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CSR Activities and Japanese Corporate Groups: A Propensity Score Matching Analysis*

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The main objectives of “Core-to-Core Program” are to create world-class research hubs in the research fields, and to foster young researchers through building sustainable collaborative relations among research/education institutions in Japan and around the world.

As a research hub in Japan for the project titled “Creation of a Research Hub for Empirical Analysis on the Evolving Diversity of Corporate Governance: Multidisciplinary Approach Combining Economics, Legal Studies and Political Science” which was selected for “Core-to-Core Program”, Waseda Institute for Advanced Studies (WIAS) works together with its overseas counterparts: University of Oxford (UK), Ecole des Hautes Etudes en Sciences Sociales (EHESS) (France), University of British Columbia (UBC) (Canada). Through strengthening the research networks, developing analysis methods, adopting a multifaceted international approach and promoting the joint use of basic data, this project aims to achieve remarkable advancements in empirical analysis of the economic systems associated with corporate governance.

CSR Activities and Japanese Corporate Groups: A Propensity Score Matching Analysis

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Abstract

This study analyzes the relationship between corporate social responsibility (CSR) related activities and corporate groups under the Japanese corporate system. We focus on horizontal corporate groups (*Keiretsu*). The relationship between independent companies and the companies belonging to these *Keiretsu* is clarified using quantitative analysis techniques to determine any differences in the implementation status of their respective CSR activities. For this verification, this study uses a propensity score matching method to narrow down the sample to only *Keiretsu* companies and those independent companies that have similar characteristics to the *Keiretsu* companies. Based on the results, even after controlling for *Yushi-Keiretsu* and the elements that define a corporate group, companies belonging to the three major corporate groups were found to consistently engage in CSR activities. In particular, the Mitsubishi Group had a strong tendency towards CSR activities. Moreover, this study confirmed that, among the independent companies, those belonging to *Yushi-Keiretsu*, which can be regarded as the former corporate group, participated in CSR activities. Therefore, there is a difference in the CSR activities undertaken by *Keiretsu* companies and independent companies, which suggests that *Keiretsu* companies undertake CSR activities as a brand management measure for the entire group.

Keywords: CSR activity, Japanese corporate system, factor analysis

JEL classification: L21, M14, M21, P52

1. Introduction

Currently, many Japanese companies have established departments related to corporate social responsibility (CSR) and appointed directors who are responsible for CSR. The establishment of such CSR departments is in response to the growing public interest in the negative externalities arising from corporate activities since the 1970s. This interest was presumably influenced by the pressure of the international community, including the United Nations Global Compact concept originating in the early 2000s and the movement of the International Organization of Standardization to standardize international standards (Tanimoto, 2006).

Accordingly, Japanese companies have CSR officers and related departments, and hire only those individuals who are committed to this aim. Such economic phenomena of firms cannot be sufficiently explained by conventional economics and finance theories, which usually advocate the maximization of corporate (shareholder) value. Therefore, it is difficult to rationalize the promotion of CSR activities, which are effectively a type of loss, given opportunity costs.

Aoki (2010) addresses the above question, assuming there are two types of consumers (investors). The first type comprises an entity that acts with the aim of maximizing self-profit in accordance with conventional economics and finance theories. This type of consumer (investor) recognizes CSR activities as an additional cost, holding other conditions constant. In contrast, the other type comprises consumers and investors who are interested in social good¹. Aoki (2010) points out that this latter type of consumer (investor) prefers CSR activities. Specifically, when CSR activities are performed at a high level within the company, this type of customer expresses increased loyalty to the company's products, thereby increasing the company's sales while allowing it to accumulate social capital. Aoki (2010) asserts that implementing CSR activities can serve as a positive signal to increase trust and loyalty among stakeholders. This allows the extension of the theory whereby CSR activities enable the management to anticipate long-run net profits that exceed the additional costs incurred in the short run; this serves as an incentive for the management to undertake CSR activities.

In a similar context, Suto (2015) focuses on and refers to the resource-based theory in CSR activities studied by Smith (2003), Galbreath (2005), and Branco and Rodrigues (2006) to highlight that CSR activities help build good stakeholder relationships, which can become a company-specific asset (intangible asset) that will persistently maximize corporate value in the long-term.

¹ These consumers and investors could be considered green consumers and environmental, social, and governance investors.

Thus, the theoretical rationale of CSR activities has been examined beyond the framework of conventional economics and finance theories. Nonetheless, few studies empirically verify this rationale and, in particular, attempt to analyze the determinants of CSR activities targeting Japanese companies. As mentioned above, the implementation of CSR activities involves costs. As such, it would be of practical research interest to conduct an empirical analysis with the following two objectives: 1) to identify which companies have incentives to actively engage in CSR activities; and 2) to determine which mechanisms and effects will have a positive effect on corporate performance in later years.

The purpose of this study is to analyze the relationship between CSR activities and the Japanese corporate group structure. Traditionally, Japanese corporate systems have certain special characteristics, which have been highlighted in the context of “Comparative Institutional Analysis” (e.g., Aoki, 1988; Aoki and Patrick, 1994; Aoki and Dore, 1994; Aoki and Okuno-Fujiwara, 1996). Moreover, as the basis of the Japanese corporate system lies in the *Keiretsu* (*Shachō-kai*), this basis plays an important role (e.g., Weinstein and Yafeh, 1995; Nakatani, 1983). In this study, we focus on the horizontal *Keiretsu*. Hereinafter, the term *Keiretsu* refers to horizontal *Keiretsu*.

Post the banking crisis and bank re-organization, cross-shareholdings have been resolved (Miyajima and Kuroki, 2007) and the *Keiretsu*'s economic role is known to have diminished, except in the case of *Mitsubishi-Keiretsu* (Tanaka, 2013). However, some studies have pointed out that the number of interlocking directorates among members of a *Keiretsu* is at almost the same level as in its heyday; this forms the basis for a mechanism that plays an ongoing role (Kikuchi, 2017). This study adopts this perspective when carrying out the analysis.

In this study, we analyze the relationship between CSR activities and corporate groups given that the following business incentives have similar effects on CSR activities. According to a questionnaire survey by the Japan Business Federation (Keidanren) in 2009, 76% (334 of 437) of companies regarded CSR activities as “one way to create corporate value (brand power, trust, etc.)” Therefore, it is considered that companies carry out CSR activities in order to build trusting relationships with various stakeholders. On the other hand, in a questionnaire survey, conducted by the Japan Fair Trade Commission Secretariat in 2001, regarding the incentives for Mitsui, Mitsubishi, and Sumitomo to belong to a *Keiretsu* (*Shachō-kai*), it was found that 67.1% (49 of 73) of all surveyed companies indicated “improvement of brand creditworthiness.” This shows that companies have the same incentives to operate as a *Keiretsu* as they do to undertake CSR activities.

In this study, it is assumed that the company undertakes costs to conduct CSR activities in order to acquire intangible assets such as brand power and trust, and chooses to belong to a *Keiretsu* to improve trust and maintain its corporate brand. The theoretical background to this lies in the context of strategic CSR theory, pioneered by Baron (2001), McWilliams and Siegal (2000, 2001), and McWilliams et al. (2006). Moreover, Aoki (2010) has presented two types of consumer (investor) profiles as discussed. Given this theoretical assumption, companies in the corporate group are expected to have two different approaches to CSR activities. One approach is that companies belonging to a *Keiretsu* have already acquired a brand and are therefore reluctant to carry out CSR activities. The other approach is that the overall group's brand management is important for corporate groups and hence, it is expected that the company actively conducts CSR activities as a measure. The purpose of this study is to verify these expectations empirically.

The structure of this study is as follows. Section 2 reviews previous studies and Section 3 presents the working hypotheses. Next, Section 4 presents the research design of this study including the approach to match propensity scores and identify corporate groups, and the basic estimation formulas for hypothesis testing. The results of the empirical analysis and additional verification of the results are reported in Section 5. Finally, Section 6 lists some limitations of this study and concludes.

2. Literature review

In this section, we review previous studies on Japanese corporate groups and strategic CSR theories. Regarding Japanese corporate groups, first, we briefly summarize the research history and current state of Japanese corporate groups. Next, through a survey of studies on strategic CSR theory, we summarize how the literature has explained the rationale of undertaking CSR activities in economics and finance theory.

2-1. Japanese corporate group

First, we summarize the research history of Japanese corporate groups. Even in relatively recent years, horizontal and vertical *Keiretsu* have been comprehensively analyzed, such as in Lincoln and Shimotani (2010). However, currently, fewer studies deal with horizontal *Keiretsu* than with vertical *Keiretsu* (Sako and Helper, 1998; Itoh et al., 2008; Matous and Todo, 2015; Takeishi and Noro, 2017).

In the Meiji era, horizontal corporate groups played a role in alleviating “financial constraints” by providing funding within the group (Morck and Nakamura 2005, 2007). After World War II, the name and function of this form of organization was changed

from “*Zaibatsu*” to “*Keiretsu*” (Miyajima, 1994; Miyajima and Kawamoto, 2010) and it continued to play an important economic function (Weinstein and Yafeh, 1995; Yafeh, 2002; Nakatani, 1983).

