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Abstract: We examine the relationship between cross-shareholdings and the information environment. This issue is important because the separation of ownership and control allows managers to act exclusively in their own interests. Despite numerous studies on the influences of other types of ownership structures, including family, institutional investor, and block ownership structures, little is known about how cross-shareholdings influence management incentives. We highlight the Japanese market, where cross-shareholding is historically one of the prominent ownership structures. Using a unique database detailing the level of cross-shareholdings, we find that higher cross-shareholdings relate to (1) greater information asymmetry in the market, (2) higher earnings quality, and (3) lower firm value. The results are consistent with the quiet life hypothesis, which predicts management avoids difficult decisions and costly actions when isolated from market pressures.

Keywords: Corporate governance, cross-shareholding, information asymmetry, earnings quality, firm value.

JEL classification: G32, M41

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1 Introduction

Ever since the issues surrounding the separation of security ownership and control were first addressed, it has been argued that ownership structures influence the information environment (Fama 1980; Fama and Jensen 1983). Prior literature illustrates how different classes of stakeholders, such as corporate insiders, family owners, institutional investors, and block shareholders, affect the information environment differently (e.g., El-Gazzar 1998; Heflin and Shaw 2000; Fan and Wong 2002; Ali, Chen, and Radhakrishnan 2007; Gul, Kim, and Qiu 2010).[1] Ownership structures vary between countries, but similarities exist. Cross-shareholding, a common format in several European and East Asian countries, is but one example (La Porta, Lopez-De-Silanes, and Shleifer 1999; Claessens, Djankov, and Lang 2000; Khanna and Yafeh 2007; Masulis, Pham, and Zein 2011). Despite such common usage, cross-shareholding has not been widely studied, particularly with regard to how its use affects the information environment in the market. We aim to fill this gap by providing empirical evidence of the relationship between cross-shareholding and the information environment, focusing on information asymmetry between investors. Japan provides an ideal research opportunity because it exhibits great variation in ownership structure (Jackson and Miyajima 2007; Nitta 2008) while cross-shareholding is still one of the important ownership structures characterizing the market.

Previous studies do not pay much attention on the impact of management incentives on the relationship between concentrated ownership and the information environment. Such a stream of research could, however, be reasonable, because concentrated ownership is likely to allow controlling owners to effectively control corporate policy decisions. However, corporate owners, by nature, delegate decisions to managers and only take action when necessary, since the cost to monitor management is a salient factor. In turn, there should be conflict between concentrated owners and managers. We therefore aim not only to investigate the relationship between cross-shareholding and the information

[1] Armstrong, Guay, and Weber (2010) provide an excellent review about recent studies that investigate the relationship between ownership structure and corporate disclosure.

environment, but also to clarify the management incentives behind the relationship.

Cross-held corporate shareholders could play the role of supportive allies who protect managers from external monitoring forces, thereby reducing the market's disciplinary effectiveness in the corporate control and monitoring of managerial opportunism. Cross-shareholding thus increases information asymmetry between managers and outside investors because isolating managers from market discipline allows them to become entrenched and less responsive to outside investors (entrenchment hypothesis).[2] As a result, less private information is available to outsiders because of the decreased level of disclosure.[3] It is also possible for sophisticated investors to take advantage of this situation, since this insider information is available for their exclusive use, thereby creating information asymmetry among outside (informed and uninformed) investors. For example, institutional investors have superior abilities and more resources to seek and obtain private information than individual investors do. When managers are isolated from the day-to-day operations of capital markets, they become less apt to divulge private or insider information to the public, thus providing more opportunities for institutional investors to leverage their informational advantages over more naive investors. Therefore, in cross-shareholding structures, the beneficiaries of informational advantages are not necessarily limited to company insiders.

Conversely, it is argued that cross-shareholding structures improve a firm's information environment by reducing information asymmetry between investors. The literature suggests that cross-shareholding structures are developed to protect against outside takeovers (Aoki and Patrick 1994; Morck and Nakamura 1999). Managers tend to be operationally

[2]Withholding private information could be a good corporate strategy, because cross-shareholding can prevent proprietary information from leaking to the public (proprietary cost hypothesis). The proprietary cost hypothesis also predicts a negative association between the level of cross-shareholding and information asymmetry. Further details of the proprietary cost hypothesis are discussed later.

[3]However, cross-shareholding could improve a firm's information environment because there is a direct way to share information between corporate insiders and shareholders through their mutual ownership relationship. For instance, Berglöf and Perotti (1994) show that the cross-shareholdings of Japanese companies mitigate information asymmetry between management and investors. Nevertheless, such information flows could enhance information asymmetry between shareholders. Thus, even if cross-shareholdings mitigate information asymmetry between managers and investors to some extent, it could have negative effects on information asymmetry between investors.

shortsighted when faced with takeover threats, while the existence of such protective measures promotes more long-term perspectives (Kang and Stulz 1996). In this scenario, the interests of management teams benefiting from these protective structures could become more aligned with those of shareholders, which could result in higher-quality financial reporting (alignment hypothesis). Moreover, because a firm's higher-quality financial disclosures improve its information environment, information asymmetry between outside and inside investors could be reduced (Armstrong, Balakrishnan, and Cohen 2012). In keeping with this spirit, Ferreira and Laux (2007) report that firms with fewer anti-takeover provisions exhibit a higher probability of informed trading (PIN).

