases of the Japanese banks due to their large non-performing loan (NPL) portfolios. This regulation precipitated dumping of their cross share-holdings and other non-essential assets by banks. Moreover, to promote “Western” style corporate governance, new rules were also implemented in Japan's Commercial Code in April 2003. These rules, among others, pushed firms to replace their traditional system of internal auditors with a U.S. model of outside directors and an audit committee, and were

intended to have the effect of reducing board size to speed decision-making and to increase outside directors, throwing another blow to keiretsus' traditional *modus operandi* (Lincoln and Shimotani, 2009).

Motivated by mounting financial distress due to the large amount of NPLs and other weak assets accumulated during the 1990s, a series of defensive mega-mergers that substantially changed the structure of Japanese banking took place. In April 2001, the Bank of Tokyo-Mitsubishi together with Mitsubishi and Nippon Trust Banks created the Mitsubishi Tokyo Financial Group. In December 2002, the Sumitomo Mitsui Financial Group was established by the Sumitomo-Mitsui Bank, which itself had been created by the merger of Sumitomo and Sakura Banks in 2001. Finally, in January, 2003 the giant Mizuho Financial Group was formed by Mizuho Holdings, which included the Industrial Bank of Japan, Daiichi Kangyo Bank, Fuji Bank and Yasuda Trust Bank (Kawai, 2003). Among the strategic objectives of these mergers were the gaining of maximum market power and attaining economies of scale. As part of the combined banks' financial restructuring processes, substantial amounts of their cross-shareholdings with keiretsu group member companies were sold-off or eliminated, with the buyers being largely high-performing Japanese institutional investors and foreign investors. Schaefer (2006) presents evidence showing "stable" and "mutual" shareholdings, which peaked in the early 1990s, accelerating their decline in the 2000s.

While the value of multinationality derived by PS matching method for the full sample period is a 2.3% premium in mean and 5.3% premium in median, Panel B shows that in the first sample period (FY1995–2002) the MNC value premium is higher (3.0% and 10.4% premiums, respectively, in mean and median). In contrast, in the second sample period (FY2003–2011), the value of multinationality turned to a marginal discount (–0.4%) in mean, while remaining a premium (6.0%) in median. See Appendix 1 for details on the value of multinationality disaggregated by fiscal year.

Contraction in MNC value premiums (and turning to discounts) during FY2003–2011 can be explained by the changes occurring in the keiretsu structure. These are delineated as follows: (a) MNCs that were formerly keiretsu members lost the "group" benefits of internal capital markets, lower information asymmetries and risk-sharing, consequently impacting firm values negatively; (b) MNCs whose bank ownership ties were reduced or eliminated lost the advantages of "patient capital" previously provided by their main banks, thereby lowering firm value; and (c) MNCs that were no longer group members lost keiretsu groups' and main

Table 10

Difference-in-difference analysis with second-period slope dummies (2PSD).

	(1)	(2)	(3)
Multinationality (MNC)	0.031 (0.01)	0.035 (0.00)	0.050 (0.00)
Keiretsu group membership (KGM)	0.002 (0.77)	–0.011 (0.17)	–0.001 (0.95)
Interaction of MNC and KGM	0.011 (0.23)	0.007 (0.47)	–0.020 (0.21)
Main bank ownership	–2.082 (0.00)	–2.050 (0.00)	–2.047 (0.00)
Foreign sales ratio	0.289 (0.00)	0.287 (0.00)	0.287 (0.00)
Asian financial crisis	–0.003 (0.82)	–0.003 (0.80)	–0.003 (0.79)
Global financial crisis	–0.042 (0.00)	–0.053 (0.00)	–0.044 (0.00)
2PSD on MNC	–0.050 (0.00)	–0.054 (0.00)	–0.077 (0.00)
2PSD on KGM		0.028 (0.01)	0.005 (0.68)
2PSD on MNC * KGM			0.049 (0.02)
<i>Joint significance test on dummy variables</i>			
F-statistic	25.73	16.83	13.27
p-value (F-statistic)	(0.00)	(0.00)	(0.00)
<i>Year dummy variables are included in all regressions</i>			
<i>Regression statistics</i>			
Adjusted R-squared	0.052	0.052	0.052
F-statistic	46.05	44.17	42.37
p-Value (F-statistic)	(0.00)	(0.00)	(0.00)
Observations	15,774	15,774	15,774