Following the banking crisis, cross-shareholdings have been resolved (Miyajima and Kuroki, 2007) and with bank restructuring, many studies have now concluded that the economic role of these *Keiretsu* has diminished (e.g., Tanaka, 2013). However, some studies point out that the number of interlocking directors between corporate groups remains at the same level as during the heydays, indicating that the *Keiretsu* continues to have a real role (Kikuchi, 2017). In addition, of the three large corporate groups, findings report that only the Mitsubishi group “exceptionally holds the substance of economic activities such as intra-group transactions and joint investment” (Tanaka, 2013, p. 350). Based on these evidences, this study assumes that the *Keiretsu*’s economic effects have diminished, but continue to exist under some incentive.

== **Figure 1** Corporate groups (*Keiretsu*) and *Yushi-Keiretsu* ==

== **Table 1** Cross-shareholding ratio of the six major corporate groups ==

Kikkawa (1996) asserts that the pre-war *Zaibatsu* and post-war corporate groups (Mitsui, Mitsubishi, and Sumitomo) are discontinuous on the basis that the influence of their families and their head office (holding company) has disappeared. In addition, the author supports the view of Miyajima (1992), pointing out that the *Keiretsu* has functional continuity since the *Zaibatsu*. Specifically, Kikkawa (1996) claims that the *Keiretsu* (Mitsui, Mitsubishi, and Sumitomo) has two functions: (1) the basic function of shareholder stabilization through cross-shareholding, and (2) additional functions such as “exchange of information, risk sharing, and reduction of transaction costs” through exchanges at the President’s Meeting (*Shachō-kai*). In terms of this function, *Yushi-Keiretsu* consisting of Fuyo, Sanwa, and Ichikan is located at the outer edge of the analyzed *Keiretsu* (Mitsui, Mitsubishi, and Sumitomo). Kikkawa (1996) claims that there is an inclusive relationship between *Keiretsu* and *Yushi-Keiretsu* (**Figure 1**). *Yushi-Keiretsu* is “a group of companies in various industries and a specific financial institution with a large share of financing based on a long-term loan relationship,” Kikkawa (1996) opines that its core functions are diluted more than those of the *Keiretsu*. In fact, according to Kikuchi (2017), the cross-shareholding trends of the six major corporate groups show that there is a difference in the dilution levels of *Keiretsu* (*Shachō-kai*) and *Yushi-Keiretsu* (**Table 1**).

2-2. Rationale of CSR activities

Next, the rationale of CSR activities is examined through the literature review. This context is diverse and interdisciplinary. Among these, this research focuses on the theoretical literature called Strategic CSR Theory, which was initiated by Baron (2001), McWilliams and Siegal (2000, 2001), and McWilliams et al. (2006). This strategic CSR theory regards CSR activities as one of the “investments” towards maximizing long-term corporate value.

McWilliams and Siegel (2001) point out that a company’s management performs some form of cost-benefit analysis to determine the level of resources to be invested in CSR activities. Their study assumes that the management assesses the demand for CSR activities and contributes the cost of meeting the demand. Therefore, in this stream of literature, CSR activities are only a cost factor in the short term; in the long run, even if the company recovers costs and earns profits, it is of significant interest to identify the mechanism and path through which it does so. The elucidation of this route will be of great interest from the perspective of shareholder primacy and corporate finance theory.

Aoki (2010) speculates that CSR activities are conducted because of the growing interest of various stakeholders in achieving a sustainable society; in this study, such companies are called “CSR companies.” He further claims that CSR companies attract socially conscious consumers (investors) thereby increasing sales (profit). In other words, and from another perspective, this theory asserts that CSR causes the company to accumulate social capital. This accumulation of social capital improves the trust and loyalty of the company’s stakeholders. Aoki (2010) argues that this increase in profits, trust, and loyalty serves as a type of positive signal in the long run. He argues that this gives management a promising outlook on net long-term profits in excess of CSR cost contributions, and that this outlook motivates management to promote “strategic CSR.”

Aoki (2010)’s theory assumes two types of consumers and investors. One comprises the consumers and investors assumed by traditional finance theory and economics, who prefer the cheapest goods and services to maximize their own profits, and demand that companies conduct business activities (supply of goods and services) at the lowest cost (including agency costs). The other type comprises consumers and investors who are aware of social sustainability. The existence of this type of consumer and investor forms the basis of the theory explaining the rationale of CSR activities in Aoki (2010).

Suto (2015) adopts the discussion in Smith (2003), Galbreath (2005), and Branco and Rodrigues (2006) in that the company should implement CSR activities by incurring costs in the short term to build good stakeholder relationships, which eventually leads

to building intangible assets and maximizing corporate value in the long-term. Since maximizing long-term corporate value leads to maximizing the profits of shareholders, who are residual profit claimants, Suto (2015) opines that CSR activities do not conflict with traditional shareholder sovereignty in this regard. The arguments made by Aoki (2010) and Suto (2015) are consistent with the views put forth by Bénabou and Tirole (2010) that CSR activities are activities that contribute to long-term corporate value (maximizing inter-temporal profit), and are consistent with the profit-leading paths envisioned by strategic CSR theory. These provide a theoretical complement to traditional strategic CSR theories.

3. Research hypotheses

In this section, we present intuitive and ad-hoc predictions of the differences between *Keiretsu* companies and independent companies in terms of their approach to CSR activities.

3-1. CSR activities and building trust

The theoretical rationale and incentive to carry out CSR activities has been established in the literature. Here, in addition to this, based on the “recognition of practitioners” (results of questionnaire survey), this research clarifies the role played by incentives for companies to conduct CSR activities. For this purpose, a questionnaire survey published by Keidanren on September 15, 2009 is useful. In response to the question, “Does implementing CSR activities have any meaning or relevance for your firm,” 76% (334 of 437) of the surveyed companies considered it to be a way to increase corporate brand and trust. Following this, in this study, we hypothesize that companies incur additional costs and conduct CSR activities to acquire intangible assets such as brand power and trust.

3-2. Corporate groups and brands

Next, we examine the incentive for companies to belong to a *Keiretsu* (*Shachō-kai*). The Japan Fair Trade Commission Secretariat questionnaire survey conducted in 2001 would be helpful in this regard. According to the survey, 67.1% (49 of 73) of all surveyed companies cited “Improvement in brand’s creditworthiness” as a reason why companies belonging to the three major corporate groups (Mitsui, Mitsubishi, and Sumitomo) remained members of *Shachō-kai* (*Keiretsu*). However, this survey was conducted and its results published much earlier; it remains questionable whether this finding is applicable even today. Nonetheless, as far as the authors know, there are no surveys

that clarify this recognition since the Japan Fair Trade Commission Secretariat (2001). In this study, a *Keiretsu* company is considered to continue to belong to a corporate group in order to acquire corporate brand value and improve its creditworthiness.

3-3. Research hypothesis

Belonging to a corporate group may secure trust. This suggests that companies belonging to a *Keiretsu* have already acquired brand power and hence, the incentive to improve their corporate reputation is not as strong as in the case of independent companies. In this regard, *Keiretsu* companies are expected to be reluctant to engage in CSR activities. On the other hand, the alternative hypothesis is that companies belonging to a *Keiretsu* participate in more CSR activities than do independent companies in order to maintain the reputation of the group. It is expected that brand management for the entire group is important for the corporate group, and that CSR activities are actively pursued as a requisite measure. This latter conjecture may be reminiscent of Gresham's law whereby bad money drives out good money. It is speculated that companies that belong to the presidential board engage in a high level of overall CSR activities in order to prevent such situations (Gresham's law). Therefore, *Keiretsu* companies are expected to be more active in CSR activities than independent companies.

4. Empirical analysis

In this section, we first outline what research design should be used to verify the above-mentioned research hypotheses. Then, we describe the method, estimation model, usage data, and sample companies.

4-1. Research design

In this study, we analyzed the relationship between CSR activities and corporate groups (*Keiretsu*). Specifically, an empirical analysis was conducted to determine whether there was a difference in the aggressiveness of CSR activities between 1) a company belonging to a *Keiretsu* (hereinafter, *Keiretsu* company) and 2) a company that did not belong to a *Keiretsu* (hereinafter, independent company). Ideally, it should be possible to observe the level of CSR activities in both cases where a company belongs to a corporate group (scenario whereby the company exists as a *keiretsu* company) or to an independent company (scenario where it is an independent company) through a simple experimental environment. However, this is not feasible because of the lack of available social science statistics.

The second-best method is based on “the counterfactual assumption” (Winship and Morgan, 1999; Hoshino, 2009) using the propensity scores obtained by matching independent companies with similar tendencies (covariates) in the *Keiretsu* (“Propensity Score Matching,” Rosenbaum and Rubin, 1983). This approach analyzes determinant models of CSR activities with corporate group dummies as explanatory variables, while keeping other conditions fixed. In drawing this research design, we used the method of Nakazawa (2013a, 2013b) as a reference.