Although the above discussion assumes that managers' interests are likely to be either entrenched or aligned with shareholder interests when they are insulated from the market's disciplinary effect, there is another behavioral scenario in which some managers may find themselves. Specifically, it is plausible that managers enjoy a "quiet life" when they are insulated from takeover threats (quiet life hypothesis). Such managers are likely to avoid difficult decisions (Bertrand and Mullainathan 2003; Giroud and Mueller 2010). In keeping with this notion, Zhao and Chen (2008, 2009) show that managers enjoying the quiet life are less likely to engage in earnings management when their firms have takeover protection. Although better earnings quality could improve the firm's information environment, managers enjoying the quiet life are less likely to take proactive measures to improve the information environment: Proactive disclosure activities involve additional costs and attract public attention that could jeopardize their quiet life. Accordingly, under the quiet life hypothesis, cross-shareholding structures are likely to increase information asymmetry between investors.

Using cross-shareholding data for Japanese listed companies, we find that cross-shareholdings are positively related to the PIN. This implies that information asymmetry between investors is high for firms with higher proportions of cross-shareholdings. The evidence is robust for other information asymmetry proxies, such as an alternative PIN measure (adjusted PIN) and the bid-ask spread. The results indicate that either the entrenchment

hypothesis or the quiet life hypothesis is more plausible than the alignment hypothesis.

To distinguish between the entrenchment hypothesis and the quiet life hypothesis, we conduct further analysis of the effect of cross-shareholding on earnings quality. Entrenched managers are more likely to engage in opportunistic earnings management because they need to conceal expropriation activities and the weakened monitoring of management behavior could overlook such opportunistic behavior. In contrast, managers enjoying the quiet life are unlikely to engage in earnings management. Such managers have less incentive to expropriate shareholder wealth, since this would require concealment or otherwise entail difficult decisions and costly efforts. The results show that higher cross-shareholding is correlated with higher earnings quality, which is consistent with the quiet life hypothesis. The evidence is consistent with four alternative earnings quality measures using accruals. This suggests that managers working within higher-cross-shareholding structures have less incentive to distort earnings and tend to enjoy quiet lives with stable positions.

To assure the robustness of our findings, which support the quiet life hypothesis, we conduct an additional analysis. Specifically, we examine the association between cross-shareholdings and firm value and discover that more cross-shareholdings lower firm value, as measured by Tobin's Q and the return on net operating assets. This relationship again supports the quiet life hypothesis. Taken together with this study's other results, the quiet life hypothesis is the most likely theory to explain management behavior when working within highly cross-held structures that are protected from market pressures.

Our research contributes to the literature in the following ways. First, to the best of our knowledge, this study is the first to comprehensively investigate the relationship between cross-shareholdings and the information environment in the market. Furthermore, we find that management teams that enjoy the quiet life cause a positive relationship between cross-shareholdings and information asymmetry. Our results enhance the discussion concerning the effects of cross-shareholdings, which are common structures in several countries.

Second, we contribute to the literature concerning ownership structures and their consequences by using a unique database detailing the level of cross-shareholdings, which to date has not been adequately measured. Recent debates have explored how family firms and/or companies' control-enhancing mechanisms (e.g., cross-shareholdings, stock pyramids, and issues of dual-class shares) work in the marketplace, particularly outside of the United States (Bebchuk, Kraakman, and Triantis 2000; Khanna and Palepu 2000; Almeida, Park, Subrahmanyam, and Wolfenzon 2011; Masulis, Pham, and Zein 2011). Our results provide new evidence on how one particular mechanism, cross-shareholding, affects the information environment.

Third, our results support the quiet life view in situations where management is isolated from market discipline. The results imply that management teams working within high-cross-shareholding environments are less likely to distort accounting information; they also do not invest in projects that maximize firm value and do not try to resolve information asymmetry between investors. This adds to the discussion concerning the consequences of introducing anti-takeover protection devices, which will be useful not only for academics but also for policy makers.

The remainder of the paper is organized as follows: In the next section, we present the institutional background and hypothesis development, followed by an explanation of the research methodology. We then describe the sample and empirical model and present the results of the empirical analyses. The final section concludes the paper.

2 Institutional Background and Hypothesis Development

2.1 Institutional background in Japan

Corporate ownership in Japan has been characterized by stable shareholders, with reciprocal shareholdings among many corporations and banks (Nakatani 1984; Hoshi, Kashyap, and Scharfstein 1990; Aoki and Patrick 1994). While the largest single shareholder typically had less than a 5% stake, the web of small reciprocal cross-shareholdings often

accounted for 20% of shares, which resulted in approximately 40% of all Japanese stock being held by stable shareholders, at least until the early 1990s (Jackson and Miyajima 2007). When the Japanese economy was hit by the banking crisis of the 1990s, these close relationships between companies began to fade. Nitta (2008) illustrates the gradual decline of cross-shareholding relationships from the middle of the 1990s to the early 2000s.

However, the level of cross-shareholding remained relatively stable in the 2000s, although much lower than in the 1990s. Importantly, it is argued that cross-shareholdings resurged in the middle of the 2000s (Nitta 2009). Cross-shareholding was highlighted as an anti-takeover provision in the Japanese market, since hostile takeover bids by international investment funds increased in the 2000s.[4] In the meanwhile, this trend began to reverse in 2008 as the unwinding of cross-shareholdings became prevalent.[5] While the importance of cross-shareholdings within the Japanese economy has decreased moderately over the last two decades, it is still a distinguishing practice. Interestingly, cross-shareholding is argued as having been an effective corporate group strategy for information sharing between stakeholders in the past, whereas it has been recently highlighted as a takeover protection device.