The sample period is FY1995 to 2011. The dependent variable is industry-adjusted q, the firm's q ratio relative to its industry average, $FIRMq - INDqMean$. All models use a sample of 15,774 firm-year observations, as the full sample was reduced by 75 observations due to some keiretsu firm-year observations with missing lagged variables. MNC is 1 if a firm satisfies both foreign sales ratio being greater than 10%, and the number of host countries with controlled subsidiaries being equal to or greater than 2. $KGM = 1$ if a firm is either a horizontal or vertical keiretsu member, otherwise 0. $MNC * KGM$ is the interaction between MNC and KGM. If a firm-year observation is in the second sub-sample period (FY2003–2011), then the second-period slope dummy variable is 1 and otherwise 0. Interaction variables show the interactions between the second-period dummy and MNC, KGM and $MNC * KGM$. Each of these interaction variables represents the slope change of each corresponding variable in the second sub-sample period from FY2003–2011. Joint significance test statistics shown below these interaction terms are F-tests for H_0 : 2nd-period slope dummies are all equal to zero. See Table 1 for definitions of other variables. All explanatory variables are one-year lagged, except for MNC, Asian and global financial crisis dummies. The p-values are shown in parentheses, using White heteroscedasticity-consistent standard errors.

banks' assistance in bridging gaps in their host countries' institutional and infrastructure landscapes, especially in developing countries, hence, firm value was impaired.

Another potential explanation involves the acceleration in corporate mergers and acquisitions (M&A) happening in the second sub-sample period. These M&A activities were mainly “in-in” type deals, whereby Japanese companies acquired other Japanese firms (both MNCs and DCs), and an important consequence was the inevitability of redundancies in some Japanese MNCs' overseas networks. Post-acquisition, these MNCs' networks were characterized as having multiple foreign subsidiaries in the same host countries (i.e., increased concentration or depth of MNC networks). This can explain the reduction in the international Herfindahl in the second time period (FY2003–2011). According to the multinational network theory, these redundancies would impair firm value, causing contraction of multinational premiums. This is especially likely since Japanese acquirers were reluctant to lay-off redundant staff and/or sell-off surplus factories in order to avoid realizing losses.

5.2. Difference-in-difference analysis

Table 10 shows the results of a difference-in-difference analysis with second-period time dummies (for FY2003–2011) using industry-adjusted q for firm value. The sample includes 15,774 firm-year observations of MNCs and DCs.

In all models the MNC dummy variable is found to be positive (0.031 to 0.050) and significant. This implies a positive impact on value for MNCs compared to DCs and, thus, is supportive of the overall MNC value premium. However, in these same models, coefficients for the second-period slope dummies on MNC are negative and significant, indicating that multinationality exerts a negative influence on value for MNCs in the FY2003 to 2011 timeframe. This negative impact of multinationality on value in the later period may be due to the muted ability of keiretsu membership and main bank ownership interacting with host country environments to bridge institutional gaps. Simply put, as the power of keiretsu and main bank links diminishes, these organizational arrangements are less effective in overcoming the liabilities of newness and foreignness faced by MNCs.

An alternative explanation for the decline in the value of multinationality may be due to the higher concentration of foreign subsidiaries in firms' multinational networks in the second sub-period. As indicated previously, the international Herfindahl variable declined substantially between the first period of FY1995–2002 and the second period of FY2003–2011, signifying increased depth in firms' foreign subsidiary networks. Weakening keiretsu and the merger wave among the largest banks during this period propelled corporate consolidations (Lincoln and Shimotani, 2009; Taguchi et al., 2010), likely accounting for the increased depth in MNCs' overseas networks, which, as per Allen and Pantzalis (1996) and Lee and Makhija (2009), would be detrimental to firm value. However, it is worth noting that in the fully specified model (3), the second-period slope dummy on the interaction of MNC and keiretsu group membership is positive and significant, meaning that keiretsu membership still offers some benefits to MNCs in dealing with cultural and institutional distances.

5.3. Effects of international Herfindahl on the value of multinationality

Table 11 presents the effects of international Herfindahl (IH) on two alternative measures of the value of multinationality, including Dq_Mean (defined as $FIRMq - INDqMean$ or industry-adjusted q ratio) and DVq_Mean (defined as $MNCq - DCqMean$, via PS-matching). The results closely fit predictions of the multinational network theory.

In Panel A covering the full sample period (FY1995–2011), the highest quintile of IH (where mean IH = 0.873) displays significant value premiums, while the lowest quintile of IH (where mean IH = 0.463) exhibits significant value discounts. The difference between these quintiles of IH (highest minus lowest or HML) at 0.410 indicates a large divergence in the concentration of foreign subsidiaries within the MNCs' host country networks, and is supportive of the significant value differences shown in the two MNC value measures (0.138 and 0.085, for Dq_Mean and DVq_Mean , respectively). Consistent with the multinational network theory and the findings of Allen and Pantzalis (1996), Lee and Makhija (2009) and Chung et al. (2010), as the foreign subsidiaries of MNCs in the highest [lowest] quintile of IH are the most dispersed [concentrated] within their overseas networks, MNCs in the highest [lowest] quintile of IH can avail themselves of the most [least] valuable real options for profit maximization and risk hedging within their array of host countries.