4-2. Identification of corporate group

Japan’s horizontal corporate series usually refers to the following six major corporate groups: Mitsui, Mitsubishi, Sumitomo, Fuyo, Sanwa, and Ichikan. However, as mentioned in Section 3, after the banking crisis, banks were reorganized in the process of forming megabanks, their functions became weaker than before, and the boundary between the *Keiretsu* became ambiguous. In this study, we used three major corporate groups (Mitsui, Mitsubishi, and Sumitomo), which are considered to have relatively strong group relationships, as a proxy variable for *Keiretsu*. Next, in terms of independent companies, those belonging to *Yushi-Keiretsu* were introduced as control variables in the additional estimation. The selection of companies belonging to *Keiretsu* is based on the websites of *Keiretsu*-related organizations; those listed on the company list on the homepage are considered the companies belonging to each *Keiretsu*. As for *Yushi-Keiretsu*, Former Fuyo and Former Sanwa are based on the websites of related organizations. Regarding Ichikan, there is currently no publicly available information of related organizations to the authors’ best knowledge; hence, we referred to the Weekly Diamond (July 29, 2017) to identify the member companies.

4-3. Propensity score matching

In order to obtain the propensity scores, a logit analysis was performed using the *Keiretsu* dummy as the dependent variable, as follows.

- Propensity score derivation model (logit model)

$$\text{Keiretsu}_i = \alpha_0 + \alpha_1 \text{ASS}_i + \alpha_2 \text{DPH}_i + \alpha_3 \text{AGE}_i + \alpha_4 \text{BRD}_i + \alpha_5 \text{MBD}_i + \varepsilon$$

where i represents company i . The variables used in the propensity score derivation model (logit model) are as follows. *Keiretsu* refers to the *Keiretsu* dummy, which is the sum of the Mitsui, Mitsubishi, and Sumitomo dummies. *ASS* refers to the total natural logarithm of the company size. *DPH* represents the degree of policy holding, which is

the stable holding ratio or cross holding ratio. AGE represents the company's maturity in terms of number of years of operation (i.e., (t-1)-Year of establishment, where t indicates the current time point). BRD represents the sophistication of the board of directors, measured in terms of the number of board members with scale adjustments. MBD refers to the strength of the company's relationship with the main bank and is measured by the main bank shareholding ratio or dependency on main bank borrowings. Finally, ε represents the error term.

Here the dependent variable is *Keiretsu*, which is a dummy variable that takes on a value of 1 if the company corresponds to 1) Mitsui, 2) Mitsubishi, or 3) Sumitomo. In this study, the factors that explain *Keiretsu* are assumed to be company size, degree of policy holding, maturity, board size, and main bank dependence. The degree of policy holding (stable holding ratio or cross-holding ratio) and main bank dependency (MB stock holding ratio and MB borrowing dependency) are introduced as variables because they can be considered the stipulation factors of the *Keiretsu*. From the basic statistics, there is a remarkable difference in scale between a *Keiretsu* and an independent company; hence, this should be considered when calculating the propensity score. In addition, the variables representing the number of years of operation and degree of sophistication of the board of directors have been introduced because these should not be excluded as external features of *Keiretsu*².

4-4. Basic estimation model

In Section 4-3, we established a propensity score derivation model (logit model). Here, only the companies with a *Keiretsu* dummy value of 0 and having a score close to the propensity score of the companies with a *Keiretsu* dummy value of 1 are included in the sample. The research hypothesis is verified using the following estimation model.

• Basic estimation model (Tobit model)

$$\text{CSR}_{i,t} = \alpha_0 + \alpha_1 \text{Keiretsu}_{i,t-1} + \alpha_2 \text{ASS}_{i,t-1} + \alpha_3 \text{RD}_{i,t-1} + \alpha_4 \text{ADV}_{i,t-1} + \alpha_5 \text{FSR}_{i,t-1} \\ + \alpha_6 \text{ROA}_{i,t-1} + \alpha_7 \text{DASS}_{i,t-1} + \alpha_8 \text{FRGN}_{i,t-1} + \text{IND} + \text{FY} + \varepsilon$$

Here, i indicates company i and t indicates the time point t . The variables used in the determinant model (Tobit model) are as follows. CSR refers to the CSR activity data, which is a continuous number with a lower limit of 0. Keiretsu and ASS take on the

² As suggested by Kikuchi (2017), the mutual dispatch of directors within *Keiretsu* may be an external feature. Since these features can be regarded as an unrefined board structure, they are used as variables.

same definitions as in the propensity score matching model in Section 4-3. RD refers to technical competitiveness and is measured by R&D investment/sales. ADV refers to product differentiation and is measured by advertising expenses/sales. ROA represents the profitability of the industry, adjusted for size. DASS is the debt ratio and is a measure of the company's financial security. FRGN refers to the foreign company shareholding ratio, which represents the extent of external pressure. IND is the industry dummy based on the TSE 33 industry classification code, FY is the year dummy, and ε is the error term.

In the basic estimation model of this study, the data provided by Toyo Keizai Inc. forms the source of the CSR data to be used as dependent variables. This CSR data comprises the (1) CSR score and its components, (2) Employment score, (3) Environmental score, and (4) Corporate governance + social score. The explanatory variable, *Keiretsu*, is a dummy variable that is set to 1 for companies belonging to (1) Mitsui, 2) Mitsubishi, or 3) Sumitomo. In addition, ASS, RD, ADV, FSR, ROA, DASS, and FRGN are introduced as control variables³.

The proxy variable of the company size (ASS) uses the value obtained by converting total assets to natural logarithm, and its introduction follows McWilliams and Siegel (2000; 2001) as well as Suto and Takehara (2008a; 2008b) among others. Next, the proxy variable for corporate technical competitiveness (RD) uses the R&D investment intensity, and the proxy variable for product differentiation (ADV) uses the ratio of advertising expenses to sales. The adoption of these two variables is based on the theory proposed by McWilliams and Siegel (2000; 2001), who point out that the research and development that creates sociality can be considered a part of CSR activities. Moreover, they highlight that advertising costs serve to interest consumers to purchase socially relevant goods and services by increasing their awareness of the company's CSR activities. Therefore, both are expected to have a positive correlation.

Additionally, referring to the research results of Tanimoto and Suzuki (2005) and others, the overseas sales ratio (the extent of stakeholder relationship or FSR) has been introduced as a control variable. ROA is introduced because it is widely recognized in the business and academia that the degree of profitability affects the status of CSR activities. DASS introduces the debt ratio as a proxy variable for financial security taking reference from Bae et al. (2011) and Sasaki and Hanaeda (2014). FRGN has been introduced to represent the foreign ownership ratio as per Tanimoto and Suzuki (2005)

³ In this study, we assume that the level of CSR activity in period t is determined by the corporate characteristics in period $t-1$ (i.e., the explanatory variables and control variables in the basic estimation model). This is why there is a lag in the measurement time of the dependent variable and the explanatory/control variables.

and Suzuki et al (2010). In addition, year dummies and industrial dummies have been introduced, and the model has been designed to control the effects of other possible factors.

4-5. Data, sample, and basic statistics

The list of proxy variables used in this analysis is summarized in **Table 2**.

== **Table 2** Proxy variables ==

First, our sample comprises companies that have complete financial data for the entire period under study. The financial and regulatory industries were excluded from the sample, and the *Keiretsu* dummies were assigned a value of 1 for *Keiretsu* companies and 0 otherwise. Next, if the CSR activities are to be conducted in year t , the CSR data and financial data were reconciled so that the various financial data were as at $t-1$ years. Then, based on the propensity scores calculated by the logit model using the *Keiretsu* dummy as the dependent variable, a company with *Keiretsu* dummy equal to 0 is matched with the company with *Keiretsu* dummy equal to 1 to which it has the closest score.

Matching was performed between companies within the same fiscal year. However, if the propensity score was calculated only for companies that had a CSR score, the sample size would drastically decrease. In this study, in order to secure an adequate sample size, a CSR score of 0 was assigned to companies that were not listed in the CSR company ranking provided by Toyo Keizai Inc and otherwise had financial data available. For this reason, the dependent variable, CSR, was assumed to have a lower limit of 0 and take on continuous values. Therefore, the determinant model of CSR activity using *Keiretsu* as an element uses the Tobit model.

The resulting sample of companies in this analysis is presented in **Table 3**. In this study, companies (both *Keiretsu* and independent companies) exceeding a caliper (distance of a certain propensity score) of 0.03 were excluded from matching. In addition, one company with an abnormal value of “Industry, Size Adjusted ROA” of 48,409.504 was excluded from the sample.

== **Table 3** Overview of sample firms ==

== **Figure 2** Sample company outline ==

== **Table 4** Overview of *Keiretsu* dummy companies ==

== **Table 5** Basic statistics ==

Figure 2 is a Venn diagram of the sample of companies before (Panel A) and after (Panel B) matching. Separately, **Table 4** summarizes the *Keiretsu* dummy companies within the sample company. After the match, the Mitsui dummy score is 314, Mitsubishi dummy is 275, and Sumitomo dummy is 240, respectively, accounting for 37.88%, 33.17%, and 28.95%, of *Keiretsu* dummies. From these distributions, it is considered that there is no notable bias in each *Keiretsu* in the panel sample of this study.

