Does the difference in awareness between asset owners and asset managers have an impact on firms' ESG activities?

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Abstract

We investigate the effects on E&S activities of investee companies of differences in ESG awareness between asset managers and asset owners by using the exogenous investment policy change by GPIF, i.e., UN PRI signature. The results show that the firms in which the GPIF-mandated asset managers are major shareowners increase their E&S scores more, after the GPIF signed the PRI. The firms' E&S score of GPIF-mandated asset managers that had signed the PRI are improved after changing the policy, although the score of nonGPIF mandated managers that had signed is not improved. These results imply that the agreement between asset owners and asset managers plays a more critical role in promoting firms' E&S activities.

Keywords: Corporate Social Responsibility, Asset Owner, Ownership, Exogenous shock, Difference-in-Difference Estimation, Japan.

JEL Classification Codes: G11; G32; G39

1. INTRODUCTION

Asset managers such as mutual funds and investment advisory firms collect funds from asset owners, such as pension funds, and invest in firms, becoming shareholders. Asset owners and their asset managers agree on the goal of improving the firm performance in which they invest, but they do not always agree on their assessment of whether a firm's new strategies will improve long-term performance. It is not still unknown how the discrepancy in perceptions between asset managers and asset owners will affect their invested firms. Firms' E&S (Environment and Social) activities and investments are one of the strategies that are evaluated differently by asset owners and asset owners. According to survey research, it is not uncommon for asset managers and asset owners to still believe that CSR investments "sacrifice returns" and "violate fiduciary responsibility" (Eccles et al. 2017; Brandon et al. 2021). There are vary findings on the impact of E&S activities on firm value and stock price performance (Albuquerque , et al., 2019; Dai et al., 2021; Griffin et al. 2021; Shirasu and Kawakita, 2020; Masulis and Reza, 2015; Cheng et al, 2016; Cronqvist and Yu, 2017), and the impact of institutional equity ownership on firms' E&S investment is controversial (Velte 2022, Gibson-Brandon et al. 2021, Dyck et al., 2019, Barnea and Rubin, 2010). It is argued that the characteristics of institutional investors investing in ESG are not homogeneous, but rather non-homogeneous (Velte 2022, Gibson-Brandon et al. 2021). The purpose of this study is to examine these differences in investor behavior in terms of differences in the perceptions of asset owners and asset managers.

These are fiduciary responsibility[1] and valuation periods as reasons why the difference in awareness of E&S activities between them affects the ESG engagement to firms of the Asset manager. Asset managers are held fiduciary liable by the asset owner if they behave against the asset owners' profits. If the asset

[1] Brandon et al. (2021) note that there is significant different among regions, in the U.S. regulatory environment is still lacking consensus on fiduciary responsibility, while in Europe, social norms, including fiduciary responsibility, are entrenched and regulated.

owner perceives that E&S activities will hurt performance, the activities could be singled out as the reason for poor performance and the asset manager could be held liable for fiduciary responsibility.[2] Several studies note that outperformance in E&S investments takes a long time, on average, six to seven years (e.g., Robert et al. 2014).[3] However, the time horizon for Asset owners to evaluate Asset managers is known to be shorter than that (Eccles et al. 2017). If the period of evaluation by the asset owner who does not support E&S activities for the asset manager is shorter than the period of E&S activities produces outperform, it will be difficult for the asset manager to actively promote E&S engagement. In other words, without buy-in from the asset owner regarding E&S activities, we can expect that the asset manager will be less likely to engage in active E&S engagement with the portfolio company.

To test these hypotheses, this paper uses the recognition change event of Japan's Public Pension Fund (GPIF), the world's largest asset owner with $1.5 trillion under management. The advantages of using this data are (1) to verify the gap between the perceptions of asset managers and asset owners, and (2) to address the endogeneity issue at the time of verification. The GPIF is not legally allowed to trade stocks by itself. Unlike the U.S. asset owner, GPIF never manages its own assets, and all investments in firms are made through the asset manager. Since the asset owner and asset manager are completely separate organizations, the differences in their perceptions can be verified. GPIF publishes a time series of data on the asset managers it invests in, so we can follow the changes. The endogeneity problems arise when examining the impact of asset owners' support on the promotion for E&S activities by asset managers. For example, examining the correlation between the asset owner's support for E&S activities and the E&S activities of

[2] The ERISA law provides that the pension fund has a fiduciary responsibility to put in best interests of the pension fiduciaries. Until now, in the U.S., the interpretation of whether ESG investments violate fiduciary responsibility has changed with change of political party, with Democrats promoting ESG and Republicans opposing it. In 2020, they introduced a rule "financial factors only". However, in the Nikkei October 26, 2021, the U.S. Department of Labor is amending the Elisa Act. The new rule will also consider ESG factors such as climate change risk and diversity of employees. The new rule will also take into account ESG factors such as climate change risk and diversity of employees.

[3] For example, employee satisfaction has a certain value but is not immediately observed (Edmans, Li, & Zhang, 2018).

the asset manager's portfolio companies does not allow us to distinguish whether the asset owner's support is driving the asset manager's E&S investments or simply asset owner is investing in an asset manager that is active in E&S investments. To overcome such endogenous problems, in this paper, we employ the 2015 the United Nations Principles for Responsible Investment (UN PRI) signature of GPIF as an exogenous shock.[4] The signatures resulted from a sudden change in environmental policy by the Japanese government, to which the GPIF, which manages public pension funds, had to respond. The policy change of GPIF, the asset owner with a large share of Japanese equities, came as an unexpected shock to Japanese asset managers at the time. Only three Japanese asset owners have signed the PRI until December 2021 (Nikkei newspaper), making it easy to verify the impact of GPIF's signature on asset managers. For the PRI signatory asset manager before the GPIF signature, the GPIF signature represents a new agreement between asset owners and asset managers regarding their E&S activities. This paper attempts to address the endogeneity problems by examining the post-matching difference in difference analysis whether GPIF mandate asset managers who agree on E&S activities before GPIF signature have increased E&S engagement activities for invested firms after GPIF signature. This paper predicts that after the two sides agree on E&S, the involvement of shareholders as asset managers in E&S of their portfolio companies will be stronger than before the agreement.

We find that Japanese firms improved ESG score after the signed PRI of GPIF, and the firms in which the GPIF-mandated investors (asset managers) were major shareowners increased their E&S scores more. Interestingly, after the GPIF signed the PRI, the firms' E&S score of GPIF mandate investors that had signed the PRI were improved, although the firms' E&S score of non-GPIF mandate investors that had signed the PRI were not improved. This result is consistent with this paper's hypothesis, which shows that even if the

[4] Several paper show that shareholders who sign the PRI endorse E&S activities and encourage their portfolio companies to actively engage in E&S activities (e.g. Dyck et al. 2019, Dimson et al. 2018). Brandon et al. (2021) show that in outsides the U.S., where responsible investment is more widely practiced, the ESG activities of PRI-participating institutions are naturally high. In contrast, in the U.S., individual investors are more commonly the originators or clients, so their investment policies have varieties, and PRI participants are not generally active in the ESG activities.

asset managers have signed the PRI and committed to ESG activities, the lack of commitments of the asset owners makes firms limit active ESG activities. The results were found to be robust for both placebo testing with propensity score matching, examination with legacy samples, and testing with other E&S measures.

Our study contributes to the previous studies in some key areas. The first contribution is the finding that the investee firms' behavior changes with the awareness between the asset owner and the asset manager. Although many studies have examined the effects of conflicts of interest among shareholders and between managers and shareholders on investee firms' behavior, few studies have examined the effects of conflicts of interest between shareholders and their investors on investee firms' behavior. This study can be considered as a pioneer of such research.

The second contribution is to the study of the impact of shareholders on firms' E&S activities. Previous studies have shown that the impact of institutional equity ownership on firms' E&S investment is controversial (Velte 2022, Dyck et al., 2019, Barnea and Rubin, 2010). The impact on E&S has been mixed with respect to PRI signatures by institutional investors. Dyck et al. (2019) shows that the institutional investors' commitment through PRI signing will encourage firms' E&S activities. On the other hand, Brandon et al. (2021) shows that the impact of the PRI signature varies depending on whether the investor is a U.S. or non-U.S. investor. This study complements these research by examining the impact of the agreement/gap between asset manager's and asset owner's perception on these effects to firms' E&S activities.