In Panels B and C, which show the effects of IH for two sub-samples, respectively, a similar pattern is apparent, but with some notable differences. In the earlier period (Panel B), the highest and lowest quintiles of IH have means of 0.882 and 0.512, respectively, and, importantly, both quintiles exhibit value premiums (mostly significant). For example, the DVq_Mean metric is a premium of 0.092 for the highest IH quintile and also a premium 0.047 for the lowest IH quintile. In sharp contrast, in the later period (Panel C), the highest and lowest quintiles of IH are 0.870 and 0.447, respectively, and notably, the highest quintile of IH displays value premiums (which are smaller than those in the full sample), while the lowest quintile of IH exhibits value discounts (which are larger than those in the full sample). For example, here the DVq_Mean metric is a premium of 0.040 for the highest IH quintile, but a discount of -0.054 for the lowest IH quintile.

Taken together these results support the notion that the MNC value discounts observed during FY2003–2011 are attributable to the higher concentration of MNCs' foreign subsidiaries within their host country networks occurring in this timeframe. As suggested previously, this increased concentration of MNC networks was primarily the result of a rising trend of corporate mergers and acquisitions following on the heels of the partial dismantling of the keiretsu groups that was witnessed during the FY2003–2011 period.

Table 11

The effect of international Herfindahl on alternative measures of the value of multinationality.

	IH	Dq_Mean	DVq_Mean
<i>Panel A. Full sample: FY1995–2011</i>			
Highest IH quintile (N = 600)			
IH	0.873	0.064	0.055
p-Value		(0.00)	(0.00)
Lowest IH quintile (N = 647)			
IH	0.463	−0.073	−0.031
p-Value		(0.00)	(0.02)
Difference: HML	0.410	0.138	0.085
p-Value	(0.00)	(0.00)	(0.00)
<i>Panel B. First sub-sample: FY1995–2002</i>			
Highest IH quintile (N = 167)			
IH	0.882	0.119	0.092
p-Value		(0.00)	(0.00)
Lowest IH quintile (N = 162)			
IH	0.512	0.028	0.047
p-Value		(0.21)	(0.04)
Difference: HML	0.370	0.091	0.044
p-Value	(0.00)	(0.01)	(0.19)
<i>Panel C. Second sub-sample: FY2003–2011</i>			
Highest IH quintile (N = 433)			
IH	0.870	0.044	0.040
p-Value		(0.00)	(0.00)
Lowest IH quintile (N = 485)			
IH	0.447	−0.104	−0.054
p-Value		(0.00)	(0.00)
Difference: HML	0.423	0.148	0.094
p-Value	(0.00)	(0.00)	(0.00)
<i>Panel D. Differences between sub-samples</i>			
HML (first sub-sample period)	0.370	0.091	0.044
HML (second sub-sample period)	0.423	0.148	0.094
HML = (First − Second)	−0.053	−0.057	−0.050
p-Value	(0.00)	(0.00)	(0.01)

The sample period is FY1995 to 2011 and is divided into two sub-samples: first sub-sample period is FY1995–2002 and second sub-sample period is FY2003–2011. The initial sample of 3549 PS matched observations is reduced to 2893 after eliminating 656 observations without International Herfindahl (IH) measures for the entire period. For each year, the values of multinationality, Dq_Mean (defined as $FIRMq - INDqMean$) and DVq_Mean (defined as $MNCq - DCqMean$, via PS-matching), are sorted by IH into quintiles. The lowest IH quintile consists of the bottom 20% of IH observations while highest IH quintile consists of the top 20% of IH observations. When the IH measure is tied at the 20th or 80th percentiles, all tied observations are included in the lowest or the highest quintiles, respectively. Thus, N (the number of observations) is different between the lowest and the highest quintiles. HML = Highest Minus Lowest in IH quintiles; and HML = HML in first sub-sample minus HML in second sub-sample.

6. Conclusion

Existing work on corporate international diversification of U.S. firms is inconclusive, and is related partly to the issue of whether the endogeneity of the firm's decision to be diversified is adequately addressed. Whether there is a value premium for internationally diversified firms based in another major economy, such as Japan, is an open question. A parallel literature on business groups concerns whether business group affiliation influences firm performance. While business groups perform some positive functions by creating internal markets for capital and information, especially in developing countries with insufficient indigenous institutional infrastructure (Khanna and Palepu, 2000), there is also evidence on tunneling and other inefficient resource allocation within the group.

We study the combined value impact of corporate multinationality and business groups for Japanese industrial keiretsu firms. The keiretsu firms are especially interesting as they are heavily engaged in international business, and they also include both horizontal and vertical diversification types as well as main bank involvement. The fact that keiretsu firms are devoid of family control, unlike most business groups in other countries, also enables us to focus on the interaction of multinationality and the industrial organization characteristics of the business group, without complication from family control issues. We adapt the propensity score method used by Villalonga (2004a) in her industrial diversification work, which accounts for endogeneity of diversification, and construct samples of comparable domestic and multinational firms based on propensity score and other key firm-specific characteristics.