Table 5 summarizes these basic statistics. Panel A shows the basic statistics before matching, and Panel B shows the basic statistics after matching. Based on Panel A, there is a remarkably large difference in the company size between a *Keiretsu* company and an independent company. However, from Panel B, it can be seen that the matching is at a similar company size. The average CSR score of *Keiretsu* companies before matching is nearly four times higher than that of independent companies; even after matching, *Keiretsu* companies continue to have higher CSR scores.

5. Results

5-1. Basic estimation results

This section reports the results of the pre-match estimation (see **Table 6**) and the basic estimation (see **Table 7**) of the relationship between CSR activities and corporate groups.

== **Table 6** Pre-match estimates ==

== **Table 7** Basic estimation ==

The dependent variables in the estimation models presented in **Table 6** and **Table 7** are as follows: CSR scores for models (1) and (2), employment scores for models (3) and (4), environmental scores for models (5) and (6), and corporate governance + social score for models (7) and (8). Of these, models (1), (3), (5), and (7) include *Keiretsu* as an explanatory variable, and models (2), (4), (6), and (8) have Mitsui, Mitsubishi, and Sumitomo as explanatory variables.

According to the estimation results presented in **Table 6** and **Table 7**, the *Keiretsu* dummy is positive and statistically significant in both cases. Looking at the coefficient

of the basic estimate (after matching), it can be seen that a *Keiretsu* company has a CSR score that is 18.110 points higher than that of an independent company. Next, the coefficient of the Mitsubishi dummy is positive and statistically significant at 1% level for each of the models, implying that among the *Keiretsu* companies, those belonging to the Mitsubishi group, in particular, are actively engaged in CSR activities. Based on these results, it is clear that companies belonging to the three major corporate groups (*Keiretsu* companies) engage in CSR activities, and that the Mitsubishi Group has a particularly strong tendency to do so. These results support the view that brand management is important for the corporate group as a whole and that CSR activities are actively pursued as a measure.

5-2. Additional verification

In this sub-section, we describe the results of some additional verification of the estimation results shown in Section 5-1. Specifically, the following three types of additional verification were conducted: 1) Basic estimation + “*Keiretsu* element,” 2-a) Pre-match estimation + *Yushi-Keiretsu*, 2-b) Basic estimation + *Yushi-Keiretsu*, 3) Basic estimation + “*Keiretsu* element” + *Yushi-Keiretsu*.

== **Table 8** Basic estimation + “*Keiretsu* element” ==

== **Table 9** Pre-match estimation + *Yushi-Keiretsu* ==

== **Table 10** Basic estimation + *Yushi-Keiretsu* ==

== **Table 11** Basic estimation + “*Keiretsu* element” + *Yushi-Keiretsu* ==

The “*Keiretsu* element” refers to the cross-shareholding, stable holding ratio, main bank shareholding ratio, dependence on main bank borrowing, years of operation, and the number of board of directors adjusted for size and industry. Meanwhile, *Yushi-Keiretsu* is a dummy variable representing a group of independent companies that have been included along with Fuyo, Sanwa, and Ichikan controls. Focusing on the functional aspects highlighted by Kikkawa (1996), *Yushi-Keiretsu* can be said to be a group with attributes located at the outer edge of the corporate group. The collective functions of *Yushi-Keiretsu* are considered to have become more ambiguous than that of the three major corporate groups since the main bank, which was at the core, became a megabank.

In these additional tests, the *Keiretsu* dummy has been consistently observed to be positive and statistically significant. In the verification with the addition of both the *Yushi-Keiretsu* dummy and Mitsubishi dummy, it is observed that the Mitsui dummy is also positive and statistically significant. On the other hand, the coefficient of the *Yushi-Keiretsu* dummy is also high and statistically significant. The (former) *Yushi-Keiretsu* group of companies has lost its economic function as a group following the banking crisis, and has been transformed from a group of companies to an independent company. Therefore, it may be considered that as per the results of this estimation, companies are more aggressively undertaking CSR activities as a means of ensuring their credibility.

6. Conclusions and limitations

This study focuses on horizontal corporate groups (*Keiretsu*). The purpose of this study was to clarify the relationship between the companies belonging to a *Keiretsu* and independent companies through empirical analysis to assess the differences in the implementation of CSR activities across the two types of companies. Using the propensity score method, we matched a sample of *Keiretsu* corporate group companies with the independent company that had the most similar elements to that of the respective *Keiretsu* company. The post-match analysis made it clear that companies belonging to the three major corporate groups are active in CSR activities and that the Mitsubishi Group, in particular, has a strong tendency to engage in such activities. This tendency was consistent even when controlling the elements that defined the corporate group, such as “*Yushi-Keiretsu*.” Moreover, in the analysis that included the companies that belonged to “*Yushi-Keiretsu*,” which can be regarded an old company group, the results of the *Keiretsu* companies continued to be robust in that they continued to participate in CSR activities. On the other hand, (former) *Yushi-Keiretsu* companies also exhibited a positive relationship with CSR activities.

These estimates support the view that brand management is important for the corporate group as a whole and that CSR activities are actively pursued as a measure. In addition, after the banking crisis, the economic functions of the group have been lost and the group has transformed from a corporate group to an independent company. In the group comprising (formerly) *Yushi-Keiretsu* companies, CSR activities ensured the credibility of the individual company. It is not possible to reject the possibility that companies have been engaging in CSR activities more aggressively as a means of doing so. The incentives for CSR activities may differ between the three major corporate groups that continue to function as corporate groups and the *Yushi-Keiretsu*, who have

lost their basic functions.

One interpretation of these results is that, for the three major corporate groups, it remains important to maintain the brand value throughout the group. Conducting CSR activities is an important corporate strategy towards this objective because it does not lead to a “bad money drives good money out of circulation” situation. On the other hand, the *Yushi-Keiretsu*, located at the outer edge, may be carrying out CSR activities more aggressively as a function to ensure the reliability of the independent company. Building a theoretical framework for this is a limitation of the current study that can be explored in future research.

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Table 1 Cross-shareholding ratio of the six major corporate groups

	1994年	1999年	2004年	2009年	2013年
Mitsubishi (三菱)	26.11	23.64	16.81	15.6	13.08
Sumitomo (住友)	24.45	20.81	11.47	9.95	5.71
Mitsui (三井)	16.77	15.82	8.04	6.71	5.25
Keiretsu Avg.	22.44	20.09	12.11	10.75	8.01
Fuyo (芙蓉)	14.90	14.71	6.01	4.04	2.21
Sanwa (三和)	15.67	14.39	8.88	6.08	4.96
Ichikan (一勘)	11.92	12.11	8.30	7.88	4.53
Yushi-Keiretsu Avg.	14.16	13.74	7.73	6.00	3.90
All group, Avg.	18.30	16.91	9.92	8.38	5.96

Source: Kikuchi, 2017, p. 168, partially revised.

Definitions in this study, Cross-shareholding ratio is limited to cross-shareholding among group companies

Table 2 Proxy variables

Variable	Proxy variable		出所
Dependent variable			
CSR	csr score	300点満点	TOYO KEIZAI CSR Online
	Employment score	100点満点	2011-2018
	Environmental score	100点満点	CSR company white paper
	CG / Sociality score	100点満点	2017、2018
Independent			
Keiretsu	- Mitsui dummy	Variable that gives "1" to companies listed in company group HP	Organizations HP
	- Mitsubishi Dummy		
	- Sumitomo Dummy		
Yushi-Keiretsu	- Fuyo dummy	Variable that gives "1" to companies listed in company group HP, and Weekly economic magazine	Fuyo、Sanwa : Organizations HP Ichikan : Weekly diamond (July 29, 2017 issue)
	- Sanwa dummy		
	- Ichikan dummy		
ASS	Total assets	$\ln(\text{Total assets})$	NEEDS-Cges
RD	R&D intensiveness	R&D investment / Sales	NEEDS-Cges, Finance Data Bank (DBJ)
ADV	Advertising-To-Sales Ratio	Advertisement cost / Sales	NEEDS-Cges, Finance Data Bank (DBJ)
FSR	Overseas sales ratio	Sales outside Japan / Sales	NEEDS-Cges, Finance Data Bank (DBJ)
ROA	ROA	Industry and other adjustments ROA	NEEDS-Cges
DASS	Debt ratio	$(\text{Total liabilities} / \text{Total assets}) \times 100$	NEEDS-Cges
FRGN	Foreign corporation		Finance Data Bank (DBJ)
IND	Ownership ratio		TSE 33 Industry Classification Code
FY			
DPH	Stable ownership ratio		NEEDS-Cges
AGE	Cross-shareholding ratio		NEEDS-Cges
BRD	Founding years	$(t-1) - \text{Established year}$	QUICK-Astra Manager
MBD	Number of Board of Directors	Number of Board of Directors / $\ln(\text{Total assets})$	NEEDS-Cges
	Main-bank stock holding ratio	Shareholding ratio of Main Bank	NEEDS-Cges
	Main bank borrowing dependence	Borrowing from main bank / Total borrowings $\times 100$	NEEDS-Cges