2.2 Hypothesis development

According to the literature, when companies are isolated from market discipline through ownership structures such as block ownership, family ownership, or corporate insider ownership, shareholders and management are likely to be either entrenched or to be aligned with (Shleifer and Vishny 1986; La Porta et al. 1999; Attig, Fong, Gadhoum, and Lang 2006). There is also another plausible theory: that management is simply

[4]They were mostly failed, but it was enough to cause Japanese firms to take measures to lower takeover threat (e.g., "Increased steady shareholdings," *Nikkei Kinyu Shimbun*, July 30, 2007; Yamazaki 2007).

[5]This reversal was again partly due to globalization, as Japanese firms were forced to comply with global accounting standards (International Financial Reporting Standards) with regard to financial statement preparation and expanded corporate disclosures. As a result, it became difficult for these firms to justify these cross-holding relationships. According to a survey conducted by Nomura Securities, the ratio of cross-shareholding of listed Japanese companies reached record low levels of 10.9% as of the fiscal year-end in 2012 (*Nikkei Quick News*, June 27, 2013).

reluctant to make difficult decisions and prefers to just enjoy the quiet life when the firm is less subject to takeover threat (Bertrand and Mullainathan 2003). Although our ultimate purpose is to investigate the relationship between cross-shareholdings and information asymmetry in the market, we also aim to clarify management incentives behind the structure. We therefore suggest that the management of cross-held companies behave in certain ways, as explained by either the entrenchment, alignment, or quiet life hypothesis. To determine the relevant hypothesis, we first investigate the information environment in the market and subsequently highlight earnings quality and firm value.

Entrenchment hypothesis assumes that management does not behave in the best interests of other shareholders because cross-held shareholders could play the role of supportive allies and are thereby isolated from market disciplinary effects. Because such managers behave opportunistically at the expense of shareholder interests, they would adversely affect firm value, engage in opportunistic earnings manipulations, and not be forthcoming in corporate disclosures in order to protect their personal interests. Therefore, if the entrenchment hypothesis is supported, we will obtain the following results: (1) Information asymmetry in the market is higher, (2) earnings quality is lower, and (3) firm value is lower for firms with higher cross-shareholdings.

One could think that the incentive to prevent proprietary information from leaking out to the public can also explain the same relationships as the entrenchment hypothesis does. Since the disclosure of proprietary information should be unfavorable to a firm, managers prefer to withhold information (e.g., Verrecchia 1983). Fan and Wong (2002) show that more highly concentrated ownership allows managers to engage in less public disclosure. A proprietary cost explanation would predict a negative relationship between cross-shareholdings and information asymmetry or earnings quality while withholding proprietary information does not necessarily jeopardize corporate value. We do not formally develop the hypothesis concerning proprietary cost but discuss it when relevant to interpreting the results.

The alignment hypothesis argues that management's interests are likely to align with

shareholder's interests. Managers are inclined to be myopic in situations where the threat of hostile takeover is high and, in turn, tend to invest in projects that provide only short-term profits, even if those projects would deteriorate firm value in the long run. Thus, when increasing cross-shareholding reduces takeover threats, managers enjoy more security, have longer-term perspectives, and are more motivated to act in the best interests of shareholders. Accordingly, the alignment hypothesis expects favorable consequences to cross-shareholdings and consequently (1) information asymmetry in the market is lower, (2) earnings quality is higher, and (3) firm value is higher for firms with higher proportions of cross-shareholdings.

Finally, under the quiet life hypothesis, management is expected to avoid difficult decisions and costly efforts when they are protected from takeovers. Such managers will not create earnings distortions nor will they invest in projects that maximize firm value because such acts tend to cost them time and money. With respect to information asymmetry in the market, they are unlikely to actively disclose corporate information to external parties, especially voluntarily, again because of costs. Such management behaviors will exacerbate information asymmetry in the market. Taken together, the quiet life hypothesis expects (1) information asymmetry in the market to be greater, (2) earnings quality to be higher, and (3) firm value to be lower for firms with more cross-shareholdings.

3 Research Methodology

3.1 Information asymmetry proxy

We use the PIN as a proxy for information asymmetry in the market. Easley, Hvidkjaer, and O'Hara (2002, hereafter EHO) propose a structural model based on the work of Glosten and Milgrom (1985) and Easley and O'Hara (1987) to estimate the PIN. As

EHO, we define the PIN as follows:

$$PIN = \frac{\alpha\mu}{\alpha\mu + \varepsilon_b + \varepsilon_s}, \tag{1}$$

where α is the probability of private information event, μ is the rate of informed trade arrival, and ε_b (ε_s) is the arrival rate of uninformed buy (sell) orders.[6]