Our finding is a statistically significant 2.3% multinationality premium for the period of FY1995–2011, which demonstrates that for Japanese firms the benefits of corporate international diversification outweigh the costs. We further show that the multinationality premium is negatively impacted by keiretsu membership — this is due to tunneling in the horizontal keiretsu and dominance of

core firms over member suppliers in the vertical keiretsu. The multinationality value premium is also negatively related to main bank ownership, as main banks appropriate shareholders' wealth in favor of debt-holders and may induce over-investment by horizontal keiretsu firms. Finally, both vertical keiretsu group membership and main bank ownership positively impact the value of multinationality in developing countries, as they provide significant benefits to subsidiaries in host countries with poor infrastructure and inadequate capital markets.

The Japanese keiretsu has undergone significant changes in the first decade of the 2000s, resulting in the general weakening of the traditional ownership-based keiretsu system through a series of restructurings, including the consolidation of main banks, greater competition among and across member firms, improved corporate governance and accounting reforms. Even so, the basic conclusions regarding the multinationality premium and its determinants hold in the later part of the sample period of FY1995–2011.

The results of this study add to the debate on corporate international diversification and organization by providing new evidence of a significant multinationality premium for firms based in Japan, and by relating the multinationality premium to key characteristics of the keiretsu business group. These results show that the effect of international diversification interacts with the effect of business groups with varying influences depending on the industrial organization characteristics of the business group formation, such as vertical versus horizontal integration as well as main bank involvement. It is also shown that the value of multinationality is enhanced for group firms operating in developing countries with poor institutional infrastructures. An interpretation is that while corporate multinationality and business groups may be viewed as substitutes, as they are related negatively with each other, both are also substituting for inadequate indigenous institutional infrastructure in emerging markets. Finally, we note that the full implications of the changes in the keiretsu system and their effect on international strategies of Japanese firms remain an open issue for future study.

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Appendix 1. The value of multinationality based on Tobin's q by fiscal year

MNCq – DCqMean	Tobin's q of an MNC less mean Tobin's q of matching domestic firms				MNCq – DCqMedian	Tobin's q of an MNC less median Tobin's q of matching domestic firms		
	Observations	MNCq – DCqMean		t-Test		MNCq – DCqMedian		t-Test
MNCq – DCqMedian		PS	SI		PS	SI		
Fiscal year								
FY1995	117	0.021	0.064	***	0.046	0.083	***	
FY1996	171	0.003	0.067	***	0.021	0.094	***	
FY1997	149	0.030	0.044		0.079	0.100	**	
FY1998	208	0.064	0.099	***	0.110	0.149	***	
FY1999	167	0.055	0.081	**	0.108	0.130	**	
FY2000	212	0.066	0.073		0.110	0.105		
FY2001	230	0.029	0.079	***	0.057	0.100	***	
FY2002	232	0.050	0.065	*	0.092	0.090		
FY2003	170	0.001	0.054	***	0.007	0.068	***	
FY2004	218	0.025	0.072	***	0.065	0.094	***	
FY2005	233	0.021	0.100	***	0.062	0.148	***	
FY2006	215	0.004	0.075	***	0.060	0.138	***	
FY2007	188	–0.008	0.020	***	0.002	0.060	***	
FY2008	184	–0.038	–0.028		–0.051	–0.034		
FY2009	197	0.062	0.101	***	0.068	0.135	***	
FY2010	137	–0.023	0.004	***	0.030	0.044	*	
FY2011	148	0.001	0.043	***	–0.008	0.079	***	
Total observations	3176							

The sample period is FY1995 to 2011 (ending March 31), and the sample consists of 3176 commonly matched firm-year observations of multinational firms matched using the propensity score (PS) matching method and the size-and-industry (SI) matching method. See Table 3 for a detailed description of the PS and SI matching methods. All variables are measured at the end of the fiscal year. ***, **, and * denote significance differences at the one, five, and ten percent levels (two-sided), respectively.

Appendix 2. The value of multinationality using the alternative value-to-sales (VTSR or m) ratio