Table 3 Overview of sample firms

CSR data		Financial data	Before matching			After matching		
Year	Survey timing		<i>Keiretsu</i>	Independence	total	<i>Keiretsu</i>	Independence	total
2007	June 2006	FY2005	64	2,837	2,901	61	57	118
2008	June 2007	FY2006	64	2,767	2,831	63	61	124
2009	June 2008	FY2007	63	2,937	3,000	61	53	114
2010	June 2009	FY2008	64	2,852	2,916	61	55	116
2011	June 2010	FY2009	64	2,763	2,827	64	55	119
2012	June 2011	FY2010	66	2,723	2,789	65	59	124
2013	June 2012	FY2011	66	2,714	2,780	66	37	103
2014	June 2013	FY2012	65	2,722	2,787	64	54	118
2015	June 2014	FY2013	64	2,721	2,785	63	58	121
2016	June 2015	FY2014	66	2,762	2,828	65	58	123
2017	June 2016	FY2015	67	2,797	2,864	66	58	124
2018	June 2017	FY2016	67	2,837	2,904	65	60	125
2019	June 2018	FY2017	66	2,829	2,895	65	56	121
			846	36,261	37,107	829	721	1,550

Table 4 Overview of *Keiretsu* dummy companies

		Before matching	After matching
<i>Keiretsu</i>	The number of companies	846	829

	The number of companies	326	314
	A percentage of the	38.53%	37.88%
	csr score	mean	159.05
		SD	117.42
Mitsui	Employment score	mean	49.01
		SD	37.93
	Environmental score	mean	54.41
		SD	39.95
	CG / Sociality score	mean	55.50
		SD	40.68

	The number of companies	277	275
	A percentage of the	32.74%	33.17%
	csr score	mean	163.68
		SD	110.46
Mitsubishi	Employment score	mean	50.75
		SD	35.30
	Environmental score	mean	54.40
		SD	37.25
	CG / Sociality score	mean	58.36
		SD	38.90

	The number of companies	243	240
	A percentage of the	28.72%	28.95%
	csr score	mean	140.22
		SD	115.65
Sumitomo	Employment score	mean	43.22
		SD	36.60
	Environmental score	mean	49.06
		SD	40.59
	CG / Sociality score	mean	47.82
		SD	39.63

Table 5 Basic statistics
Panel A Before matching

Variable name		Obs	Mean	Std. Dev.	Min	p25	p50	p75	Max
csr score	All samples	37107	39.15	81.16	0	0	0	0	295.20
	Keiretsu	846	155.16	114.95	0	0	206.70	255.50	294.10
	Independence	36261	36.44	78.17	0	0	0	0	295.20
Employment score	All samples	37107	12.23	25.70	0	0	0	0	100
	Keiretsu	846	47.92	36.79	0	0	58.50	81.80	100
	Independence	36261	11.40	24.78	0	0	0	0	100
Environmental score	All samples	37107	13.07	27.67	0	0	0	0	100
	Keiretsu	846	52.87	39.31	0	0	70.50	86.90	100
	Independence	36261	12.14	26.64	0	0	0	0	100
CG / Sociality score	All samples	37107	13.82	28.63	0	0	0	0	100
	Keiretsu	846	54.23	39.98	0	0	74.70	88.50	99.40
	Independence	36261	12.88	27.61	0	0	0	0	100
Keiretsu dummy	All samples	37107	0.023	0.149	0	0	0	0	1
Mitsui dummy	All samples	37107	0.009	0.093	0	0	0	0	1
Mitsubishi Dummy	All samples	37107	0.007	0.086	0	0	0	0	1
Sumitomo Dummy	All samples	37107	0.007	0.081	0	0	0	0	1
Total assets (1 billion yen)	All samples	37107	243.99	1222.53	0.05	12.96	34.43	102.94	50300
	Keiretsu	846	2140.21	5100.07	41.21	212.48	577.12	2072.06	50300
	Independence	36261	199.75	915.12	0.047	12.67	33.05	95.40	31200
ln(Total assets)	All samples	37107	10.59	1.68	3.85	9.47	10.45	11.54	17.73
	Keiretsu	846	13.38	1.52	10.63	12.27	13.27	14.54	17.73
	Independence	36261	10.52	1.63	3.85	9.45	10.41	11.47	17.26
R&D intensiveness	All samples	37107	2.34	47.09	0	0	0.26	1.79	4882.54
	Keiretsu	846	1.52	1.69	0	0.03	0.78	2.61	8.06
	Independence	36261	2.36	47.64	0	0	0.24	1.76	4882.54
Advertising-To- Sales Ratio	All samples	37107	0.86	2.89	0	0	0	0.04	119.80
	Keiretsu	846	0.58	1.36	0	0	0	0.22	8.51
	Independence	36261	0.86	2.91	0	0	0	0.03	119.80
Overseas sales ratio	All samples	37107	0.11	0.21	0.00	0.00	0.00	0.15	1.00
	Keiretsu	846	0.27	0.25	0.00	0.00	0.24	0.46	0.97
	Independence	36261	0.11	0.21	0.00	0.00	0.00	0.14	1.00
Industry adjust- ment ROA	All samples	37107	-1.46	9.17	-380.90	-4.39	-1.50	1.58	348.68
	Keiretsu	846	-0.62	3.31	-16.11	-2.69	-0.79	1.31	15.00
	Independence	36261	-1.48	9.26	-380.90	-4.44	-1.52	1.60	348.68
Debt ratio	All samples	37107	50.04	21.44	1.2	34	50.26	65.65	823.2
	Keiretsu	846	59.71	14.61	21.15	50.1	61.54	70.12	106.5
	Independence	36261	49.81	21.53	1.2	33.7	49.9	65.44	823.2
Foreign corporation Ownership ratio	All samples	37107	9.97	12.10	0	0.95	5.18	15.22	94.2
	Keiretsu	846	21.82	11.63	0.73	12.96	22.29	30.36	72.32
	Independence	36261	9.70	11.97	0	0.9	4.93	14.6	94.2

Panel B After matching

Variable name		Obs	Mean	Std. Dev.	Min	p25	p50	p75	Max
csr score	All samples	1550	142.84	116.50	0	0	193.80	249.80	294.10
	Keiretsu	829	153.05	115.07	0	0	204.10	254.70	294.10
	Independence	721	131.10	117.11	0	0	171.90	244.10	293.20
Employment score	All samples	1550	44.36	37.33	0	0	54.70	80.30	100.00
	Keiretsu	829	47.20	36.78	0	0	58.20	81.40	100.00
	Independence	721	41.09	37.71	0	0	51.00	77.30	100.00
Environmental score	All samples	1550	48.48	39.92	0	0	65.60	85.50	100.00
	Keiretsu	829	52.15	39.35	0	0	70.40	86.90	100.00
	Independence	721	44.26	40.19	0	0	57.40	83.80	100.00
CG / Sociality score	All samples	1550	49.88	40.52	0	0	70.10	87.00	100.00
	Keiretsu	829	53.57	40.07	0	0.0	74.40	88.00	99.40
	Independence	721	45.64	40.65	0	0	61.30	85.00	100.00
Keiretsu dummy	All samples	1550	0.53	0.50	0	0	1	1	1
Mitsui dummy	All samples	1550	0.20	0.40	0	0	0	0	1
Mitsubishi Dummy	All samples	1550	0.18	0.38	0	0	0	0	1
Sumitomo Dummy	All samples	1550	0.15	0.36	0	0	0	0	1
Total assets (1 billion yen)	All samples	1550	1697.941	3210.18	1.44	180.86	536.99	1858.27	32600
	Keiretsu	829	1667.935	3089.79	41.21	206.87	555.27	1918.13	32600
	Independence	721	1732.441	3345.08	1.44	144.73	500.83	1784.17	21000
ln(Total assets)	All samples	1550	13.22	1.56	7.28	12	13.19	14.44	17.30
	Keiretsu	829	13.32	1.45	10.63	12.24	13.23	14.47	17.30
	Independence	721	13.11	1.68	7.28	11.88	13.12	14.39	16.86
R&D intensiveness	All samples	1550	1.82	2.83	0	0.01	0.778	2.74	30.70
	Keiretsu	829	1.50	1.68	0	0.04	0.777	2.57	8.06
	Independence	721	2.19	3.70	0	0	0.779	3.11	30.70
Advertising-To- Sales Ratio	All samples	1550	0.75	1.76	0	0	0	0.517	17.64
	Keiretsu	829	0.57	1.37	0	0	0	0.133	8.51
	Independence	721	0.96	2.11	0	0	0	0.959	17.64
Overseas sales ratio	All samples	1550	0.26	0.27	0.00	0.00	0.19	0.47	0.99
	Keiretsu	829	0.27	0.25	0.00	0.00	0.23	0.45	0.97
	Independence	721	0.25	0.28	0	0.00	0.14	0.48	0.99
Industry adjust- ment ROA	All samples	1550	-0.27	3.99	-30.34	-2.49	-0.508	1.71	38.115
	Keiretsu	829	-0.63	3.33	-16.11	-2.69	-0.819	1.296	15.002
	Independence	721	0.14	4.60	-30.34	-2.21	-0.137	2.137	38.115
Debt ratio	All samples	1550	57.15	17.42	6.25	45.71	59.295	69.98	106.5
	Keiretsu	829	59.51	14.64	21.15	49.90	61.21	70	106.5
	Independence	721	54.43	19.81	6.25	40.91	56	69.86	93.06
Foreign corporation Ownership ratio	All samples	1550	21.72	13.21	0	11.39	21.11	30.64	77.98
	Keiretsu	829	21.69	11.69	0.73	12.76	22.08	30.23	72.32
	Independence	721	21.76	14.78	0	10.01	20.25	31.50	77.98