Although the PIN developed by EHO is one of the most common measures of information asymmetry in prior studies, it has room for improvement. Duarte and Young (2009, hereafter DY) extend the EHO model and decompose the PIN into two elements: an information asymmetry component (adjusted PIN, or $adj.PIN$) and a liquidity-related component by introducing symmetric buy and sell order flow shocks. In the extended DY model,

$$adj.PIN = \frac{\alpha\left[(1-\delta)\,\mu_b + \delta\mu_s\right]}{\alpha\left[(1-\delta)\,\mu_b + \delta\mu_s\right] + (\Delta_b + \Delta_s)\left[\alpha\theta' + (1-\alpha)\,\theta\right] + \varepsilon_b + \varepsilon_s}, \tag{2}$$

where δ is the probability of a low signal, μ_b (μ_s) is the arrival rate of informed buy (sell) orders, θ is the probability of buy and sell symmetric order flow shocks on days with private information, and θ' is the same probability on days with no private information. In the event of symmetric order-flow shock, the additional arrival rate of buy (sell) orders is Δ_b (Δ_s). Following DY, we employ $adj.PIN$ as an alternative measure of information

[6]In EHO model, the likelihood of observing B buys and S sells on a certain day is:

$$\begin{aligned}\mathcal{L}(\boldsymbol{\theta} \mid B, S) = {} & \alpha(1-\delta)e^{-(\mu+\varepsilon_b)}\frac{(\mu+\varepsilon_b)^B}{B!}e^{-\varepsilon_s}\frac{(\varepsilon_s)^S}{S!} \\ & + \alpha\delta e^{-\varepsilon_b}\frac{(\varepsilon_b)^B}{B!}e^{-(\mu+\varepsilon_s)}\frac{(\mu+\varepsilon_s)^S}{S!} + (1-\alpha)e^{-\varepsilon_b}\frac{(\varepsilon_b)^B}{B!}e^{-\varepsilon_s}\frac{(\varepsilon_s)^S}{S!},\end{aligned}$$

where (B, S) is the total number of buys and sells for the day and $\boldsymbol{\theta} = (\mu, \varepsilon_b, \varepsilon_s, \alpha, \delta)$ is the parameter vector. This function consists of the sum of three Poisson probabilities weighted by the probability of each event type. The data set over multiple days allows us to estimate the parameters. Because days are independent, the likelihood function for T days is a product of the above likelihood over days,

$$\mathcal{L}(\boldsymbol{\theta} \mid M) = \prod_{i}^{T} \mathcal{L}(\boldsymbol{\theta} \mid B_i, S_i),$$

where (B_i, S_i) is trading data for day $i = 1 \ldots, T$ and $M = ((B_1, S_1), \ldots, (B_T, S_T))$ is the data set.

asymmetry in the market. We use trading days during April of year $t-1$ to March of year t and estimate the parameter vectors of the EHO and DY models by maximizing the likelihood function. We also employ a widely accepted measure, the bid-ask spread, as an additional measure of information asymmetry in the market. Our measure based on the bid-ask spread is defined as the natural log of the daily average relative spread from April of year $t-1$ to March of year t.

3.2 Earnings quality measures

To test the hypotheses, we need to estimate our measures of earnings quality. Although abnormal accruals, which are known to measure opportunistic earnings management behavior, are common measures of earnings quality, measurement error issues in their estimation are noted in prior studies (e.g., Kothari, Leone, and Wasley 2005). We therefore employ four models to estimate earnings quality to ensure the robustness of the results: the Jones (1991) model, the modified Jones model (Dechow, Sloan, and Sweeney 1995), the Dechow-Dichev (2002, hereafter DD) model, and the modified DD model (Francis, LaFond, Olsson, and Schipper 2005). The basic concept behind these models is to detect abnormal portions or errors in accruals. Researchers use these calculated abnormal portions of accruals as a measure of earnings quality (e.g., Wang 2006; Zhao and Chen 2009).

Our sample period starts in 1999, but Japanese firms were required to disclose cash flow statements only on and after the fiscal year beginning April 1, 1999. We therefore cannot calculate accruals in a direct and less biased way by deducting operating cash flow from earnings (Hribar and Collins 2002). Instead, we calculate accruals (ACC) using the balance sheet approach according to Shuto's (2007) accrual estimations for listed Japanese companies.[7]

[7]Specifically, total accruals are defined as (Δcurrent assets $-$ Δcash and cash equivalents) $-$ (Δcurrent liabilities $-$ Δfinancing item) $-$ Δother allowance $-$ depreciation. Current accruals ($CACC$) for DD and modified DD models are defined as (Δcurrent assets $-$ Δcash and cash equivalents) $-$ (Δcurrent liabilities $-$ Δfinancing item).

3.3 Firm value measures

Measures of firm value are required to test the hypotheses. We therefore utilize Tobin's Q and RNOA, which are generally used in the literature as measures of firm value or performance. Tobin's Q ($TobinQ$) is defined as total assets minus the book value of equity plus the market value of equity, all deflated by total assets and the RNOA ($RNOA_t$) is defined as operating income deflated by average net operating assets.

4 Sample Selection and Empirical Model

4.1 Sample and data

To construct our sample, we begin with all observations having March fiscal year-ends listed on the Tokyo Stock Exchange from 1999 to 2007.[8]

The financial statement, price, and cross-shareholding data are collected from the *Nikkei Economic Electronic Databank System* (*NEEDS*), the *Nikkei Portfolio Master Database*, and the *Data Package of Cross-Shareholding and Stable-Shareholding* of the *NLI Research Institute*. To estimate the PIN, we need data on the numbers of buyer- and seller-initiated trades each day. These data are gathered from the *Nikkei NEEDS TICK Database*. Our sample is composed of all firm-years that have all of the required data, excluding financial firms. We investigate the three hypotheses using three measures, namely, information asymmetry, earnings quality, and firm value. Because the sample requirements vary with the variables utilized, the sample sizes differ across regressions. Specifically, the sample size is 12,445 for the information asymmetry regression (PIN), 14,175 for the earnings quality regression ($abs(Jones)$), and 16,530 for the firm value regression ($TobinQ$).[9] We winsorize $TobinQ$, signed abnormal accruals, $RNOA$, and

[8]Because our database of crossholding includes data as of March end every year, we limit our sample to firms with March fiscal-year end to reconcile financial data with crossholding data. About 75% of listed Japanese firms have March fiscal-year end.