MNCm – DCmMean		Value-to-sales ratio (VTSR) of an MNC less mean VTSR of matching domestic firms					
MNCm – DCmMedian		Value-to-sales ratio (VTSR) of an MNC less median VTSR of matching domestic firms					
		MNCm – DCmMean			MNCm – DCmMedian		
	Observations	PS	SI	t-Test	PS	SI	t-Test
A. Full sample	3176	0.038	0.107	***	0.071	0.136	***
B. By fiscal year							
FY1995	117	0.179	0.216	**	0.205	0.234	*
FY1996	171	0.078	0.154	***	0.124	0.201	***
FY1997	149	0.091	0.126	*	0.144	0.191	**
FY1998	208	0.107	0.183	***	0.168	0.264	***
FY1999	167	0.092	0.158	***	0.187	0.218	
FY2000	212	0.112	0.148	***	0.176	0.192	
FY2001	230	0.118	0.132		0.136	0.157	
FY2002	232	0.092	0.094		0.126	0.120	
FY2003	170	–0.065	0.014	***	–0.092	0.015	***
FY2004	218	–0.067	0.046	***	–0.019	0.059	***
FY2005	233	–0.005	0.099	***	0.002	0.123	
FY2006	215	–0.028	0.088	***	–0.116	0.068	***
FY2007	188	–0.072	0.029		–0.021	0.073	***
FY2008	184	–0.011	0.067	***	0.001	0.075	***
FY2009	197	0.092	0.185	***	0.117	0.179	***
FY2010	137	–0.036	0.029	***	–0.032	0.050	***
FY2011	148	–0.003	0.065	***	0.030	0.076	**
C. By industry							
Food	137	0.096	0.460	***	0.402	0.439	**
Textiles	61	–0.164	–0.189		–0.126	–0.165	
Chem. & pharma.	675	–0.102	–0.005	***	–0.020	0.061	***
Glass & ceramics	115	0.392	0.388		0.391	0.388	
Oil, coal & rubber	9	–0.045	–0.010		0.019	–0.006	
Iron, steel, nonferrous metals	249	–0.052	0.014	***	0.003	0.040	***
Metal products	64	0.220	0.195		0.257	0.239	
Machinery	602	0.069	0.197	***	0.108	0.235	***
Electrical equipment	848	0.069	0.129	***	0.070	0.145	***
Transportation equipment	330	–0.010	–0.021		–0.011	–0.019	
Precision instruments	86	0.089	0.128		0.098	0.163	***

The PS matching method uses the propensity to be MNC derived from the logistic regression model to match MNCs with similar DCs as follows: (1) within each fiscal year and industry (2-digit SIC code), observations in the MNC and DC groups are sorted from lowest to highest propensity score, and DC observations with scores lower (higher) than the minimum (maximum) score for MNCs are discarded; (2) firms are divided into blocks defined by quantiles of the propensity score distribution for MNCs; (3) balancing tests are performed for overall propensity score and 11 firm characteristics – tests of difference in means between the MNCs and DCs within each block; (4) if all blocks are well-balanced, the matching process ends; if not, unbalanced blocks are divided into finer blocks and step 3 repeats. Next, blocks with fewer than five matching DCs are discarded. Thus, the PS method ensures that MNCs and DCs, despite differing in a number of characteristics, are comparable within the blocks defined. Finally, the mean (median) value-to-sales (VTSR) ratio of the DCs within each block, DCmMean (DCmMedian), is assigned to each of the MNCs within that block to derive the value of multinationality, MNCm – DCmMean (MNCm – DCmMedian) for each MNC firm-year observation. In contrast, the size and industry (SI) matching method initially matches each MNC by fiscal year with DCs at the 4-digit SIC code industry level. When fewer than five matching DCs are achieved, matching proceeds to the 3-digit code industry level, and so on. At each level, matches are discarded when the absolute size difference between the MNC and the matched DC exceeds the first quartile of the size difference for the DC sample matched with that particular MNC. Using the SI method 7%, 6% and 87% of the sample are matched at the 4-digit, 3-digit and 2-digit SIC code levels, respectively. The sample consists of 3176 commonly matched firm-year observations of multinational firms from fiscal years 1995 to 2011. All variables are measured at the end of the fiscal year. ***, **, and * denote significance differences at the one, five, and ten percent levels (two-sided), respectively.

Appendix 3. PS matching results for MNCs by year and industry

	Matched				Unmatched	Total MNCs
	(a) Level 1	(b) Level 2	(a) + (b)	(% matched)		
A. By fiscal year						
1995	27	90	117	(46.1%)	137	254
1996	88	83	171	(62.9%)	101	272
1997	52	97	149	(50.5%)	146	295
1998	110	98	208	(66.2%)	106	314
1999	55	112	167	(53.4%)	146	313

(continued)

	Matched				Unmatched	Total MNCs
	(a) Level 1	(b) Level 2	(a) + (b)	(% matched)		
2000	56	156	212	(50.1%)	211	423
2001	70	160	230	(50.7%)	224	454
2002	56	176	232	(49.6%)	236	468
2003	55	115	170	(32.0%)	361	531
2004	71	147	218	(40.4%)	322	540
2005	93	140	233	(42.1%)	320	553
2006	95	120	215	(37.9%)	353	568
2007	49	139	188	(32.4%)	392	580
2008	59	125	184	(31.6%)	399	583
2009	57	140	197	(33.3%)	394	591
2010	0	137	137	(24.8%)	415	552
2011	5	143	148	(26.8%)	405	553
<i>B. By industry</i>						
Food	91	46	137	(78.7%)	37	174
Textiles	9	52	61	(20.1%)	242	303
Chemical & pharma.	188	487	675	(47.7%)	740	1415
Glass & ceramics	54	61	115	(33.8%)	225	340
Oil, coal & rubber	3	6	9	(5.4%)	159	168
Iron, steel nonferrous metals	9	240	249	(48.7%)	262	511
Metal products	17	47	64	(24.4%)	198	262
Machinery	82	520	602	(38.8%)	948	1550
Electrical equipment	280	568	848	(47.5%)	937	1785
Transportation equipment	247	83	330	(34.1%)	638	968
Precision instruments	18	68	86	(23.4%)	282	368
Total	998	2178	3176	(40.5%)	4668	7844

