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How Loud is a Soft Voice?
Effects of Positive Screening of ESG Performance on the Japanese Oil Companies[1]

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Abstract

Environmental, social, and governance (ESG) investing in equity markets has surged for corporate firms, whose managerial efforts are disclosed and evaluated in favor of environmental, social, or governance-oriented issues. Since managerial information is costly for individual investors to acquire and process, "exit or voice" activities of speculators through market monitoring is necessary to reduce uncertainty associated with firms' managerial performance (Holmström and Tirole, 1993; Tirole, 2006). This study examines Japan's Government Pension Investment Fund (GPIF), which announced that it selected some ESG indices for Japanese equities and commenced passive investment tracking them. We estimate the effects of several announcements made by GPIF on the equity prices of the monitored firms, empirically showing the effects of informational efficiency in market monitoring on share prices in a case of positive screening through GPIF's choice over the ESG indices based on public information. The panel regressions indicate that the GPIF's soft voice influencing the corporations' pro-ESG managerial efforts was loud enough to cause temporary increases in stock prices. However, the transient effects of the GPIF's market monitoring are contradictory in that the effects are absent for the corporations whose *sustainability reports* reveal information on their positive ESG-related performances. Our finding that the ESG ratings accurately reflect the content of *sustainability reports* is supportive of the GPIF's objectives of positive screening based on public information in choosing the ESG indices.

Keywords: ESG investing, market monitoring, informational efficiency, speculator, latent Dirichlet allocation

JEL codes: G14, G23

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1. Introduction

Environmental, social, and governance (ESG) investing in market exuberance implies a wide range of stakeholders and shareholders may be willing to pay a price for a firm to act socially responsibly. In light of environmental performance making good on the social responsibility for decelerating global warming, for instance, firms that have installed eco-friendly but costly facilities to reduce carbon dioxide emissions may be evaluated. According to *Global Sustainable Investment Review 2020* (Global Sustainable Investment Alliance (GSIA), 2021), the ESG investing asset values in major developed countries and regions are classified into the following nonexclusive but different sustainable investing strategies: negative screening (USD 15 trillion as of 2020); ESG integration (USD 25.2 trillion); corporate engagement and shareholder action (USD 10.5 trillion); international norms-based screening (USD 4.1 trillion); positive screening (USD 1.4 trillion); sustainability-themed investing (USD 1.9 trillion); and impact investing (USD 0.4 trillion). Compared with other sustainable strategies for market monitoring, particularly negative screening without any growth during 2016–2020, positive screening has been less popular but has grown at a high rate of 69%.

Many institutional investors have employed some indices for monitoring the ESG performance of investment-grade corporates to conduct screening of domestic and foreign firms. The ESG ratings, such as by S&P or MSCI, are known to expose divergences in each measurement, scope, and weight for evaluating corporate ESG scores (for instance, Berg, Kölbel and Rigobon, 2022). Since managerial information is costly to acquire and process for individual investors with limited capacity, speculators" "exit or voice" role is required to reduce uncertainties associated with firms" managerial performance through market monitoring. Which ESG indices to choose critically matters for informational efficiency in evaluating firms" market values, especially for institutional investors who are socially responsible for impacting market trends toward ESG investing through market monitoring even in a weak form of positive screening.

This paper addresses the effects of positive screening of corporates" ESG performance on the firms" equity prices (Holmström and Tirole, 1993; Tirole, 2006). We take the case of Japan"s government pension investment fund (GPIF) (Kato, 2022; Becht, Franks, Miyajima, and Suzuki, 2023), a choice among ESG indices that through the medium of positive monitoring affects the Japanese oil wholesalers, the so-called "brown firms" which seem to be sensitive to the public reputations for how they behave in pro-ESG activities. The GPIF, an institutional investor of the world"s largest asset size, has made passive investments in Japanese equities based on the criteria of some selected ESG indices since July 3, 2017. The go-ahead ESG investing strategy of GPIF was highly evaluated as succeeding in common values creation among equity investors, even with passive fund investing instead of selective divestment (Henderson, 2020). The "voice" effects of the positive screening, even without "exit" options of divestment, might improve management practices of the relevant firms affiliated with antienvironmental fossil fuel industries (Hirschman, 1970; Broccardo, Hart and Zingales, 2022). Our

paper presents empirical evidence on how loud a soft voice was for equity investments in brown firms.

To quantify the effects, we first measure changes in the Japanese oil companies" managerial attitudes toward ESG, with a method of natural language processing applied to ESG disclosure manifested in their annual *sustainability reports*. Second, we take some regressions of the equity prices on date dummies representing the GPIF's index selections, conditional on the Nikkei index and the WTI crude oil price. Third, we conduct a difference-in-difference (DID) analysis as a robustness check on estimation results.