[9]While we have alternative measures to confirm the validity of the results for each test, we do not provide the number of observations for all the measures due to brevity. Because the DD and modified DD models require cash flow data at $t+1$, earnings quality based on these models is estimated up to 2006.

GROWTH at the top and bottom percentiles for each regression models to avoid outlier problems.[10]

4.2 Cross-shareholding data

We obtain cross-shareholding data from the *Data Package of Cross-Shareholding and Stable-Shareholding*. The database includes the ratios of cross-shareholding and stable shareholdings as of every March year-end. According to the NLI Research Institute's definition, cross-shareholding occurs when two companies hold each other's shares.[11] The NLI Research Institute's database includes the ratio of cross-shareholdings, which is calculated by dividing the sum of total cross-shareholding with other companies by the number of shares outstanding.

4.3 Empirical model

The main regression equation to test the hypotheses is as follows:

$$\begin{aligned} DEP = \alpha + \beta_1 \log(MVE) + \beta_2 \log(TURNOVER) + \beta_3 \log(AGE) + \beta_4 RNOA_{t-1} \\ + \beta_5 GROWTH + \beta_6 LEV + \beta_7 \log(sd(RNOA)) + \beta_8 MO + \beta_9 CROSS + \varepsilon, \quad (3) \end{aligned}$$

where DEP measures information asymmetry (PIN, $adj.PIN$, or $\log(SPREAD)$), earnings quality ($abs(JONES)$, $abs(MJONES)$, $abs(DD)$, or $abs(MDD)$), and firm value ($TobinQ$ or $RNOA_t$). All dependent variables are measured at the end of the year t. The model includes various control variables to capture the incremental effect of cross-shareholdings after taking other factors' effects into account. Specifically, we control

[10] Unsigned abnormal accruals are used in the regression model, but outlier treatments of earnings quality measures are based on their signed values.

[11] They also defines stable shareholdings as the sum of the following shares: (1) cross-shares, (2) shares owned by financial institutions, (3) shares owned by trust banks using their own accounts, and (4) shares owned by other companies as shares of affiliate companies. However, because our focus is on cross-shareholding, we use cross-shareholding data for the analysis. Moreover, institutional owners, including financial institutions, may play an active governance role in deterring management's opportunistic behavior. Using data of stable shareholders could complicate the interpretation of the results.

for market variables, firm age, profitability, growth, financial status, and managerial ownership. The term $\log(MVE)$ is the natural logarithm of the market value of equity, $\log(TURNOVER)$ is the natural logarithm of average daily turnover for the year, $\log(AGE)$ is the natural logarithm of firm age, $RNOA_{t-1}$ is the return on net operation assets for year $t-1$, $GROWTH$ is annual sales growth, LEV is leverage, $\log(sd(RNOA))$ is the natural logarithm of the standard deviation of RNOA, and MO is managerial ownership. The test variable in our study is $CROSS$, which is the cross-shareholding ratio. The independent variables are measured at the beginning of the year or at $t-1$ period to see causality to the dependent variables. Table 1 provides the detailed variable definitions.

(Insert Table 1 around here.)

5 Empirical Results

5.1 Cross-shareholding and information asymmetry

Table 2 reports descriptive statistics of the variables used to estimate the model with PIN. For brevity, we show descriptive statistics for only the samples using PIN. The statistics of the estimated PIN are similar to those reported by Kubota and Takehara (2009), who also estimate the PIN for Japanese firms. The mean and median differences of the variables in the PIN model according to the degree of cross-shareholdings are exhibited in Panels A and B of Table 3, respectively. These panels show that cross-shareholding is positively associated with PIN. Untabulated analysis also reveals that univariate correlation between cross-shareholding and $adj.PIN$ and $\log(SPREAD)$ is positive.

(Insert Table 2 and 3 around here.)

To understand the link between the level of cross-shareholdings and PIN more clearly, we categorize the firms into six groups according to the level of cross-shareholdings. The mean and median differences in these variables between observations with no cross-shareholdings (C0) and those with the most cross-shareholdings (C6) are statistically

significant. We also test the differences in variables between firms with the least cross-shareholdings (C1) and with the most cross-shareholdings (C6) to determine the association between the level of cross-shareholdings and the PIN. Untabulated results indicate that the difference in the PIN is more pronounced for the tests comparing C6 and C1 relative to those comparing C6 and C0.

Table 4 presents the results of the regression analysis. It reports that cross-shareholding is positively related to PIN, $adj.PIN$, and $\log(SPREAD)$. This result is inconsistent with the alignment hypothesis. The positive relation between cross-shareholdings and PIN supports the entrenchment and quiet life hypotheses. We next examine earnings quality to clarify which hypothesis is more plausible.

(Insert Table 4 around here.)