The sample period is FY1995 to 2011. This Appendix follows Table 3 and Appendix 1, and shows the detailed PS matching results at each level as matching moves from rougher to finer blocks. The matching rule between MNCs and DCs is as follows: (1) within each fiscal year and industry (2-digit SIC code), observations in the MNC and DC groups are sorted from the lowest to the highest propensity score, and DC observations with scores lower (higher) than the minimum (maximum) score for MNCs are discarded; (2) firms are divided into blocks defined by quintiles of the propensity score distribution for MNCs; (3) balancing tests are performed for overall propensity score and 11 firm characteristics – tests of difference in means between the MNCs and DCs within each block; (4) if all blocks are well-balanced, the matching process ends; if not, unbalanced blocks are divided into finer blocks and step 3 repeats. Next, blocks with fewer than five matching DCs are discarded. Matching was completed at level 2. As a result, a total of 3176 (40.4%) of the 7844 MNC firm-year observations were matched, 12.7% and 27.7% at level 1 and level 2, respectively.

References

- Abegglen, J., Stalk Jr., G., 1985. *Kaisha: The Japanese Corporation*. Basic Books, New York.
- Allen, L., Pantzalis, C., 1996. Valuation of the operating flexibility of multinational corporations. *J. Int. Bus. Stud.* 27, 633–653.
- Almeida, H., Wolfenzon, D., 2006. Should business groups be dismantled? The equilibrium costs of efficient internal capital markets. *J. Financ. Econ.* 79, 99–144.
- Almeida, H., Park, S.Y., Subrahmanyam, M., Wolfenzon, D., 2011. The structure and formation of business groups: evidence from Korean chaebols. *J. Financ. Econ.* 99, 447–475.
- Ang, J., Constand, R., 2002. The portfolio behavior of Japanese corporations' stable shareholders. *J. Multinat. Financ. Manag.* 12, 89–106.
- Aoki, M., Patrick, H., Shread, P., 1994. The Japanese main bank system: an introductory overview. In: Aoki, M., Patrick, H. (Eds.), *The Japanese Main Bank System*. Oxford University Press, Oxford, U.K., pp. 3–50.
- Baek, J.-S., Kang, J.-K., Lee, I., 2006. Business groups and tunneling: evidence from private securities offerings by Korean chaebols. *J. Financ.* 61 (5), 2415–2449.
- Barney, J.B., 1991. Firm resources and sustained competitive advantage. *J. Manag.* 17 (1), 99–120.
- Belsley, D., Kuh, E., Welsch, R., 1980. *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*. John Wiley and Sons, New York.
- Berger, P., Ofek, E., 1995. Diversification's effect on firm value. *J. Financ. Econ.* 37, 39–65.
- Buckley, P., Casson, M., 1976. The future of the multinational enterprise. Chapter 2 A Long-run Theory of the Multinational Enterprise, pp. 32–65.
- Campa, J., Kedia, S., 2002. Explaining the diversification discount. *J. Financ.* 57, 1731–1762.
- Chakrabarti, A., Singh, K., Mahmood, I., 2007. Diversification and performance: evidence from East Asian firms. *Strateg. Manag. J.* 28, 101–120.
- Choi, J., Jiang, C., 2009. Does multinationality matter? Implications of operational hedging for the exchange risk exposure. *J. Bank. Financ.* 33, 1973–1982.
- Chung, C., Lee, S.-L., Beamish, P., Isobe, T., 2010. Subsidiary expansion/contraction during times of economic crisis. *J. Int. Bus. Stud.* 41, 500–516.
- Click, R., and Harrison, P., 2000. Does multinationality matter? Evidence of value destruction in US multinational corporations, unpublished working paper, George Washington University, Washington, D.C.
- Dastidar, Protti, 2009. International corporate diversification and performance: does firm self-selection matter? *J. Int. Bus. Stud.* 40, 71–85.
- Dehejia, R., Wahba, S., 2001. Propensity score matching methods for non-experimental causal studies. *Rev. Econ. Stat.* 84, 151–161.
- Denis, D., Denis, D., Yost, K., 2002. Global diversification, industrial diversification, and firm value. *J. Financ.* 57, 1951–1979.
- Dewenter, K., Warther, V., 1998. Dividends, asymmetric information, and agency conflicts: evidence from a comparison of the dividend policies of Japanese and U.S. firms. *J. Financ.* 53, 879–904.
- Dewenter, K., Novaes, W., Pettway, R., 2001. Visibility versus complexity in business groups: evidence from Japanese keiretsu. *J. Bus.* 74, 79–100.
- Doukas, J., Pantzalis, C., 2003. Geographic diversification and agency costs of debt of multinational firms. *J. Corp. Financ.* 9, 59–92.
- Doukas, J., Travlos, N., 1988. The effect of corporate multinationalism on shareholders' wealth: evidence from international acquisitions. *J. Financ.* 43, 1161–1175.
- Dow, S., McGuire, J., 2009. Propping and tunneling: empirical evidence from Japanese keiretsu. *J. Bank. Financ.* 33, 1817–1828.
- Dunning, J., 1988. The eclectic paradigm of international production: a restatement and some possible extensions. *J. Int. Bus. Stud.* 19, 1–31.
- Fauver, L., Houston, J., Naranjo, A., 2003. Capital market development, international integration, legal systems, and the value of corporate diversification: a cross-country analysis. *J. Financ. Quant. Anal.* 38, 135–157.