Finally, this paper also has contributions to research examining the impact of sovereign funds and universal ownership on firms' E&S activities. Sovereign wealth funds and universal ownership are viewed as shareholders willing to pay for issues on social and political agendas (Monk and Minow,1995; Agrawal

2012; Barber et al. 2021). GPIF is the world's largest sovereign wealth fund and universal owner. This paper presents complementary results to previous studies by showing that the GPIF effectively addresses the social issue of CSR through its position as an asset owner, rather than directly as a shareholder.

The remainder of this paper is structured as follows. Section 2 develops our research hypotheses, section 3 describes our sample and presents our empirical methods, section 4 discusses the empirical results, and section 5 provides concluding remarks and directions for further research.

2. OVERVIEW OF GPIF AS AN ASSET OWNER

The asset owner is the natural owner or originator of capital (Eurosif, 2016). Asset owners are in a leading position to generate demand for ESG investments. As the originators or clients of these demands, they are uniquely positioned to guide the economy by promoting more sustainable investments in controlling their vast capital. Asset owners are at the top of the institutional investor food chain (Monks, 2001). It is important to verify that the GPIF, as an asset owner, can promote more sustainable investment and corporate activities by giving mandate to asset managers. The GPIF is a part of the government, which is under pressure to carry out political objectives (Ujikane & Nozawa, 2019). Therefore, the GPIF is obligated to fulfill its responsibilities as an asset owner to the legal system (Otsuka, 2020). The GPIF adopted the Code and fulfilled its stewardship responsibilities by changing its investment policy toward ESG investment and by adopting the PRI in 2015.

Hoepner et al. (2021) found that normative and regulative aspects influence asset owners. PRIs were part of an "emerging institutional infrastructure" to promote ESG activities (Waddock, 2008). The PRI does not focus on asset managers but on asset owners, as they can promote responsible investment more extensively in financial markets, thereby creating a ripple effect for responsible investment (Hoepner et al., 2021). Asset Owner is at the top of the institutional food chain (Monks, 2001) and is in the unique position

at the top of the economic ladder and controls most of the capital (Hopner et al. 2021). Asset Owner is crucial in creating social investment demand (Eurosif2016). Many asset owners are public service organizations operating in the institutional context of single country, most typically public pension funds, of which the GPIF is a prime example.

The Japanese public pension system relied on the pay-as-you-go model, in which working-age pension contributors paid premiums to support current pensioners. The public pension system covered every adult, regardless of their employment status. The Japanese pension market was the world's third largest, with ¥ 400 trillion (about US$ 4 trillion) under management in 2018. About 70% of these assets belonged to the public pension system, which consisted of the employee pensions for private-sector workers, the mutual aid pensions for public-sector workers, and the national pension for all registered residents older than 20 and not covered by the other pension plans. The remaining 30% belonged to private pensions, such as corporate and personal ones.

The GPIF managed and invested the national and employee pension funds reserve under the Ministry of Health, Labor, and Welfare's (MHLW) supervision. The GPIF is entrusted by the MHLW but also governed by three main laws: (1) the Employees' Pension Insurance Law, (2) the National Pension Law, and (3) the Independent Administrative Institution for Pension Fund Management and Management Law (GPIF Law). Also, the GPIF's "Medium-Term Objectives," which are the goals of its investment operations within a certain period of time (in recent every five years), are set by the MHLW. Rather, the GPIF formulates a "medium-term plan" based on the Medium-Term Objectives. The 2015-Medium-Term Objectives included for the first time a commitment to ESG, which was not carefully prepared in advance but was decided exogenously, politically, by the Abe Cabinet just before 2015.

As an independent administrative agency, the GPIF was prohibited from directly trading equities to minimize any potential government influence. In short, the GPIF itself cannot invest directly at all, but its GPIF-mandates investors who manage or invest in the market under the methods described in the GPIF's regulation and Code (See Appendix 1). GPIF is not allowed to make self-investments, which differs from the so-called Big 3 like BlackRock. The GPIF uses pension benefits along with investment income earned

by GPIF-mandated investors. Therefore, it is necessary to verify whether GPIF-mandated investors promote ESG activities rather than verify the results of GPIF's own ESG activities.

The GPIF has ¥ 159 trillion in assets under management in 2018[5]. In June 2014, the MHLW reset the GPIF's target rate of return to the rate of wage inflation plus 170 basis points (bp 1.7%). The GPIF's most important mission is the financial goal of earning the investment returns necessary to ensure rigorous pension financing in line with fiscal projections. The GPIF has some basic principles: to achieve investment returns and to fulfill stewardship responsibilities (i.e., including ESG factors)[6]. Since the GPIF has accepted the Code and adopted the PRI, it fulfills its stewardship responsibilities as an asset owner. In addition, the GPIF does not own shares in the management companies and does not control them directly. However, an asset owner has an indirect influence since it chooses, engages with, and monitors the GPIF-mandated investors.

The GPIF adopted the PRI in September 2015, recognizing that it is essential for the capital market to grow sustainably, by reducing the long-term harmful effects of environmental and social problems[7]. In addition, the GPIF paid attention to ESG, a non-financial element, to secure long-term profits in stock management[8]. Being a long-term and mainly passive investor committed to ESG investment was a logical position for the GPIF, which also requested GPIF-mandated investors to report on their PRI activities shortly.

Barber et al. (2021) found that public pensions and financial institutions are highly willing to pay (WTP), whereas investors with mission objectives face political pressure and are subject to legal restrictions. The GPIF's promotion of ESG activities as a public pension fund that is responsible for suboptimal investment targets and policy issues is a behavior that demonstrates WTP. This role contrasts the behavior of a private pension fund. In other words, promoting ESG investments and reducing externalities by

[5] https://www.gpif.go.jp/operation/annual2018_report_q4.pdf
[6] According to Otsuka(2020), the GPIF has four basic principles: (1) to achieve a return on investment, (2) to diversify investment strategies, (3) to mix policy assets, and (4) to maximize long-term returns by taking stewardship responsibilities, including ESG.
[7] https://www.gpif.go.jp/investment/esg/#c
[8] https://www.gpif.go.jp/info/activity/pdf/midterm_plan_03.pdf (Third middle-term plan)

resolving social problems of S and environmental problems of E would contribute to the interests of the ultimate beneficiaries, such as workers and retirees who belong to the pension fund (UNEP FI & PRI, 2011). Furthermore, it is the implementation of the implicit contract included in ESG to achieve its fiduciary duties.

The GPIF entrusts most of its assets[9] to be managed by domestic and foreign investors who then become known as GPIF-mandated investors. ESG integration is evaluated when the mandated investment process is assessed. ESG integration is defined in the PRI as an "explicit and systematic approach to ESG and investment analysis and decisions."[10] It includes ESG activities in its outsourcing evaluation, with a weighting of 10% for active and 30% for passive mandated-investor management. The ESG activities results are incorporated into GPIF-mandated-investor evaluations as numerical values, thus indicating that they are not mere verbal promises or targets and that there are substantial economic sanctions. If the results are unsatisfactory, investors' mandates may be terminated within a year or two, which may cause investors to miss out on big business in the Japanese market, lose their certification from public pension agencies, and suffer the resultant damage to their reputations. Therefore, the GPIF's investment policy change regarding its ESG activities and its explicit evaluation of the results could be a major change for investors who must comply with these regulations.