5.2 Cross-shareholding and earnings quality

With respect to the relation between cross-shareholding and earnings quality, we test the differences in variables between firms with no cross-shareholdings or the least cross-shareholdings and with the most cross-shareholdings, as does the investigation on information asymmetry. Higher values imply lower earnings quality and untabulated results show that the measures decrease roughly monotonically with increasing levels of cross-shareholdings. The differences in the means and medians between the lowest-cross-share observations and the highest are both significant for all of the measures. We expect entrenched managers to be more likely to expropriate shareholder wealth and distort earnings, while managers enjoying the quiet life would avoid such costly actions. The results support the latter notion, which is the quiet life hypothesis.

(Insert Table 5 around here.)

The results of the regression model are reported in Table 5. The results show that cross-shareholdings and all the earnings quality measures have a negative and significant association, even after controlling for other factors. This indicates that more cross-

shareholding lessens the incentive management may have to distort earnings, supporting the quiet life hypothesis.

5.3 Cross-shareholding and firm value

The entrenchment and quiet life hypotheses predict a negative relationship between cross-shareholding and firm value, whereas the alignment hypothesis posits a positive relationship. In combination with the results obtained in the previous sections, however, our main concern at this stage is whether the results are consistent with the quiet life hypothesis. We therefore now focus on the consistency of the results with the quiet life hypothesis.

(Insert Table 6 around here.)

We again examine the mean and median differences, respectively, in $TobinQ$ and $RNOA_t$, respectively, according to the degree of cross-shareholdings. Untabulated results show that cross-shareholding has a negative association with firm value and the mean and median differences in $TobinQ$ and $RNOA_t$ between the lowest and highest cross-shareholdings are statistically significant. The result indicates that more cross-shareholding decreases firm value. According to the results in Table 6, the regression results also reveal negative and significant relationships between cross-shareholdings and $TobinQ$ as well as $RNOA_t$. These results imply that more cross-shareholdings lower firm value, which is consistent with the quiet life hypothesis.

Collectively, the results of the three measures: information asymmetry, earnings quality, and firm value as a whole support the quiet life hypothesis. We bear in mind that the management incentive to withhold proprietary information could be another possible scenario that explains the relationship between cross-shareholdings and information asymmetry, although we do not formally develop the hypothesis. The overall results of the current study, however, are not consistent with such an incentive. In sum, managers in greater cross-shareholding are neither entrenched nor aligned with those of other shareholders. The results indicate that they would rather enjoy the quiet life.

6 Conclusion

Since Regulation Fair Disclosure was promulgated in 2000, the importance of fair disclosures has attracted much attention. Although the regulation is mainly applied to U.S. listed companies, it should be of concern internationally, by regulatory bodies and academics alike. Uncovering the factors that influence the information environment in the market is thus important.

Our results show that higher levels of cross-shareholding are related to greater information asymmetry. We also find that firms with more cross-shareholdings exhibit higher earnings quality and lower firm value. These results are robust, since we confirm that using alternative measures of information asymmetry, earnings quality, and firm value do not alter the findings. The evidence suggests that cross-shareholdings exacerbate information asymmetry between investors in Japan. In conjunction with the results on earnings quality and firm value, our evidence supports the quiet life hypothesis. Management avoids difficult decisions and costly actions as the level of cross-shareholding increases, because they are isolated from takeover threats or external market forces, thereby enjoying the quiet life.

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TABLE 1: Variable Definitions

Variable	Definition
PIN	probability of informed trading by Equation (1) estimated over year t (April of year $t-1$ to March of year t)
$adj.PIN$	adjusted PIN by Equation (2) estimated over year t (April of year $t-1$ to March of year t)
$\log(SPREAD)$	natural logarithm of the average daily percentage spread for fiscal year t (April of year $t-1$ to March of year t)
$abs(Jones)$	the absolute value of abnormal accruals based on Jones (1991) for fiscal year t
$abs(MJones)$	the absolute value of abnormal accruals based on Dechow et al. (1995) for fiscal year t
$abs(DD)$	the absolute value of abnormal accruals based on Dechow and Dichev (2002) for fiscal year t
$abs(MDD)$	the absolute value of abnormal accruals based on Francis et al. (2005) for fiscal year t
$TobinQ$	(total assets(t) − book value of equity(t) + market value of equity(t))/total assets(t)
$RNOA_t$	return on net operating assets for fiscal year t (= operating income(t)/average net operating assets($t-1$ to t))
$\log(MVE)$	natural logarithm of the market value of equity (= shares ×price) at the end of year $t-1$
$\log(TURNOVER)$	natural logarithm of the average daily turnover over year $t-1$
$\log(AGE)$	natural logarithm of the number of years since the firm was established
$RNOA_{t-1}$	return on net operating asset for fiscal year $t-1$ (= operating Income($t-1$)/average net operating assets($t-2$ to $t-1$))
$GROWTH$	sale growth (= (sale($t-1$) − sale($t-2$))/sale($t-2$))
LEV	financial obligations divided by total assets at the end of fiscal year $t-1$
$\log(sd(RNOA))$	natural logarithm of the standard deviation of the RNOA over the past five years ($t-5$ to $t-1$), requiring a minimum of three years of data
MO	percentage of shares held by all directors at the end of fiscal year $t-1$
$CROSS$	cross-shareholding ratio at the end of fiscal year $t-1$

This table provide detailed definitions for all variables used in this paper. To mitigate the influence of outliers on the results, the continuous variables, $TobinQ$, $RNOA$, and $GROWTH$, were winsorized at the first and 99th percentiles of the annual distribution for the respective variables across the year. Regarding earnings quality measures (i.e., $abs(Jones)$, $abs(MJones)$, $abs(DD)$, and $abs(MDD)$), signed values were winsorized at the first and 99th percentiles, and these absolute values are used in the empirical model estimations.