- Fauver, L., Houston, J., Naranjo, A., 2004. Cross-country evidence on the value of corporate industrial and international diversification. *J. Corp. Financ.* 10, 729–752.
- Ferris, S., Kumar, R., Sarin, A., 1995. The role of corporate groupings in controlling agency conflicts: the case of keiretsu. *Pac. Basin Financ. J.* 3, 319–335.
- Ferris, S., Kim, K., Kitsabunnarat, P., 2003. The costs (and benefits?) of diversified business groups: the case of Korean chaebols. *J. Bank. Financ.* 27, 251–273.
- Gande, A., Schenzler, C., Senbet, L.W., 2009. Valuation effects of global diversification. *J. Int. Bus. Stud.* 40, 1515–1532.
- Gedajlovic, E., Shapiro, D.M., 2002. Ownership structure and firm profitability. *Acad. Manag. J.* 45, 565–575.
- Greenwood, R., Foley, C.F., Chernenko, S., 2012. Agency costs, mispricing, and ownership structure. *Financ. Manag.* 41, 885–914.
- Hackett, S., Srinivasan, K., 1998. Do supplier switching costs differ across Japanese and U.S. multinational firms? *Jpn. World Econ.* 10, 13–32.
- Hofstede, G., 1983. The cultural relativity of organizational practices and theories. *J. Int. Bus. Stud.* 14, 75–89.
- Horiba, Y., Yoshida, K., 2003. Determinants of the initial decisions by Japanese firms to undertake foreign direct investment. In: Choi, J.J., Hiraki, T. (Eds.), *Japanese Finance: Corporate Finance and Capital Markets in Changing Japan*. Elsevier, Oxford, U.K., pp. 59–86.
- Jensen, M.C., 1986. Agency cost of free cash flow, corporate finance, and takeover. *Am. Econ. Rev.* 76, 323–329.
- Joh, S.W., 2003. Corporate governance and firm profitability: evidence from Korea before the economic crisis. *J. Financ. Econ.* 68, 287–322.
- Johansson, J., Yip, G., 1994. Exploiting globalization potential: U.S. and Japanese strategies. *Strateg. Manag. J.* 15, 579–601.
- Kang, J., Liu, W., 2007. Is universal banking justified? Evidence from bank underwriting of corporate bonds in Japan. *J. Financ. Econ.* 84, 142–186.
- Kang, J., Shivdasani, A., 1997. Corporate restructuring during performance declines in Japan. *J. Financ. Econ.* 46, 29–65.
- Kawai, M., 2003. Japan's banking system: from the bubble and crisis to reconstruction, unpublished working paper, University of Tokyo, Tokyo, Japan.
- Khanna, T., Palepu, K., 2000. Is group affiliation profitable in emerging markets? An analysis of diversified Indian business groups. *J. Financ.* 55, 867–892.
- Kogut, B., 1985. Designing global strategies: profiting from operational flexibility. *Sloan Manag. Rev.* 27–38 (Fall).
- Kogut, B., Singh, H., 1988. The effect of national culture on the choice of entry mode. *J. Int. Bus. Stud.* 19, 411–432.
- Kogut, B., Zander, U., 1993. Knowledge of the firm and evolutionary theory of the multinational corporation. *J. Int. Bus. Stud.* 24, 625–646.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1998. Law and finance. *J. Polit. Econ.* 106, 1113–1155.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 2002. Investor protection and corporate valuation. *J. Financ.* 57, 1147–1170.
- Lang, L., Stulz, R., 1994. Tobin's q, corporate diversification, and firm performance. *J. Polit. Econ.* 102, 1248–1280.
- Lee, S.-L., Makhija, M., 2009. The effect of domestic uncertainty on the real options value of international investments. *J. Int. Bus. Stud.* 40, 405–420.
- Lee, P., O'Neill, H., 2003. Ownership structures and R&D investments of U.S. and Japanese firms: agency and stewardship perspectives. *Acad. Manag. J.* 46, 212–225.
- Li, D., Li, S., 1996. A theory of corporate scope and financial structure. *J. Financ.* 51, 691–709.
- Lincoln, J. and Shimotani, M., 2009. Whither the Keiretsu, Japan's business networks? How were they restructured? What did they do? Why are they gone?, unpublished working paper, University of California, Berkeley, CA.