The fundamental purpose of investment for the GPIF is to obtain stable profits through "long-term investment" in stocks. The GPIF is required by law to operate safely and efficiently, with a long-term perspective. The president of the GPIF, Mr. Mizuno, mentioned after Lehman's shock: "We believe, considering the nature of our funds, that our investment has to be made from a long-term perspective, and will continue to make every effort to make our investment safer and more efficient….."[11] The GPIF's directors introduced more interactive one-on-one meetings with its asset managers, asking them to thoroughly check their approaches to conflicts of interest and requiring them to disclose their proxy votes. GPIF-mandated investors were asked to communicate with investee firms and establish and publicize

[9] As of the end of March 2020, the GPIF invested in a wide range of assets, including 2389 domestic stocks and 2722 foreign stocks.
[10] https://www.unpri.org/fixed-income/what-is-esg-integration/3052.article
[11] https://www.gpif.go.jp/en/performance/pdf/2008_q4.pdf (Review of Operations in Fiscal 2008)

policies and guidelines for voting rights that would maximize long-term shareholder profits[12]. In addition, GPIF-mandated investors had to exercise their voting rights by recognizing the ESG's importance in improving corporate values over the long term.

3. EMPIRICAL ANALYSES

3.1. Data and Methodology

We collected all the available Japanese ESG score data from 2009 to 2018 from GoodBankers (G.B.), an independent investment advisory firm specializing in social investment research. G.B. scores do not include financial information or consistent long-term information, and information about outcomes is considered. The ESG data were divided into four categories: social activities ("community"), "employees," and the environment ("Environment") (See Appendix 2). The ESG scores that we used are published annually in August. We used two categories: social (integrated from the consumer, social activities, and employee categories) and environment. We calculated the social score as 1/2*community+1/2*employees.

The descriptions of ESG score, accounting, and ownership data are shown in Appendix 3. We use both scores that are raw scores and mx-min normalized scores[13]. Accounting data were retrieved from the Quick databases.

Ownership and turnover data were collected from the Thomson Reuter database. Thomson Reuters calculates the turnover ratio; Absolute Value of (U.S. Dollar Value of Current Buys + U.S. Dollar Value of Current Sells)／(Current Assets + Previous Assets). We acquired detailed information from the Thomson Reuters database from the Japanese financial report, Yuka Shoken Hokokusyo. In Japanese regulatory reporting, Yuka Shoken Hokokusyo includes trust accounts with hidden shareholder details. Some of those

[12] https://www.gpif.go.jp/investment/stewardship/pdf/voting_rights_principle.pdf, voting rights principal
[13] normalized score = (score-min score) / (max score-min score)

are revealed in the Thomson Reuters database, which includes that information in its "large holding" and "investment trust management" reports[14].

We acquired information about GPIF-mandated investors, since 2009, from the GPIF website, where the names of those investors are made available[15]. The GPIF-mandated investors do not change frequently and are relatively consistent. We employed two kinds of variables: the asset owner's share value managed by the GPIF-mandated investors (owner shares), and the GPIF dummy variable, which is 1 if the owner shares of the GPIF-mandated investors are more than 3% or 5%; else, it is 0. The alternative dummy variable is the non-GPIF institutional dummy variable, which equals 1 if the shares of non-GPIF institutional investors are more than 3% or 5%; else, it is 0. The owner shares of non-GPIF institutional investors are the total owner shares of institutional investors minus the owner shares of GPIF- mandated investors.

We acquired information about PRI signed investors, from the PRI website, where the names of those investors are made available [16]. The number of PRI-signed investors in the world is about 2000 in March 2018. However, the number of PRI-signed Japanese investors in less than 100, also Japan ranks mere 10th in the world in its number of signatory institutions, which is large behind the U.S and Europe. Unlike European institutional investors, asset managers in Japan have not been as so active in ESG activities and signing PRI.

In our sample, an ESG-active firm covered by the respective ESG database must have regular common stock listed on the Tokyo stock market and accounting data based on the Japanese Yen. Observations that are greater or lower than the 1st or 99th percentiles are winsorized to remove any potential outliers.

[14] For example, BlackRock is one of the largest TAKEDA shareholders, and although the name BlackRock is not in the regulatory financial statement, we acquired the owner share data from Thomson.
[15] https://www.gpif.go.jp/operation/
[16]https://d8g8t13e9vf2o.cloudfront.net/Uploads/h/r/j/signatorydirectoryupdated122020_169996_778605_873356_806439.xlsx

We employed the DID method between the two kinds of dummy variables, the share of GPIF-mandated institutional investors and the share of non-GPIF intuitional investors.

Finally, we matched the GPIF stocks with non-GPIF changes using propensity matching and regression with dummy variables. Where the owner shares of GPIF-mandated investors are more than 3% or 5%, the dummy variables GPIFD3 and GPIFD5 are 1 and 0[17] otherwise.

3.2. Sample Description

Table 1 presents an outline of the ESG data from 2012 to 2018. The community category addresses societal activities. The employee category consists of capacity development, career development support, and labor unions. Finally, the environmental category relates to environmental management. Table 1 shows the number of ESG scores and the average scores, which are raw and normalized scores.

【Insert Table 1 around here】

Table 2 presents basic descriptive statistics. Panel A of Table 2 shows the basic statistics, and Panel B shows the correlation matrix. In Panel B, the correlation of the shareholding of asset managers' PRI and shareholding of Non-GPIF- mandated with PRI-signed (nonGPIFPRI) is 0.91, the shareholding of GPIF-mandated investors with PRI-signed (nonGPIFPRI) and shareholding of Non-GPIF- mandated investors is 0.76. We use the dummy variables of GPIF-mandated or Non-GPIF- mandated investors' shares more than 3% or 5% as well PRI-signed investors.

【Insert Table 2 around here】

[17] We did not use the dummy variables of GPIFD1 if the owner shares of GPIF-mandated investors were more than 1% because the number of GPIFD1=0 was not enough to do propensity matching.

Figure 1 shows the ESG score movements before and after GPIF's policy change. ESG scores, which is the social score and the environments' ESG score. Both social and environmental scores are man-min normalized. We show the difference between the GPIF-mandated institutional investors (GPIF) and Non-GPIF mandated with PRI signed investors (nonGPPRI). We identify the 3%-GPIF-mandated institutional investors (GPIF>=3), almost all GPIF mandated investors have signed PRI, whose shareholding is more than 3% and the others are the 3%-Non-GPIF-mandated institutional investors with PRI-signed (noGPIFPRI>=3). Also, we identify the 5%-GPIF-mandated institutional investors (GPIF>=5), almost all GPIF mandated investors have signed PRI, whose shareholding is more than 5% and the others are the 5%-Non-GPIF-mandated institutional investors with PRI-signed (noGPIFPRI>=5).

For social scores, the difference of the GPIF-mandated institutional investors (GPIF) and Non-GPIF mandated with PRI signed investors (nonGPPRI) expanded after GPIF's policy change after t=0, and also, for environmental scores, both differences are expanded after the policy change.

【Insert Figure 1 around here】

The distribution of GPIF-mandated investors' ownership ratios of is shown in Table 2, with an average of 4.93% and 3.66% in Q2, with half of the investors holding less than 3.6%. The proportion of investors with around 0.1% or fewer holdings is also high (see Appendix 4). The recent trend toward passive investment may influence this, but whether investors with excessively low ownership can be considered GPIF-mandated investors is questionable. Therefore, we define GPIF-mandated investors as those with a share of 3% or 5% or more as dummy variables influencing shareholders. The reason is that under Japan's Companies Act, a shareholder-ownership ratio of 3% means the right to demand the dismissal of a director, and a ratio of 5% or more means the obligation to submit an extensive shareholding report as large investors.

4. EMPIRICAL RESULTS

4.1. Do Political GPIF Changes Promote ESG Activities?

We examined whether external investment policy changes could trigger ESG activities. Two varieties of triggers were set. First, in 2015, the GPIF adopted the PRI and announced that the GPIF-mandated investors had to report on their activities shortly. The second was the fact that the GPIF-mandated investors had to consider ESG in their GPIF portfolios by 2017. It should be noted that in 2015, all investors had already been announced, knowing that they had to proceed with ESG investments in 2017. Therefore, we determined the timing of the external shock that occurred in 2015. The second shock in 2017 was regarded as a repercussion of the first shock.