TABLE 2: Descriptive Statistics

	PIN	MVE (billions JPY)	$\log(MVE)$	$TURNOVER$	$\log(TURNOVER)$	AGE	$\log(AGE)$
Obs.	12,445	12,445	12,445	12,445	12,445	12,445	12,445
Mean	0.220	191	24.302	0.003	−6.559	57.1	3.973
SD	0.104	875	1.647	0.005	1.099	19.5	0.416
Q1	0.153	11	23.142	0.001	−7.304	47	3.850
Median	0.200	28	24.064	0.002	−6.570	56	4.025
Q3	0.266	99	25.317	0.003	−5.873	68	4.220

	$RNOA_{t-1}$	$GROWTH$	LEV	$sd(RNOA)$	$\log(sd(RNOA))$	MO	$CROSS$
Obs.	12,445	12,445	12,445	12,445	12,445	12,445	12,445
Mean	0.035	0.023	0.265	0.129	−3.435	0.039	0.110
SD	0.109	0.134	0.207	1.475	1.154	0.084	0.091
Q1	0.008	−0.045	0.084	0.016	−4.143	0.002	0.036
Median	0.032	0.014	0.241	0.030	−3.490	0.005	0.095
Q3	0.068	0.076	0.405	0.062	−2.782	0.029	0.165

This table reports the descriptive statistics. See Table 1 for the variable definitions.

TABLE 3: Mean and Median Differences in the Test Variables

Panel A: Mean Differences for the Variables in the PIN Regression According to Cross-Shareholdings

CROSS Category	Obs.	*PIN*	log(*MVE*)	log (*TURNOVER*)	log(*AGE*)	$RNOA_{t-1}$	*GROWTH*	*LEV*	log (*sd*(*RNOA*))	*MO*
C0	1,122	0.215	24.069	−6.065	3.516	0.055	0.067	0.224	−2.550	0.094
C1	2,794	0.214	24.387	−6.514	3.833	0.051	0.038	0.240	−3.311	0.059
C2	2,529	0.218	24.361	−6.590	3.995	0.035	0.022	0.272	−3.529	0.037
C3	2,338	0.220	24.450	−6.535	4.077	0.028	0.013	0.280	−3.610	0.026
C4	1,614	0.220	24.343	−6.628	4.127	0.023	0.011	0.276	−3.596	0.020
C5	1,040	0.228	24.183	−6.735	4.142	0.019	0.004	0.292	−3.684	0.019
C6	1,008	0.244	23.892	−6.919	4.156	0.020	0.002	0.282	−3.616	0.014
Total	12,445	0.220	24.302	−6.559	3.973	0.035	0.023	0.265	−3.435	0.039
C6−C0		0.029***	−0.178***	−0.854***	0.640***	−0.035***	−0.065***	0.058***	−1.066***	−0.080***
C6−C0 (*t*-stat.)		(6.40)	(−2.62)	(−17.82)	(30.05)	(−5.28)	(−9.28)	(6.33)	(−18.37)	(−17.37)

Panel B: Median Differences for the Variables in the PIN Regression According to Cross-Shareholdings

CROSS Category	Obs.	*PIN*	log(*MVE*)	log (*TURNOVER*)	log(*AGE*)	$RNOA_{t-1}$	*GROWTH*	*LEV*	log (*sd*(*RNOA*))	*MO*
C0	1,122	0.198	23.871	−6.109	3.689	0.052	0.041	0.165	−2.853	0.005
C1	2,794	0.193	24.183	−6.488	3.932	0.042	0.028	0.182	−3.345	0.004
C2	2,529	0.198	24.051	−6.626	4.007	0.032	0.016	0.244	−3.496	0.005
C3	2,338	0.196	24.200	−6.531	4.078	0.029	0.009	0.266	−3.569	0.005
C4	1,614	0.203	24.089	−6.625	4.094	0.026	0.005	0.263	−3.644	0.005
C5	1,040	0.209	24.020	−6.693	4.127	0.022	0.003	0.267	−3.711	0.005
C6	1,008	0.226	23.746	−6.937	4.127	0.025	−0.003	0.276	−3.648	0.005
Total	12,445	0.200	24.064	−6.570	4.025	0.032	0.014	0.241	−3.490	0.005
C6−C0		0.028***	−0.125*	−0.828***	0.438***	−0.028***	−0.044***	0.111***	−0.795***	−0.001***
C6−C0 (*z*-stat.)		(7.19)	(−1.75)	(−16.72)	(25.40)	(−10.12)	(−9.53)	(8.62)	(−16.91)	(−3.22)

This table reports the mean (Panel A) and median (Panel B) differences in variables according to the level of cross-shareholdings. Here C0 (C6) represents firms with no (most) cross-shareholdings. We categorize observations into six groups according to the level of cross-shareholding, as follows: C0, $CROSS = 0\%$; C1, $0\% < CROSS < 5\%$; C2, $5\% \leq CROSS < 10\%$; C3, $10\% \leq CROSS < 15\%$; C4, $15\% \leq CROSS < 20\%$; C5, $20\% \leq CROSS < 25\%$; C6, $25\% \leq CROSS$. The superscripts *** and * indicate statistical significance at the 1% and 10% levels, respectively. The panels exhibit the differences and their statistical significance in the variables between the firms with the most cross-shareholdings (C6) and those with none (C0). See Table 1 for the variable definitions.