- Lins, K., 2003. Equity ownership and firm value in emerging markets. *J. Financ. Quant. Anal.* 38, 159–184.
- Lins, K., Servaes, H., 1999. International evidence on the value of corporate diversification. *J. Financ.* 54, 2215–2239.
- Lu, J., Beamish, P., 2004. International diversification and firm performance: the S-curve hypothesis. *Acad. Manag. J.* 47, 598–609.
- Morck, R., Nakamura, M., 1999. Banks and corporate control in Japan. *J. Financ.* 54, 319–339.
- Morck, R., Yeung, B., 1991. Why investors value multinationality. *J. Bus.* 64, 165–187.
- Morck, R., Nakamura, M., Shivdasani, A., 2000. Banks, ownership structure and firm value in Japan. *J. Bus.* 73, 539–568.
- Myerson, R., 1982. Optimal coordination mechanisms in generalized principal–agent problems. *J. Math. Econ.* 10, 67–81.
- Pantazis, C., 2001. Does location matter? An empirical analysis of geographic scope and MNC market valuation. *J. Int. Bus. Stud.* 32, 133–155.
- Prowse, S., 1990. Institutional investment patterns and corporate financial behavior in the United States and Japan. *J. Financ. Econ.* 27, 43–66.
- Rajan, R., Servaes, H., Zingales, L., 2000. The cost of diversity: the diversification discount and inefficient investment. *J. Financ.* 55, 35–80.
- Sambharya, R., Banerji, K., 2006. The effect of keiretsu affiliation and resource dependencies on supplier firm performance in the Japanese automobile industry. *Manag. Int. Rev.* 46, 7–37.
- Schaede, U., 2006. The strategic logic of Japanese *keiretsu*, main banks and cross-holdings, revisited, unpublished working paper, Columbia University, New York, NY.
- Scharfstein, D., Stein, J., 2000. The dark side of internal capital markets: divisional rent-seeking and inefficient investments. *J. Financ.* 55, 2537–2564.
- Shenkar, O., 2001. Cultural distance revisited: towards a more rigorous conceptualization and measurement of cultural differences. *J. Int. Bus. Stud.* 32, 519–535.
- Stein, J., 1997. Internal capital markets and the competition for corporate resources. *J. Financ.* 52, 111–133.
- Tabeta, N., 1998. The Kigyo Keiretsu organization and opportunism in the Japanese automobile manufacturing industry. *Asia Pac. J. Manag.* 15, 1–18.
- Taguchi, H., Yanagawa, T. and Harita, M., 2010. The dynamic impacts of M&A on employment in Japan, unpublished working paper, Policy Research Institute, Ministry of Japan, Tokyo, Japan.
- Tihanyi, L., Griffith, D., Russell, C., 2005. The effect of cultural distance on entry mode choice, international diversification, and MNE performance: a meta-analysis. *J. Int. Bus. Stud.* 36, 270–283.
- Tong, T., Reuer, J., 2007. Real options in multinational corporations: organizational challenges and risk implications. *J. Int. Bus. Stud.* 38, 215–230.
- Tseng, C.-H., Tansuhaj, P., Hallagan, W., McCullough, J., 2007. Effects of firm resources on growth in multinationality. *J. Int. Bus. Stud.* 38, 961–974.
- Villalonga, B., 2004a. Does diversification cause the “diversification discount?” *Financ. Manag.* 33, 5–27.
- Villalonga, B., 2004b. Diversification discount or premium? New evidence from the business information tracking series. *J. Financ.* 59, 479–506.
- Walker, M., 2005. Industrial groups and investment efficiency. *J. Bus.* 78, 1973–2001.
- Weinstein, D., Yafeh, Y., 1998. On the costs of a bank-centered financial system: evidence from the changing main bank relations in Japan. *J. Financ.* 53, 635–672.
- Wernerfelt, B., 1984. A resource-based view of the firm. *Strateg. Manag. J.* 5 (2), 171–180.
- Williamson, O., 1996. *The Mechanisms of Governance*. Oxford University Press, Oxford, U.K.
- Xu, D., Shenkar, O., 2002. Institutional distance and the multinational enterprise. *Acad. Manag. Rev.* 27, 608–618.
- Yafeh, Y., 2000. Corporate governance in Japan: past performance and future prospects. *Oxf. Rev. Econ. Policy* 16, 74–84.