The Japanese Corporate Governance Code (introduced in 2015 and adopted in the Tokyo Stock Exchange's listing rules) deals with matters including the diversity of directors, reduction of cross-shareholdings, and aggressive Stewardship activities in corporate pensions. However, this Code was set for corporations, not investors, and did not address social and environmental factors as part of its improved governance. The GPIF's PRI adoption strongly influenced social and environmental factors. The Stewardship Code was also presented to investors at the same time and focused primarily on companies' corporate governance. It did not specifically address social or environmental activities[18] and did not have the binding power of the Companies Act. It only respected the discretion of institutional investors. However, the GPIF, one of the world's giant asset owners and a part of the national government, had changed its investment goals and shifted its focus to ESG activities to fulfill its responsibilities as an asset owner regarding the spirit of the SSC. How has the GPIF's change in investment policy been received? No evaluation has yet been conducted. The GPIF's investment policy changes also represent an exogenous shock to ESG investment for institutional investors. In this study, we used this exogenous shock to address endogeneity.

[18] However, while the women's activities in Abenomics are mentioned in the Code, it is mentioned to society in general, and they say they are not powerful enough to move institutional investors.

First, we examined the effect of the external GPIF investment policy change in 2015 as basic analyses. Our analysis term is from 2012 to 2018, three years on either side of the GPIF adopting the PRI in 2015. The post dummy (postD) equals 1 if the year is between 2016 and 2018; otherwise, it is 0. In addition, we set some dummy variables for GPIF.

In our analyses, we compared the effects of the PRI-signed asset management investors and GPIF-mandated investors. GPIF, as an asset owner, engage the asset managers (the GPIF-mandated investors) to promote ESG, while PRI-signed asset managers should address ESG activities directly by themselves. Almost all GPIF-mandated investors have already signed PRI and GPIF supports them about promoting the ESG. It means asset managers who are just PRI-signed investors have conflicts about promoting ESG, but GPIF-mandated investors should be able to promote ESG more without constraints because of support of GPIF. Then, among PRI-signed asset managers, the GPIF-mandated investors would be more likely to hold shares of companies that are actively engaged in ESG activities than non-GPIF-mandated investors.

The PRI dummy (D(AMPRI ≥ 3, 5)) is 1 if the owner share of PRI-signed investors is more than 3% or 5%, respectively; else, it is 0. Also, The without PRI-signed dummy (D(AM_NonPRI ≥ 3, 5)) is 1 if the owner share of without PRI-signed investors is more than 3% or 5%, respectively; else, it is 0. Under Japan's Companies Act, a shareholder-ownership ratio of 3% means the right to demand the dismissal of a director, and a ratio of 5% or more means the obligation to submit a large shareholding report as a major investor.

We split the PRI dummy (D(AMPRI ≥ 3, 5)) to the two dummy variables, The GPIF dummy and the Non-GPIF with PRI signed dummy. The GPIF dummy (D(GPIF ≥ 3, 5)) is 1 if the owner share of GPIF-mandated investors is more than 3% or 5%, respectively; else, it is 0. The Non-GPIF with PRI-signed dummy (D(NonGPIFPRI ≥ 3, 5)) is 1 if the owner share of NonGPIF-mandated investors with PRI-signed is more than 3% or 5%, respectively; else, it is 0. Of course, the non-GPIF dummy (D(NonGPIF ≥ 3, 5)) is 1 if the owner share of non-GPIF institutional investors is more than 3% or 5%, respectively. The non-GPIF dummy (D(NonGPIF ≥ 3, 5)) is 1 if the owner share of non-GPIF investors is more than 3% or 5%, respectively. On the other hand, Non-GPFI and without PRI signed dummy (D(NonGPIFnonPRI>=3,5)),

the share of investors who are neither GPIFMs nor PRI signatories, is 1 if the owner share of non-GPIF without PRI signed investors is more than 3% or 5%, respectively.

The dependent variables are the ESG scores(raw or max-min normalize), including the owner share of the GPIF-mandated investors (GPIF) et al. and control variables for the firms' characteristics, such as size, leverage, return on assets (ROA), and market-to-book ratio, with fixed effects accounting for unobservable time-invariant firm heterogeneity.

【Insert Table 3 around here】

Panel A of Table 3 presents the basic results for GPIF-mandated investors while controlling for Non-PRI investors or non-GPIF investors, where the shares of GPIF-mandated investors are more than 5%. At first, we investigated the impact of PRI-signed investors on ESG. The dummy variables D(AMPRI ≥ 5), where share of PRI-signed investors are more than 5%, are set to 1. The others, including the controlling dummy variables for without PRI-signed dummy (D(AM_NonPRI ≥ 5). The D(AMPRI ≥ 5) is positively significant, while (D(AM_NonPRI ≥ 5) is insignificant for environmental score, and the most primary variables, the interaction terms (D(AM_NonPRI ≥ 5)*postD, are insiginificant in both social and environmental categories after the 2015 investment policy changes. in Equation (1) and (2). Although, as same line of some previous studies, higher share of PRI-signed investors have promote ESG (environment) for a long time, For PRI Signature Investors as a whole, ESG activities have not changed significantly as a direct result of the 2015 policy changes.

Next, we investigated the impact of GPIF-mandated investors on ESG. We split the PRI dummy (D(AMPRI ≥ 5)) to the two dummy variables, The GPIF dummy and the Non-GPIF with PRI signed dummy. With the 2015 policy change, ESG activities would change significantly as GPIF mandated investors would be more, because of supports from asset owner, GPIF. The dummy variables D(GPIF ≥ 5), where the shares of GPIF-mandated investors are more than 5% are set to 1. The others, including the controlling dummy

variables for the Non-GPIF with PRI signed dummy (D(NonGPIFPRI ≥ 5) in Equation (3) and (4). Focusing on the primary variables, the interaction terms (D(GPIF ≥ 5)*postD, are positively siginificant in environmental categories after the 2015 investment policy changes, while controlling variables (D(NonGPIFPRI ≥ 5) are not significant. It means that even it is difficult to increase shareholdings in ESG companies without the strong support of asset owners, even if the investors have been PRI signatories, especially in a time ESG investments are not yet well established.

Additionally, the results for GPIF-mandated investors controlling for non-GPIF with PRI signed investors and non-GPIF without PRI-signed investors, in Equation (5) and (6). The interaction terms (D(GPIF ≥ 3,5)*postD, are positively significant in environmental categories after the 2015 investment policy change. Also, interestingly, the coefficients of environmental D(NonGPnonIPRI ≥ 5 *postD is negatively significant. That means that although the NonGPIF without PRI signed investors are slowing down the environmental activities, the GPIF-mandated investors promote environmental activities as their owner shares increased after the 2015 change.

These results, of Panels B in Table new entrant companies 3, indicate the results for GPIF-mandated investors controlling for Non-PRI investors or non-GPIF investors, where the shares of investors are more than 3%. The results are similar to Panels A in Table 3, where the shares of investors are more than 5%. Strong asset owners supports are necessary to increase holdings of ESG-performing corporate stocks regardless of PRI-signed.

To verify the robustness of the results, we examine the same investigations using raw ESG scores. The empirical results are similar[19].

4.2. GPIF Changes with Matched Regression, Propensity Score Matching

Next, we examined the effects of the GPIF change on ESG activities by employing a propensity score matching methodology. The dummy variable where the share of GPIF-mandated investors is more

[19] No reported for space.

than 3% D(GPIF ≥ 3) is set to 1, as is D(GPIF ≥ 5) where the owner share of GPIF-mandated investors is more than 5%. The other variables are set to 0 (see Appendix 5).

As a first step, using only 2015 data, we investigated logit regressions where the dependent variables were the D(GPIF ≥ 3) and D(GPIF ≥ 5) dummy variables, and the independent variables were the ESG scores and firms' characteristics. Appendix 6 shows the balanced check between the treatment group (the GPIF) and the control group (non-GPIF with PRI signed) after logit regressions. Comparing the original and matched data shows almost the same treatment and control group distribution. The companies in the control group matched using the logit model with 2015 data for all propensity-matched analysis periods.