TABLE 4: Information Asymmetry Regression Results

	PIN	$adj.PIN$	$\log(SPREAD)$
Constant	0.596***	0.422***	1.940***
	(12.2)	(11.2)	(5.02)
$\log(MVE)$	−0.023***	−0.015***	−0.344***
	(−15.8)	(−11.5)	(−27.4)
$\log(TURNOVER)$	−0.031***	−0.020***	−0.248***
	(−9.39)	(−9.89)	(−10.5)
$\log(AGE)$	−0.009**	−0.006***	−0.044
	(−2.25)	(−2.61)	(−1.14)
$RNOA_{t-1}$	0.024	−0.010	−0.250***
	(1.36)	(−1.20)	(−3.04)
$GROWTH$	0.020***	−0.008	−0.223
	(2.61)	(−1.04)	(−1.09)
LEV	−0.004	−0.002	0.561***
	(−0.33)	(−0.27)	(8.14)
$\log(sd(RNOA))$	−0.001	−0.002	0.066***
	(−0.51)	(−1.11)	(4.12)
MO	0.038	0.007	−0.286*
	(1.49)	(0.58)	(−1.77)
$CROSS$	0.036*	0.045***	0.274*
	(1.65)	(2.63)	(1.83)
Observations	12,445	9,917	12,340
Adjusted R^2	0.3233	0.3091	0.6807

This table reports the results of the measures of information asymmetry regressed on cross-shareholdings and control variables. The information asymmetry measures employed are PIN, $adj.PIN$, and $\log(SPREAD)$. The t-statistics, reported in parentheses, are based on two-way cluster-robust standard errors, following Petersen (2009). The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. See Table 1 for the variable definitions.

TABLE 5: Earnings Quality Regression Results

	abs $(JONES)$	abs $(MJONES)$	abs (DD)	abs (MDD)
Constant	0.161***	0.168***	0.099***	0.078***
	(9.77)	(10.9)	(10.0)	(9.15)
$\log(MVE)$	−0.000	−0.001	−0.000	−0.000
	(−1.10)	(−1.36)	(−1.27)	(−0.80)
$\log(TURNOVER)$	0.001***	0.001***	0.002***	0.001***
	(3.07)	(3.13)	(5.24)	(3.37)
$\log(AGE)$	−0.019***	−0.020***	−0.010***	−0.007***
	(−4.66)	(−4.62)	(−5.54)	(−5.01)
$RNOA_{t-1}$	−0.016***	−0.018***	−0.018***	−0.015***
	(−3.30)	(−3.32)	(−4.51)	(−3.04)
$GROWTH$	0.021**	0.022*	−0.001	−0.001
	(2.06)	(1.93)	(−0.31)	(−0.41)
LEV	0.006	0.007*	0.005***	0.000
	(1.29)	(1.65)	(2.83)	(0.28)
$\log(sd(RNOA))$	0.006***	0.006***	0.004***	0.004***
	(6.77)	(6.34)	(8.14)	(9.96)
MO	0.008	0.007	0.000	0.004
	(0.93)	(0.78)	(0.04)	(0.86)
$CROSS$	−0.022***	−0.024***	−0.011***	−0.012***
	(−3.23)	(−3.41)	(−3.44)	(−5.09)
Observations	14,175	14,126	11,831	10,923
Adjusted R^2	0.0779	0.0776	0.0804	0.0837

This table reports the results of the measures of earnings quality regressed on cross-shareholdings and control variables. The earnings quality measures employed are $abs(JONES)$, $abs(MJONES)$, $abs(DD)$, and $abs(MDD)$. The t-statistics, reported in parentheses, are based on two-way cluster-robust standard errors, following Petersen (2009). The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. See Table 1 for the variable definitions.

TABLE 6: Firm Value Regression Results

	$TobinQ$	$RNOA_t$
Constant	0.883	-0.235^{***}
	(1.51)	(-5.79)
$\log(MVE)$	0.089^{***}	0.009^{***}
	(5.94)	(9.44)
$\log(TURNOVER)$	0.053^{***}	-0.003^{*}
	(3.54)	(-1.88)
$\log(AGE)$	-0.292^{***}	0.012^{**}
	(-4.36)	(2.56)
$RNOA_{t-1}$	0.484^{***}	0.431^{***}
	(4.06)	(16.8)
$GROWTH$	0.371^{***}	0.044^{**}
	(2.81)	(2.16)
LEV	0.195^{***}	-0.041^{***}
	(3.06)	(-5.17)
$\log(sd(RNOA))$	0.110^{***}	0.006^{***}
	(8.82)	(2.99)
MO	0.121	0.088^{***}
	(0.84)	(3.65)
$CROSS$	-0.447^{***}	-0.021^{***}
	(-5.68)	(-3.34)
Observations	16,530	16,588
Adjusted R^2	0.3098	0.2569

This table reports the results of the measures of firm value regressed on cross-shareholdings and control variables. The firm value measures employed are $TobinQ$ and $RNOA_t$. The t-statistics, reported in parentheses, are based on two-way cluster-robust standard errors, following Petersen (2009). The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. See Table 1 for the variable definitions.