Table 6 Pre-match estimates

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	csr	csr	Employment	Employment	Enviro- nmental	Enviro- nmental	CG/ Sociality	CG/ Sociality
Keiretsu	19.376** (7.621)		6.002** (2.441)		6.538** (2.552)		6.846** (2.731)	
Mitsui		1.147 (11.651)		-0.002 (3.733)		0.811 (3.902)		0.174 (4.175)
Mitsubishi		42.595*** (12.557)		13.401*** (4.022)		12.953*** (4.208)		16.401*** (4.497)
Sumitomo		17.480 (13.577)		5.666 (4.347)		6.968 (4.543)		4.911 (4.871)
ln(Total assets)	97.141*** (1.484)	97.092*** (1.484)	30.731*** (0.474)	30.716*** (0.474)	32.894*** (0.499)	32.885*** (0.499)	34.357*** (0.531)	34.331*** (0.531)
R&D intensiveness	-38.719 (36.949)	-37.793 (36.352)	-11.041 (11.198)	-10.789 (11.032)	-13.538 (12.622)	-13.312 (12.473)	-14.881 (13.812)	-14.412 (13.516)
Advertising-To-Sales Ratio	-33.670 (66.907)	-37.215 (66.988)	-4.807 (21.040)	-5.902 (21.066)	-25.188 (23.114)	-26.238 (23.139)	-5.868 (23.714)	-7.287 (23.744)
Overseas sales ratio	46.600*** (8.120)	46.199*** (8.120)	14.830*** (2.605)	14.701*** (2.605)	15.806*** (2.718)	15.696*** (2.718)	16.288*** (2.912)	16.121*** (2.912)
Industry adjustment	-0.188 (0.248)	-0.196 (0.249)	-0.021 (0.078)	-0.024 (0.078)	-0.112 (0.085)	-0.115 (0.085)	-0.060 (0.089)	-0.063 (0.089)
Debt ratio	-0.947*** (0.091)	-0.946*** (0.091)	-0.300*** (0.029)	-0.300*** (0.029)	-0.317*** (0.031)	-0.317*** (0.031)	-0.342*** (0.032)	-0.342*** (0.032)
Foreign corporation Ownership ratio	-0.126 (0.158)	-0.112 (0.158)	-0.020 (0.050)	-0.015 (0.050)	-0.068 (0.053)	-0.064 (0.053)	-0.047 (0.057)	-0.041 (0.057)
Constant	-1,152.319*** (16.808)	-1,151.894*** (16.807)	-362.225*** (5.353)	-362.098*** (5.353)	-394.745*** (5.679)	-394.675*** (5.679)	-407.343*** (6.006)	-407.109*** (6.005)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FY dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37,107	37,107	37,107	37,107	37,107	37,107	37,107	37,107
Pseudo R2	0.103	0.103	0.117	0.117	0.120	0.120	0.115	0.115

Standard errors in parentheses. *** p<0.01, ** p<0.05, and * p<0.1

Table 7 Basic estimation

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	csr	csr	Employment	Employment	Enviro- nmental	Enviro- nmental	CG/ Sociality	CG/ Sociality
Keiretsu	18.110** (7.939)		5.406** (2.499)		6.400** (2.747)		6.539** (2.826)	
Mitsui		-1.160 (10.127)		-1.085 (3.185)		0.296 (3.513)		-0.269 (3.598)
Mitsubishi		44.883*** (10.365)		13.637*** (3.263)		14.380*** (3.595)		17.241*** (3.681)
Sumitomo		10.749 (11.100)		3.908 (3.490)		4.675 (3.850)		2.389 (3.946)
ln(Total assets)	66.964*** (3.635)	65.492*** (3.619)	21.710*** (1.147)	21.265*** (1.143)	22.658*** (1.257)	22.239*** (1.255)	23.036*** (1.293)	22.419*** (1.285)
R&D intensiveness	276.454 (185.299)	322.185* (186.028)	78.642 (58.178)	90.361 (58.412)	114.222* (64.137)	126.379* (64.528)	85.564 (65.995)	107.570 (66.122)
Advertising-To-Sales Ratio	97.113 (239.586)	15.970 (239.244)	45.297 (75.057)	19.233 (74.961)	28.411 (83.200)	3.104 (83.247)	22.848 (85.244)	-7.360 (84.959)
Overseas sales ratio	25.976 (21.043)	22.361 (20.996)	11.812* (6.626)	10.833 (6.613)	3.769 (7.280)	2.805 (7.278)	10.817 (7.492)	9.129 (7.462)
Industry adjustment	1.374 (1.023)	0.908 (1.026)	0.495 (0.322)	0.337 (0.323)	0.372 (0.354)	0.227 (0.356)	0.516 (0.364)	0.350 (0.364)
Debt ratio	-0.471* (0.284)	-0.472* (0.282)	-0.136 (0.089)	-0.137 (0.089)	-0.147 (0.098)	-0.148 (0.098)	-0.192* (0.101)	-0.192* (0.100)
Foreign corporation Ownership ratio	0.066 (0.415)	0.403 (0.420)	-0.012 (0.131)	0.095 (0.133)	0.046 (0.144)	0.149 (0.146)	0.021 (0.148)	0.151 (0.149)
Constant	-779.994*** (52.408)	-769.218*** (52.106)	-247.046*** (16.433)	-243.964*** (16.344)	-273.020*** (18.261)	-270.145*** (18.196)	-266.282*** (18.610)	-261.389*** (18.461)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FY dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,550	1,550	1,550	1,550	1,550	1,550	1,550	1,550
Pseudo R2	0.0679	0.0691	0.0846	0.0861	0.0781	0.0792	0.0759	0.0776

Standard errors in parentheses. *** p<0.01, ** p<0.05, and * p<0.1

Table 8 Basic estimation + “*Keiretsu* element”

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	csr	csr	Employment	Employment	Enviro- nmental	Enviro- nmental	CG / Sociality	CG / Sociality
Keiretsu	19.862** (7.854)		5.962** (2.470)		7.031*** (2.722)		7.098** (2.795)	
Mitsui		9.599 (10.220)		2.308 (3.213)		3.764 (3.549)		3.652 (3.631)
Mitsubishi		43.540*** (10.371)		13.079*** (3.264)		14.294*** (3.601)		16.507*** (3.682)
Sumitomo		4.502 (11.049)		2.075 (3.473)		2.465 (3.836)		0.176 (3.928)
ln(Total assets)	74.527*** (3.894)	72.746*** (3.900)	24.136*** (1.226)	23.576*** (1.229)	25.102*** (1.349)	24.563*** (1.354)	25.747*** (1.384)	25.055*** (1.384)
R&D intensiveness	274.392 (182.775)	344.702* (183.971)	79.596 (57.328)	98.540* (57.742)	112.574* (63.383)	133.641** (63.890)	84.418 (65.067)	114.851* (65.371)
Advertising-To-Sales Ratio	117.580 (237.480)	72.467 (237.468)	49.163 (74.247)	34.314 (74.299)	37.754 (82.736)	23.421 (82.838)	29.301 (84.409)	13.077 (84.251)
Overseas sales ratio	28.847 (21.033)	24.358 (21.025)	12.813* (6.618)	11.613* (6.620)	4.899 (7.287)	3.567 (7.294)	11.584 (7.487)	9.615 (7.471)
Industry adjustment ROA	0.968 (1.023)	0.797 (1.025)	0.362 (0.321)	0.298 (0.322)	0.266 (0.355)	0.212 (0.356)	0.348 (0.364)	0.292 (0.364)
Debt ratio	-0.300 (0.291)	-0.331 (0.290)	-0.079 (0.091)	-0.088 (0.091)	-0.095 (0.101)	-0.104 (0.101)	-0.128 (0.103)	-0.141 (0.103)
Foreign corporation Ownership ratio	0.885** (0.440)	1.089** (0.442)	0.256* (0.139)	0.318** (0.139)	0.311** (0.153)	0.374** (0.154)	0.314** (0.157)	0.393** (0.157)
Cross-shareholding ratio	0.172 (0.529)	0.155 (0.527)	0.078 (0.166)	0.075 (0.166)	0.042 (0.184)	0.036 (0.183)	0.061 (0.188)	0.052 (0.187)
Stable ownership ratio	1.763*** (0.283)	1.654*** (0.289)	0.560*** (0.089)	0.521*** (0.091)	0.570*** (0.098)	0.535*** (0.100)	0.639*** (0.101)	0.602*** (0.102)
Main bank stock holding ratio	3.394 (2.623)	3.157 (2.609)	0.978 (0.825)	0.905 (0.821)	1.484 (0.910)	1.411 (0.906)	0.971 (0.933)	0.881 (0.926)
Main bank borrowing dependence	0.339 (0.242)	0.353 (0.241)	0.140* (0.076)	0.143* (0.076)	0.088 (0.084)	0.092 (0.084)	0.116 (0.086)	0.123 (0.086)
Founding years	0.306* (0.183)	0.422** (0.186)	0.077 (0.057)	0.110* (0.058)	0.144** (0.063)	0.179*** (0.065)	0.082 (0.065)	0.131** (0.066)
Number of Board of Directors	-16.807 (16.590)	-12.819 (16.634)	-4.729 (5.209)	-3.348 (5.227)	-5.103 (5.755)	-3.842 (5.779)	-7.126 (5.907)	-5.740 (5.911)
Constant	-975.951*** (62.609)	-962.962*** (62.357)	-308.879*** (19.621)	-304.570*** (19.556)	-340.022*** (21.848)	-336.151*** (21.795)	-333.915*** (22.207)	-329.009*** (22.074)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FY dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,550	1,550	1,550	1,550	1,550	1,550	1,550	1,550
Pseudo R2	0.0712	0.0720	0.0886	0.0895	0.0816	0.0824	0.0797	0.0810