【Insert Table 4 around here】

Equations (1) to (4) from Panel A of Table 4 show the DID regressions using matched data for 2012 to 2018, [t-3 vs. t+3]. One of the primary variables is the interaction terms (D(GPIF ≥ 3,5)*postD) or (D(GPIF ≥ 3,5)*postD), positively significant in environmental ESG categories after the 2015 changes, except for Equation (2) and (4). Although our focus in this study is on the three years after the policy change from a long-term perspective, the results for the first year after the change are shown [t-3 vs. t+1], in Equation (3) to (8) Panel A of Table 4. The positive impact of the three-year results is similar to the one-year post after the policy change.

Panel B of Table 4 shows the results of the placebo test for propensity score-matched regressions and the DID regressions using matched data for 2012 to 2014 (t-3 and t-2 vs. t-1). It compares the GPIF investment policy change one year before (t-1) to that of three and two years before (t-2 and t-3). The GPIF-related variables of the coefficient of one year before (t-1) are tested to be parallel and unchanged compared to three and two years before (t-2 and t-3). The primary variables are interaction terms (D(GPIF ≥ 3,(or 5))*preD) are not significant. In other words, before the GPIF investment policy change, there was no difference in ESG activities between GPIF-mandated and Non-GPIF with PRI signed investors.

Here, we consider the tew kinds of companies: legacy companies (those with ESG ratings before 2015) and new companies (those who that entered ESG activities in 2016). The companies used in the estimation of Table 4 may be taken as legacy companies, since they already have received ESG scores in 2015. Therefore, the results in Table 4 are the results for legacy companies. The remaining new entrant companies that obtained new ESG ratings in 2016 or later are then subjected to subsample analyses.

In Table 5 shows the results of GPIF-mandated investors(D(GPIF>=3,5) and Non-GPIF with PRI signed investors (D(nonGPIFPRI>=3,5)) hold more than 3% or 5% of the shareholding for new entrant companies. Only the results of environmental ESG, equations (2) and (4) display that the coefficient of newer GPIF-mandated investors (D(GPIF>=3,5) is significantly negative. In contrast, that of Non-GPIF with PRI signed investors (D(nonGPIFPRI>=3,5) is negative but not significant. This result indicates that PRI-signed investors for new entrant companies do not actively encourage ESG activities.

【Insert Table 5 around here】

In this study, we have employed the GB rating score as the longest history in Japan and independent rating agency. We try the other ESG rating scores for robustness, MSCI and Thomson Reuters (Thomson). Table 6 shows the regression results, Equation (1)-(4) are the results using with MSCI score and Equation (5)-(8) are the results using with MSCI score. The results are different from the scores. Here, shortly focusing on the critical interaction terms, (D(GPIF ≥ 3)*postD)or (D(GPIF ≥ 5)*postD). For MSCI score, (D(GPIF ≥ 5)*postD) of Equation (3) is positively significant in social categories, also for Thomson score, (D(GPIF ≥ 3)*postD) of Equation (6) is, positively significant in environmental ESG categories after the 2015 changes, although the control group (non-GPIF) are all insignificant. Our empirical results for GPIF-mandated investors are robust for other ESG ratings.

【Insert Table 6 around here】

5. CONCLUSIONS

This study analyzes empirical analyses of the links between ESG activities and owns shares of GPIF-mandated investors, especially long-term GPIF investors, after GPIF's external investment policy change in 2015. The GPIF takes a long-term investment view and adopts a public social role as a sovereign asset owner through mandated investor monitoring. The increase in ESG investment at the substantial starting point in 2015 is the change in asset owners' ESG investment policies.

We divided the ESG activities of institutional investors into social and environmental, examined those before and after the GPIF investment policy change, and found that the presence of the GPIF mandated investors with a larger shareholding promoted ESG. We further examined institutional investor ESG activities by dividing those investors into short- and long-term ones. We discovered that a larger shareholding of long-term GPIF-mandated investors promoted ESG more, although short-term GPIF-mandated investors also promoted ESG. Finally, we confirmed our empirical results for robustness using propensity score matching methods. The existence of GPIF-mandated investors greatly facilitated ESG activities after the GPIF investment policy change.

We could say that the GPIF has created more than just an investment boom. As a result of investment policy changes, the GPIF took a long-term investment view, thereby ensuring that GPIF-mandated investors were more socially responsible in maximizing shareholder value. Our study provides an empirical analysis of the links between ESG activities and owner shares of GPIF-mandated investors, after GPIF's external political change. These results are consistent with the statement that only investigating the institutional investors' or asset managers' ESG activities is insufficient; it is also essential to consider the asset owners' influence.

ESG in Japan has been growing rapidly since 2015, but the analysis in this study is only an initial step. It is essential to examine what happened in the early stages to understand the causes of this phenomenal growth. However, it is important to note that not only companies' base analyses but also investor-based

analyses. That problems remain. Finally, we should not expect today's behavior to be the same as in the early days.

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Figure 1: ESG score movements before and after 2015

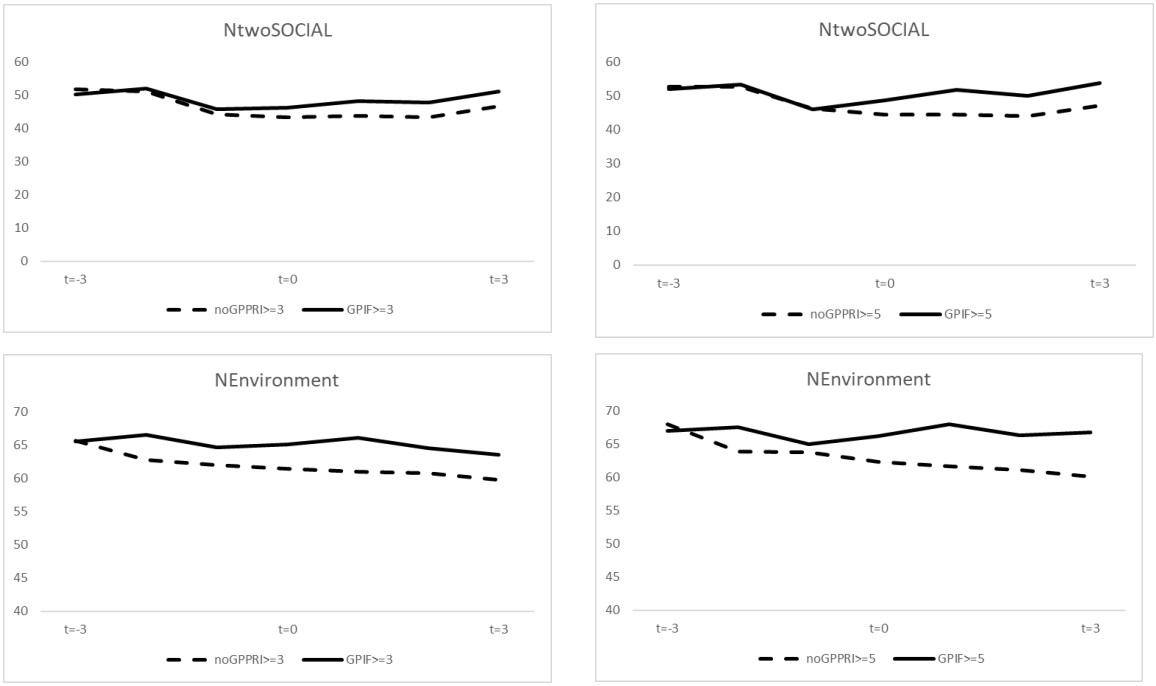


Table 1: Overview of the G.B. Score Data for ESG Screening

Categories		Points of screening
S	Community	Activities of socials, community
	Employee	Development of literacy, Support of career-development , labor association, Equal opportunity of working, Diversification, Care for temporally employee, affirmative-action employer
E	Environment	Management of environment-friendliness

	Social			Environment		
	N	score average		N	score average	
		raw	normalized		raw	normalized
2012	676	46.94	47.99	723	57.22	60.43
2013	695	46.34	48.58	756	56.71	60.05
2014	843	40.73	41.73	767	56.96	60.41
2015	858	39.60	41.51	775	57.12	60.22
2016	895	40.75	42.46	792	57.25	60.26
2017	916	41.00	42.29	807	57.91	60.09
2018	908	44.54	46.04	901	55.60	59.31

Table 2: Descriptive Statistics

Panel A: Basic statistics

Variable	Obs	Mean	Std. Dev.	Min.	Max.	Q1	Q2	Q3
Scoial Score(raw)	5791	42.60	28.77	0.00	95.51	13.53	44.41	68.07
Environmental score(raw)	5521	56.94	22.95	0.00	96.38	41.65	61.70	74.64
Scoial Score(normalized)	5791	44.13	30.17	0.00	99.74	13.56	45.98	70.96
Environmental score(normalized)	5521	60.09	24.22	0.00	100.00	43.91	65.06	78.71
Firm size	5722	12.55	1.41	9.43	16.32	11.57	12.40	13.45
Leverage	5722	47.02	19.44	10.01	89.43	32.04	46.43	61.87
Return on assets (ROA)	5722	6.32	4.54	-4.81	22.61	3.29	5.73	8.63
Market-to-book	5713	0.86	0.66	0.15	4.05	0.44	0.66	1.04
Asset turnover	6089	0.16	0.14	0.01	0.85	0.07	0.12	0.19
Shareholding of Institutional Investor	6109	27.57	14.58	0.00	99.44	16.45	26.42	36.90
Shareholding of GPIF	6109	4.93	4.81	0.00	53.33	1.11	3.66	7.43
Shareholding of nonGPIF	6109	22.63	11.90	0.00	99.23	13.78	21.90	30.09
Shareholding of asset managers' PRI	6109	15.12	10.27	0.00	76.33	7.47	13.03	20.84
Shareholding of NonGPIFPRI	6109	10.18	7.32	55.50	0.00	4.59	8.59	14.25
Shareholding of NonGPIFnonPRI	6109	4.41	4.54	44.37	0.00	0.83	3.14	6.51
Shareholding of longGIPF	6109	2.05	2.30	0.00	32.21	0.53	1.21	2.84

Panel B: Correlation Matrices

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Scoial Score(normalized)	(1)	1.00													
Environmental score(normalized)	(2)	0.70	1.00												
Firm size	(3)	0.59	0.54	1.00											
Leverage	(4)	0.22	0.21	0.43	1.00										
Return on assets (ROA)	(5)	-0.09	-0.19	-0.20	-0.51	1.00									
Market-to-book	(6)	0.00	-0.08	-0.03	-0.07	0.48	1.00								
Asset turnover	(7)	-0.04	-0.08	-0.08	0.13	-0.02	0.10	1.00							
Shareholding of Institutional Investor	(8)	0.15	0.19	0.19	-0.03	0.13	0.26	0.07	1.00						
Shareholding of GPIF	(9)	0.20	0.22	0.20	0.12	0.00	0.14	0.17	0.69	1.00					
Shareholding of nonGPIF	(10)	0.10	0.14	0.16	-0.08	0.16	0.27	0.01	0.95	0.44	1.00				
Shareholding of asset managers' PRI	(11)	0.12	0.16	0.21	0.01	0.12	0.26	0.12	0.86	0.77	0.74	1.00			
Shareholding of NonGPIFPRI	(12)	0.04	0.08	0.17	-0.07	0.17	0.28	0.06	0.75	0.42	0.76	0.91	1.00		
Shareholding of NonGPIFnonPRI	(13)	0.18	0.19	0.16	0.00	0.01	0.07	-0.07	0.42	0.16	0.46	0.11	0.05	1.00	
Shareholding of longGIPF	(14)	0.15	0.16	0.14	0.03	0.00	0.05	0.10	0.48	0.69	0.31	0.52	0.28	0.14	1.00

Table 3: Regression results of political GPIF changes in 2015

The results of panel regression of the effects of the external GPIF investment policy change in 2015. P-values are in parentheses. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variables are normalized ESG scores. The independent variables include post dummy (postD) if the year is 2016-2018 is 1, the others are 0. And, there are some dummy variables for GPIF. The GPIF dummy (D(GPIF ≥ 3, 5)) is 1 if the owner share of GPIF-mandated investors is more than 3% or 5% respectively, else it is 0. The non-GPIF dummy (D(NonGPIF ≥ 3, 5)) is 1 if the owner share of non-GPIF institutional investors is more than 3% or 5%, respectively. Also, the owner share of the GPIF-mandated investors (GPIF), and control variables for the firms' characteristics are included.

Panel A: 5%

	Social	Environment	Social	Environment	Social	Environment
	(1)	(2)	(3)	(4)	(5)	(6)
D(AM_PRI>=5)	-0.250	0.658**				
	(-0.342)	(2.053)				
D(AM_PRI>=5)*postD	-2.006*	0.512				
	(-1.872)	(1.169)				
D(GPIF>=5)			-0.217	0.192	-0.108	0.265
			(-0.441)	(0.755)	(-0.236)	(1.253)
D(GPIF>=5)*postD			0.114	0.821**	0.186	1.019***
			(0.172)	(2.517)	(0.291)	(3.393)
D(NonGPIFPRI>=5)			0.393	-0.106	0.881*	-0.00466
			(0.548)	(-0.344)	(1.691)	(-0.0207)
D(NonGPIFPRI>=5)*postD			0.220	-0.493	-1.196	-0.181
			(0.121)	(-0.471)	(-1.245)	(-0.484)
D(AM_NonPRI>=5)	0.0655	-0.284				
	(0.130)	(-1.146)				
D(AM_NonPRI>=5)*postD	0.508	-0.482				
	(0.757)	(-1.601)				
D(NonGPIFnonPRI>=5)					-0.0889	-0.332
					(-0.171)	(-1.340)
D(NonGPIFnonPRI>=5)*postD					0.308	-0.549*
					(0.441)	(-1.803)
lasset	2.684*	1.116	1.869	1.320	2.761**	1.046
	(1.958)	(1.435)	(1.150)	(1.274)	(2.029)	(1.342)
lev	-0.00150	-0.0593***	-0.0386	-0.0658***	-0.000867	-0.0593***
	(-0.0312)	(-2.960)	(-0.760)	(-2.582)	(-0.0182)	(-2.963)
roa	0.0539	-0.0417	0.0321	-0.0320	0.0593	-0.0346
	(0.883)	(-1.245)	(0.478)	(-0.901)	(0.976)	(-1.065)
MtB	0.321	0.359	-0.0913	0.492	0.310	0.398
	(0.708)	(1.423)	(-0.203)	(1.502)	(0.688)	(1.586)
turnovr	-2.312	-1.456**	0.195	-0.705	-2.376	-1.502**
	(-1.152)	(-2.199)	(0.0895)	(-0.808)	(-1.176)	(-2.288)
postD	5.451***	2.858***	5.622***	1.860***	4.875***	2.563***
	(5.551)	(6.714)	(5.198)	(3.367)	(4.763)	(5.740)
Observations	5,419	5,142	4,349	4,073	5,419	5,142
R-squared	0.081	0.103	0.089	0.106	0.082	0.106
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES

Panel B: 3%

	Social	Environment	Social	Environment	Social	Environment
	(1)	(2)	(3)	(4)	(5)	(6)
D(AM_PRI>=3)	-0.957	-0.0005				
	(-1.092)	(-0.001)				
D(AM_PRI>=3)*postD	-2.203*	0.352				
	(-1.801)	(0.695)				
D(GPIF>=3)			0.449	0.233	0.160	0.263
			(0.900)	(1.003)	(0.332)	(1.179)
D(GPIF>=3)*postD			0.367	0.660**	-0.141	0.717**
			(0.545)	(2.146)	(-0.210)	(2.379)
D(NonGPIFPRI>=3)			0.890	-0.311	-0.0359	-0.0849
			(0.873)	(-0.993)	(-0.0554)	(-0.301)
D(NonGPIFPRI>=3)*postD			-2.013	0.579	-1.738*	-0.0639
			(-0.947)	(0.743)	(-1.755)	(-0.153)
D(AM_NonPRI>=3)	0.0224	-0.0590				
	(0.0431)	(-0.239)				
D(AM_NonPRI>=3)*postD	0.110	-0.0621				
	(0.173)	(-0.221)				
D(NonGPIFnonPRI>=3)					-0.000623	-0.164
					(-0.00120)	(-0.669)
D(NonGPIFnonPRI>=3)*postD					0.0785	-0.244
					(0.125)	(-0.870)
postD	5.781***	2.787***	5.847***	2.351***	5.747***	2.620***
	(6.251)	(6.911)	(6.189)	(5.159)	(6.073)	(6.313)
Observations	5,419	5,142	4,906	4,622	5,419	5,142
R-squared	0.081	0.100	0.092	0.107	0.081	0.102
Control	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES

Table 4: Propensity score matched regression

The results of propensity score matched regression. P-values are in parentheses. The DID regressions using matched data for 2012 to 2018, [t-3 vs. t+3]. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variables are normalized ESG scores. The independent variables include post dummy (postD) if the year is 2016-2018 is 1, the others are 0, pre dummy (preD) if the year is 2014 1, the others are 0. And there are some dummy variables for GPIF. The GPIF dummy (D(GPIF ≥ 3, 5)) is 1 if the owner share of GPIF-mandated investors is more than 3% or 5% respectively, else it is 0..