Standard errors in parentheses. *** p<0.01, ** p<0.05, and * p<0.1

Table 9 Pre-match estimation + *Yushi-Keiretsu*

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	csr	csr	Employment	Employment	Enviro- nmental	Enviro- nmental	CG / Sociality	CG / Sociality
Keiretsu	29.024*** (7.651)		8.932*** (2.453)		10.020*** (2.560)		10.147*** (2.744)	
Mitsui		5.284 (11.627)		1.307 (3.728)		2.277 (3.889)		1.569 (4.169)
Mitsubishi		54.431*** (12.551)		16.995*** (4.024)		17.253*** (4.201)		20.414*** (4.498)
Sumitomo		29.596** (13.559)		9.348** (4.346)		11.364** (4.532)		9.025* (4.868)
Yushi-Keiretsu	52.859*** (5.306)		16.064*** (1.703)		19.022*** (1.774)		18.108*** (1.904)	
Fuyo		37.471*** (9.618)		11.229*** (3.086)		14.464*** (3.212)		12.066*** (3.451)
Sanwa		34.400*** (6.787)		11.000*** (2.176)		11.715*** (2.272)		11.903*** (2.435)
Ichikan		83.054*** (10.678)		24.577*** (3.422)		30.315*** (3.573)		28.484*** (3.828)
ln(Total assets)	94.349*** (1.493)	94.016*** (1.498)	29.898*** (0.477)	29.803*** (0.479)	31.867*** (0.502)	31.739*** (0.503)	33.410*** (0.534)	33.301*** (0.536)
R&D intensiveness	-36.565 (35.689)	-38.495 (36.693)	-10.463 (10.858)	-10.932 (11.102)	-12.708 (12.134)	-13.586 (12.597)	-14.095 (13.351)	-14.708 (13.671)
Advertising-To-Sales Ratio	-45.531 (66.730)	-51.518 (66.761)	-8.356 (20.998)	-10.182 (21.013)	-29.560 (23.030)	-31.371 (23.028)	-9.902 (23.663)	-12.247 (23.683)
Overseas sales ratio	50.229*** (8.098)	50.096*** (8.095)	15.934*** (2.600)	15.890*** (2.599)	17.119*** (2.708)	17.101*** (2.706)	17.528*** (2.906)	17.453*** (2.904)
Industry adjustment ROA	-0.134 (0.247)	-0.144 (0.246)	-0.005 (0.078)	-0.009 (0.078)	-0.092 (0.084)	-0.096 (0.084)	-0.042 (0.088)	-0.045 (0.088)
Debt ratio	-0.997*** (0.091)	-1.011*** (0.091)	-0.315*** (0.029)	-0.319*** (0.029)	-0.335*** (0.030)	-0.340*** (0.030)	-0.360*** (0.032)	-0.364*** (0.032)
Foreign corporation Ownership ratio	-0.132 (0.158)	-0.119 (0.157)	-0.022 (0.050)	-0.018 (0.050)	-0.070 (0.053)	-0.066 (0.053)	-0.049 (0.056)	-0.043 (0.056)
Constant	-1,121.098*** (16.856)	-1,116.419*** (16.932)	-352.942*** (5.372)	-351.629*** (5.397)	-383.170*** (5.689)	-381.344*** (5.714)	-396.790*** (6.027)	-395.256*** (6.054)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FY dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37,107	37,107	37,107	37,107	37,107	37,107	37,107	37,107
Pseudo R2	0.104	0.104	0.118	0.118	0.121	0.121	0.116	0.116

Standard errors in parentheses. *** p<0.01, ** p<0.05, and * p<0.1

Table 10 Basic estimation + *Yushi-Keiretsu*

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	csr	csr	Employment	Employment	Enviro- nmental	Enviro- nmental	CG / Sociality	CG / Sociality
Keiretsu	28.132*** (8.305)		8.228*** (2.619)		10.209*** (2.870)		10.054*** (2.957)	
Mitsui		3.356 (10.263)		0.169 (3.234)		2.007 (3.556)		1.356 (3.647)
Mitsubishi		56.856*** (10.747)		17.082*** (3.389)		18.830*** (3.724)		21.468*** (3.817)
Sumitomo		21.785* (11.394)		7.070** (3.590)		8.781** (3.947)		6.298 (4.051)
Yushi-Keiretsu	46.573*** (11.564)		13.051*** (3.642)		17.697*** (3.995)		16.349*** (4.119)	
Fuyo		19.086 (20.136)		5.994 (6.341)		7.540 (6.972)		5.982 (7.159)
Sanwa		17.668 (18.172)		4.195 (5.725)		6.943 (6.291)		6.861 (6.459)
Ichikan		69.788*** (15.673)		20.408*** (4.930)		25.444*** (5.430)		24.516*** (5.572)
ln(Total assets)	66.795*** (3.627)	64.280*** (3.609)	21.683*** (1.146)	20.937*** (1.141)	22.581*** (1.253)	21.788*** (1.250)	22.976*** (1.291)	21.985*** (1.281)
R&D intensiveness	273.301 (184.418)	313.558* (184.902)	77.806 (58.000)	87.793 (58.156)	112.988* (63.730)	123.475* (64.055)	84.444 (65.695)	104.484 (65.736)
Advertising-To-Sales Ratio	5.188 (239.712)	-95.562 (238.962)	19.524 (75.225)	-13.337 (75.000)	-6.594 (83.107)	-37.937 (83.039)	-9.341 (85.308)	-46.360 (84.879)
Overseas sales ratio	35.036* (21.085)	34.670* (21.029)	14.382** (6.652)	14.453** (6.635)	7.197 (7.282)	7.316 (7.280)	13.992* (7.509)	13.444* (7.475)
Industry adjustment ROA	1.545 (1.021)	0.915 (1.023)	0.544* (0.322)	0.341 (0.322)	0.436 (0.353)	0.230 (0.355)	0.575 (0.363)	0.349 (0.363)
Debt ratio	-0.632** (0.286)	-0.601** (0.284)	-0.182** (0.090)	-0.175* (0.090)	-0.209** (0.099)	-0.196** (0.099)	-0.248** (0.102)	-0.237** (0.101)
Foreign corporation Ownership ratio	-0.144 (0.418)	0.303 (0.423)	-0.072 (0.132)	0.064 (0.134)	-0.033 (0.144)	0.110 (0.146)	-0.053 (0.149)	0.118 (0.150)
Constant	-762.537*** (52.278)	-741.558*** (51.930)	-242.392*** (16.421)	-236.143*** (16.317)	-266.179*** (18.184)	-259.734*** (18.107)	-260.165*** (18.569)	-251.732*** (18.405)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FY dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,550	1,550	1,550	1,550	1,550	1,550	1,550	1,550
Pseudo R2	0.0691	0.0707	0.0857	0.0877	0.0798	0.0813	0.0772	0.0794

Standard errors in parentheses. *** p<0.01, ** p<0.05, and * p<0.1

Table 11 Basic estimation + “*Keiretsu* element” + *Yushi-Keiretsu*

VARIABLES	(1) csr	(2) csr	(3) Employment	(4) Employment	(5) Enviro- nmental	(6) Enviro- nmental	(7) CG / Sociality	(8) CG / Sociality
Keiretsu	30.914*** (8.217)		9.120*** (2.589)		11.153*** (2.844)		10.999*** (2.924)	
Mitsui		15.215 (10.390)		3.933 (3.273)		5.802 (3.603)		5.692 (3.692)
Mitsubishi		55.565*** (10.714)		16.581*** (3.378)		18.727*** (3.716)		20.746*** (3.805)
Sumitomo		16.826 (11.367)		5.656 (3.581)		6.988* (3.942)		4.552 (4.041)
Yushi-Keiretsu	51.017*** (11.473)		14.523*** (3.611)		19.013*** (3.970)		18.031*** (4.086)	
Fuyo		14.268 (19.967)		4.513 (6.288)		6.035 (6.918)		4.094 (7.099)
Sanwa		29.214 (18.163)		8.175 (5.722)		10.329 (6.293)		11.154* (6.455)
Ichikan		68.039*** (15.538)		19.761*** (4.887)		24.977*** (5.388)		23.878*** (5.523)
ln(Total assets)	74.620*** (3.884)	71.507*** (3.891)	24.183*** (1.225)	23.239*** (1.228)	25.124*** (1.344)	24.098*** (1.349)	25.777*** (1.381)	24.615*** (1.381)
R&D intensiveness	270.649 (181.691)	333.916* (182.923)	78.599 (57.092)	95.548* (57.516)	111.126* (62.915)	129.777** (63.444)	83.095 (64.689)	110.989* (65.005)
Advertising-To-Sales Ratio	7.361 (237.585)	-43.834 (237.413)	17.820 (74.415)	0.591 (74.417)	-3.523 (82.650)	-19.745 (82.708)	-9.529 (84.457)	-27.518 (84.242)
Overseas sales ratio	38.652* (21.050)	36.847* (21.062)	15.637** (6.636)	15.269** (6.645)	8.546 (7.282)	8.152 (7.297)	15.039** (7.494)	14.003* (7.485)
Industry adjustment ROA	1.110 (1.020)	0.771 (1.023)	0.403 (0.321)	0.293 (0.322)	0.319 (0.353)	0.205 (0.355)	0.397 (0.363)	0.279 (0.363)
Debt ratio	-0.465 (0.292)	-0.440 (0.292)	-0.127 (0.092)	-0.121 (0.092)	-0.156 (0.101)	-0.146 (0.101)	-0.187* (0.104)	-0.178* (0.104)
Foreign corporation Ownership ratio	0.708 (0.440)	1.040** (0.445)	0.205 (0.139)	0.303** (0.141)	0.245 (0.152)	0.353** (0.154)	0.252 (0.157)	0.380** (0.158)
Cross-shareholding ratio	0.121 (0.527)	0.109 (0.525)	0.064 (0.166)	0.062 (0.165)	0.023 (0.182)	0.019 (0.182)	0.043 (0.187)	0.037 (0.186)
Stable ownership ratio	1.841*** (0.283)	1.699*** (0.289)	0.583*** (0.089)	0.534*** (0.091)	0.598*** (0.098)	0.550*** (0.100)	0.667*** (0.101)	0.620*** (0.103)
Main bank stock holding ratio	4.204 (2.617)	4.189 (2.604)	1.210 (0.824)	1.203 (0.821)	1.788** (0.906)	1.789** (0.903)	1.255 (0.931)	1.248 (0.925)
Main bank borrowing dependence	0.351 (0.241)	0.310 (0.241)	0.144* (0.076)	0.131* (0.076)	0.092 (0.084)	0.076 (0.084)	0.120 (0.086)	0.108 (0.085)
Founding years	0.242 (0.182)	0.356* (0.185)	0.059 (0.057)	0.091 (0.058)	0.120* (0.063)	0.156** (0.064)	0.060 (0.065)	0.107 (0.066)
Number of Board of Directors	-17.396 (16.501)	-12.363 (16.528)	-4.895 (5.190)	-3.214 (5.202)	-5.317 (5.716)	-3.658 (5.734)	-7.336 (5.877)	-5.593 (5.874)
Constant	-960.611*** (62.379)	-935.905*** (62.248)	-304.804*** (19.583)	-296.949*** (19.560)	-334.072*** (21.736)	-325.800*** (21.722)	-328.454*** (22.129)	-319.697*** (22.041)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FY dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,550	1,550	1,550	1,550	1,550	1,550	1,550	1,550
Pseudo R2	0.0726	0.0737	0.0900	0.0912	0.0835	0.0846	0.0814	0.0829

Standard errors in parentheses. *** p<0.01, ** p<0.05, and * p<0.1

Figure 1 Corporate groups (*Keiretsu*) and *Yushi-Keiretsu*

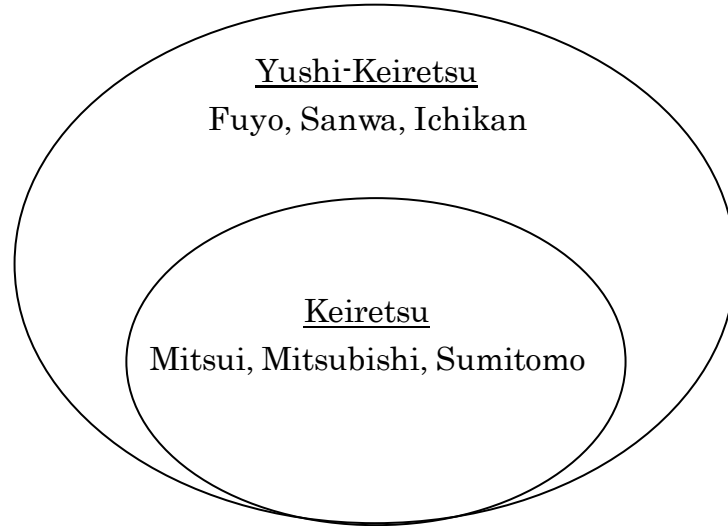
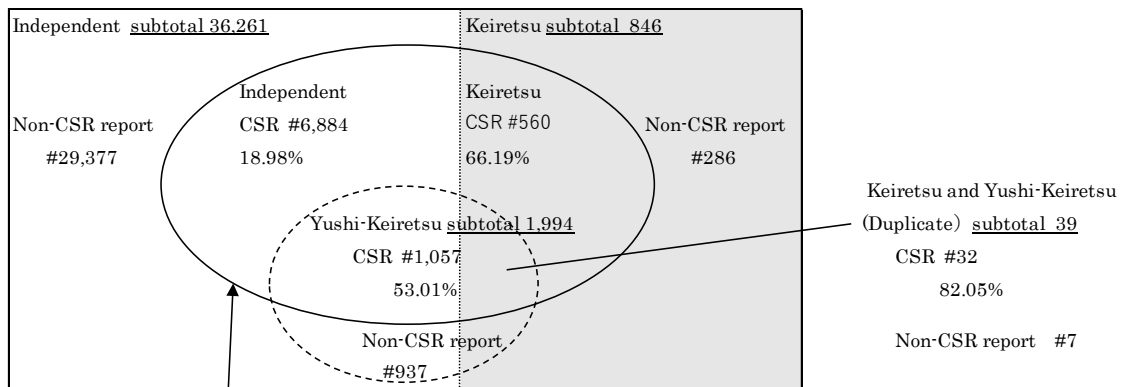


Figure 2 Sample company outline
Panel A Before matching

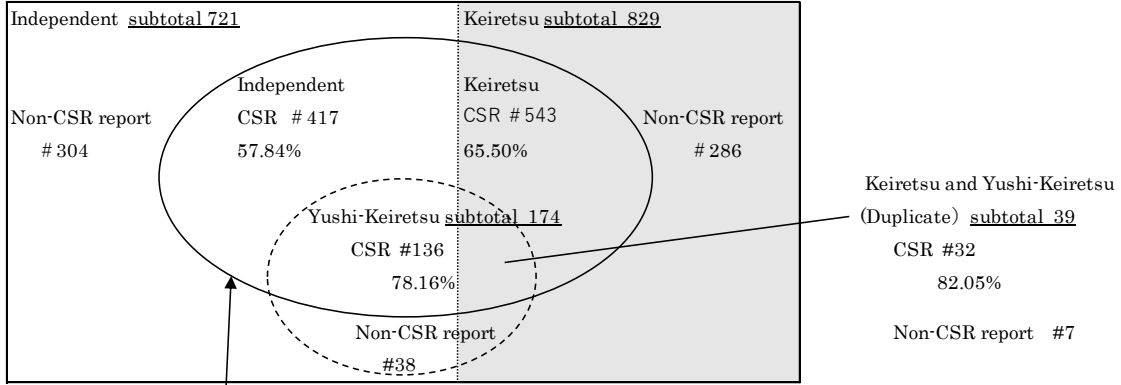
Total = 37,107



※The inside of the line, group of companies with CSR rankings

Panel B After matching

Total = 1,550



※The inside of the line, group of companies with CSR rankings