Panel A: GPIF Investors

	Social	Environment	Social	Environment	Social	Environment	Social	Environment
		[t-3, t+3]				[t-3, t+1]		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D(GPIF>=3)	0.965	0.587*			—	—		
	(1.069)	(1.920)						
D(GPIF>=3)*postD	1.332	0.985*			-0.140	1.111***		
	(1.069)	(1.723)			(-0.123)	(2.739)		
D(GPIF>=5)			0.345	-0.149				
			(0.488)	(-0.520)			—	—
D(GPIF>=5)*postD			0.310	0.743*			-0.226	0.727*
			(0.310)	(1.727)			(-0.210)	(1.742)
Observations	5,785	5,273	4,364	4,031	3,886	3,570	2,921	2,715
R-squared	0.090	0.108	0.085	0.096	0.020	0.083	0.028	0.055
PostD	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES

Panel B: placebo test

	Social	Environment	Social	Environment
	(1)	(2)	(3)	(4)
placebo				
D(GPIF>=3)	0.855	-0.0008		
	(0.591)	(-0.005)		
D(GPIF>=3)*preD	-0.586	0.359		
	(-0.267)	(0.976)		
D(GPIF>=5)			0.240	0.285
			(0.664)	(1.015)
D(GPIF>=5)*preD			-0.175	0.746
			(-0.191)	(1.382)
Observations	2,206	2,143	1,676	1,631
R-squared	0.016	0.103	0.023	0.085
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Table 5: Panel regression for new entry investors in 2016－2018

The results of panel regression for new entry investors. P-values are in parentheses. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variables are scores. The independent variables include the owner share of the GPIF-mandated investors (D(GPIF>=3,5) and nonGPIF-mandated with PRI signed investors (D(nonGPIFPRI)>=3.5)are included.

	Social	Environment	Social	Environment
	(1)	(2)	(3)	(4)
Newer				
D(GPIF>=3)	-0.762	-1.582*		
	(-0.249)	(-1.917)		
D(nonGPIFPRI)>=3	0.726	-2.990		
	(0.0835)	(-1.578)		
D(GPIF>=5)			0.0250	-1.546*
			(0.00891)	(-1.694)
D(nonGPIFPRI)>=5			-7.545	-0.517
			(-1.419)	(-0.500)
Observations	136	209	130	209
R-squared	0.185	0.515	0.204	0.508
Control	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

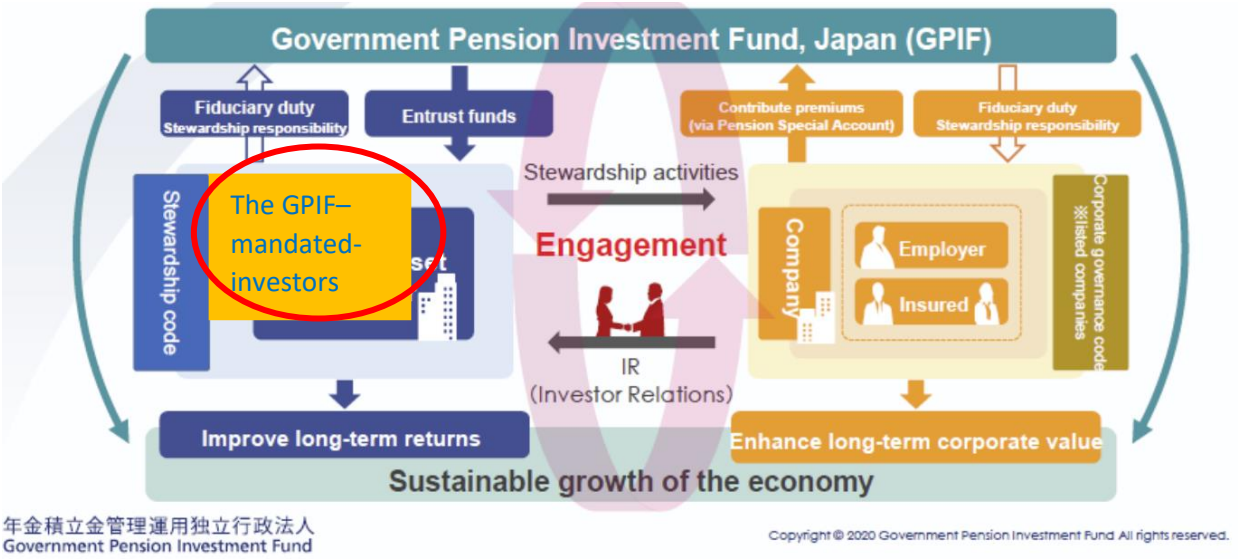
Table 6: Panel regressions using MSCI score and Thomson score

The results of panel regression of the effects of the external GPIF investment policy change in 2015 using MSCI score and Thomson Score. P-values are in parentheses. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively. The dependent variables are scores. The independent variables include post dummy (postD) if the year is 2016-2018 is 1, the others are 0. And, there are some dummy variables for GPIF. The GPIF dummy (D(GPIF ≥ 3, 5)) is 1 if the owner share of GPIF-mandated investors is more than 3% or 5% respectively, else it is 0. The non-GPIF dummy (D(NonGPIF ≥ 3, 5)) is 1 if the owner share of non-GPIF institutional investors is more than 3% or 5%, respectively. The control variables for the firms' characteristics are included.

	MSCI				Thomson			
	Social	Environment	Social	Environment	Social	Environment	Social	Environment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C_1: GPIF and non-GPIF								
D(GPIF>=3)	0.159*	0.0872			1.115	1.574**		
	(1.782)	(0.916)			(1.630)	(2.238)		
D(GPIF>=3)*postD	0.0938	0.0873			0.856	1.632*		
	(1.076)	(0.833)			(1.030)	(1.891)		
D(NonGPIF>=3)	0.493	-0.432			1.539	1.819		
	(1.063)	(-1.299)			(0.359)	(0.783)		
D(NonGPIF>=3)*postD	0.751	-0.475			6.232	2.472		
	(1.491)	(-0.985)			(1.216)	(0.893)		
D(GPIF>=5)			0.204**	0.0459			0.762	1.262**
			(2.493)	(0.526)			(1.268)	(2.033)
D(GPIF>=5)*postD			0.191**	0.0442			0.0371	1.136
			(2.330)	(0.460)			(0.0486)	(1.440)
D(NonGPIF>=5)			0.108	-0.493**			3.640	6.429**
			(0.448)	(-2.296)			(0.944)	(2.067)
D(NonGPIF>=5)*postD			0.320	-0.363			4.830	4.006
			(1.113)	(-0.971)			(1.583)	(1.552)
Observations	2,430	2,430	2,430	2,430	2,455	2,455	2,455	2,455
R-squared	0.826	0.840	0.827	0.840	0.910	0.929	0.910	0.929
Control	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES

Appendix

1. The relationship between GPIF and GPIF-mandated investors



Source: https://www.gpif.go.jp/en/investment/Stewardship_Activities_Report_2019-2020.pdf

2. ESG score (GoodBanker)

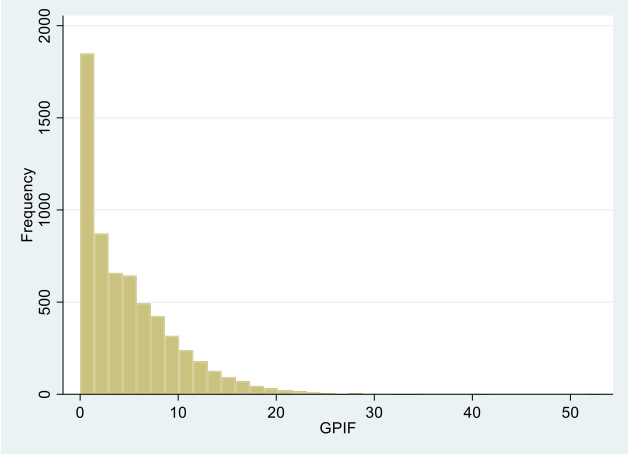
GoodBanker is the first independent SRI/ESG special research company in Japan, established in 1999. The G.B. created the first SRI products, called "Nikko Eco Fund," in 1999 in Asia and has continued original and detailed SRI analyses. Thirteen analysts are involved, and more than 1000 target companies are examined. They collect not only public information data but also private information through direct contact, hearing and receiving Q&A, etc. Every year, more than 200 companies were questioned or had meetings. Since it was established, it has made an effort to continue operating as an independent agency by no-paid consultants' policy. In previous studies, Escrig-Olmedo (2019) shows that the problem with ESG rating agencies that repeatedly integrate their management is the lack of sustainability of ratings because the rating models are not fully integrated, and Tang et al. (2020) show that companies that have an ownership relationship with an ESG rating agency (sister companies) experience. However,

Goodbanker has never had a management integration and is an independent institution, so it does not have this problem.

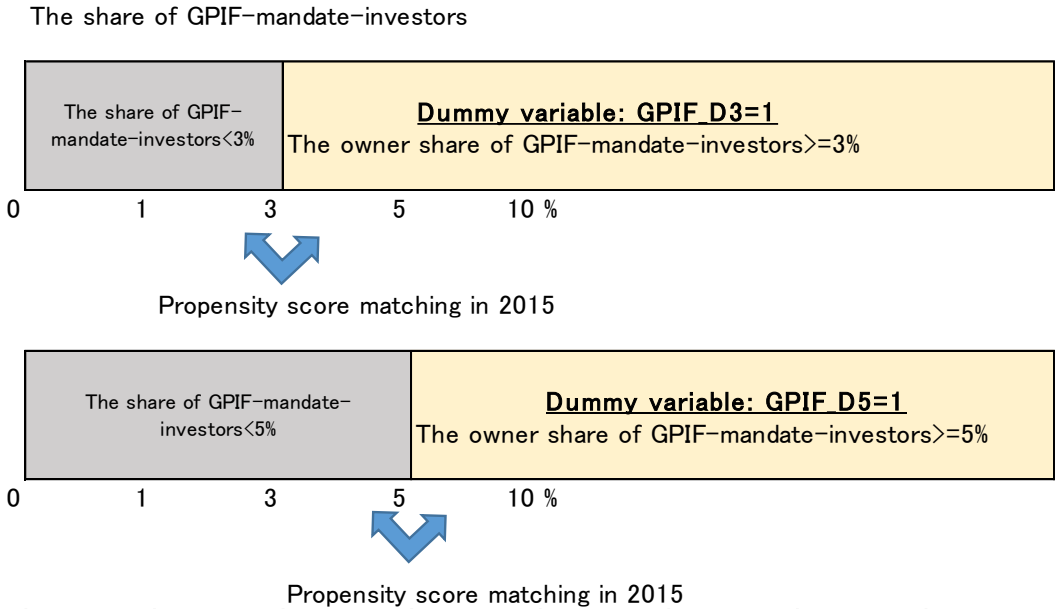
3. Variable descriptions

Variable	Description
Customer, Community, Employee, Environment	The main ESG score was evaluated by GoodBanker, Customer, Community, Employee, and Environment. Social score is min-max normalized and calculated from 1/2*community+1/2* employees.
Firm size:lasset	The natural logarithm of the total asset
Leverage:lev	The total amount of sales.
Return on assets:ROA	Ordinary profit on total asset
Market-to-book:MtB	Market value of capital plus book value of debt over the book value of capital and debt,
Asset turnover:Turnover	Date acquired from Thomson Reuter Ownership Data; "(Absolute value of the total amount sell in this quarterly period + Absolute value of the total amount bought in this quarterly period)/(Total amount held in this quarterly period+ Total amount held in previous quarterly period).
Shareholding of GPIF: GPIF	The owner shares held by GPIF mandate investors who are announced by GPIF website.
Shareholding of NonGPIF: nonGPIF	The owner shares calculated from held by owner share of institutional investor minus the owner share of GPIF mandate investors.
Shareholding of NonGPIFPRI: nonGPIFPRI:	The owner shares without held by GPIF mandate investors and signed with PRI.
Shareholding of NonGPIFNonPRI: non GPIFnonPRI investors:	The owner shares without held by GPIF mandate investors and without signed with PRI
Year dummy: Year F.E.	A dummy variable for the year.
Firm dummy: Firm F.E.	A dummy variable of firm

4. The distribution of GPIF-mandated investors' owner share



5, Propensity score matching



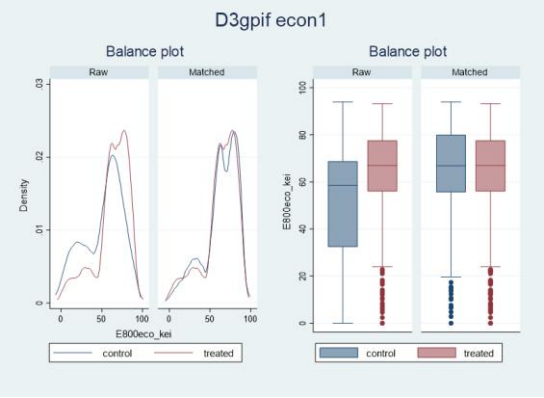
6. The balance plots of Propensity score matching

Panel A) Social: sq(score), lasset, lev, roa, MtB, turnover, IndustryDummy

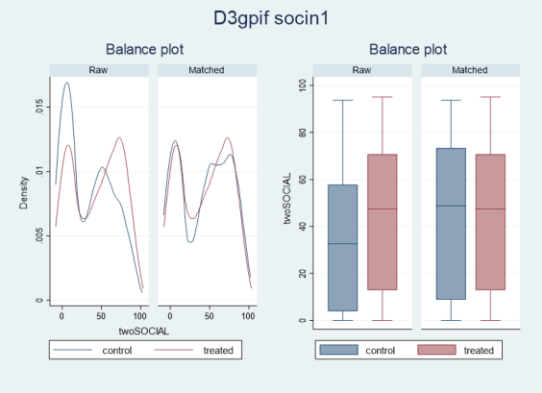
Environment: score, d.score, lasset, lev, roa, MtB, turnover, IndustryDummy

Panel B) Balance plots

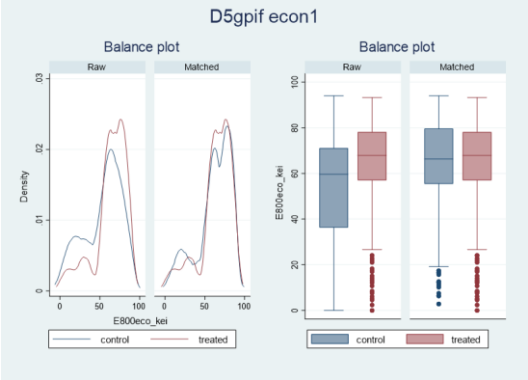
GPIF>=3%, Environment



GPIF>=3%, Social



GPIF>=5%, Environment



GPIF>=5%, Social