Our findings are as follows. Estimating a topic model of natural language processing with the latent Dirichlet allocation (LDA) method reveals that some Japanese oil-related companies started taking actions that made ESG managerial efforts in 2017 when GPIF selected ESG indices. The panel regression analysis indicates that the announcement of the start of passive monitoring based on ESG ratings chosen by GPIF in 2017 and 2018 positively impacted the companies" stock prices with an ESG rating. Since the information in the *sustainability report* is included in the ESG rating, no additional effect of releasing a *sustainability report* for corporates with a high share of pro-ESG topics in their documents is found. Since the GPIF's index selections aimed to evaluate ESG activities using publicly available information, the ESG ratings accurately captured the content of *sustainability reports* consistently with the GPIF's objective. A DID estimation for the robustness check generates mixed results, but in some cases, the average treatment effects of the GPIF announcement are depicted between the control and treatment groups around July 3, 2017.

The remainder of this paper proceeds as follows. Section 2 provides background information on GPIF as a speculator in the financial markets and relates literature on informational efficiency in market monitoring to a hypothesis that such institutional investors as the GPIF provide a positive monitoring function of speculator"s "soft voice" which can reduce uncertainties associated with investees" managerial ESG performance. Section 3 presents panel data regressions for testing the hypothesis, the LDA estimation of a topic model with corporate publications of *sustainability reports,* and a robustness check with a DID analysis. Finally, Section 4 concludes.

2. Positive screening of ESG performance: A case of Government Pension Investment Fund (GPIF)

Japan's GPIF institutionally invests the Reserve Funds of the Government Pension Plans entrusted by Japan's Minister of Health, Labour and Welfare, following the provisions of the Employees" Pension Insurance Act and the National Pension Act, and remits profits of the investment to the Special Accounts for the Government Pension Plans. The GPIF's board of governors has established investment principles as its commitment to the public, saying, "Sustainable growth of investee companies and the capital market are vital in enhancing long-term investment returns. To secure such returns for pension beneficiaries, therefore, we promote the incorporation of nonfinancial

environmental, social, and governance (ESG) factors into the investment process in addition to financial factors" (emphasis added).

Since 2017, GPIF has annually published *the ESG Report*, which reports all the assets GPIF holds at the end of the fiscal year that are evaluated with a criterion of ESG integration defined as "the explicit and systematic inclusion of ESG factors into investment analysis and investment decisions." Table 1 indicates that the ESG integration assets have increased to over 200 trillion Japanese yen (JPY) in the fiscal year 2022. A higher share of the ESG integration assets also consists of assets under management tracking ESG indexes, a narrow category of ESG investments that amounted to approximately 12.5 trillion JPY in 2022.

Table 1. ESG investments of Government Pension Investment Fund: *The ESG Reports*

Trillion JPY (share, %)	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022
ESG integration (all assets)	156	159	151	186	196.6	200.1
Assets under management tracking ESG indexes	1.5 (0.96%)	3.5 (2.20%)	5.7 (3.77%)	10.6 (5.70%)	12.1 (6.15%)	12.5 (6.25%)

2.1. Institutional arrangements for ESG monitoring

During the transition of the GPIF's commitment to ESG investments, the public institutional investor made significant decisions in institutional arrangements for ESG monitoring. These decisions were especially prevalent in selecting comprehensive and thematic ESG indices with investment targets for either domestic or foreign equities on the following dates:

i. July 3, 2017: The GPIF selected three ESG indices for Japanese equities and commenced passive investment tracking those indices: FTSE Blossom Japan Index, MSCI Japan ESG Select Leaders Index, and MSCI Japan Empowering Women Index. Two broad indices cover all environmental, social, and governance factors, and one thematic index focuses on the gender diversity among social factors. "In choosing the ESG indices, GPIF emphasized that (1) "*positive screening*" that determines constituent companies based on their ESG evaluation should be adopted, (2) the evaluation should be based on *public information* and its method, and results should be disclosed, and (3) ESG evaluators and index providers should be properly governed, and their conflict of interests should be properly managed" (italics added).

ii. September 25, 2018: The GPIF also selected the S&P/JPX Carbon Efficient Index for Japanese equities and the S&P Global Ex-Japan Large Mid Carbon Efficient Index for non-Japanese equities.

iii. December 18, 2020: The GPIF selected two additional ESG-themed benchmarks: MSCI

ACWI ESG Universal Index for general-ESG-themed foreign equities and Morningstar Gender Diversity Index for diversity-themed foreign equities.

iv. March 30, 2022: The GPIF adopted a general ESG index for Japanese equities: FTSE Blossom Japan Sector Relative Index.

v. April 14, 2023: The GPIF further adopted a thematic type of ESG index: Morningstar Japan ex-REIT Gender Diversity Tilt Index.

Table 2. Comparisons with the ESG Indices GPIF has adopted

Number of index constituents Assets under management (Billion JPY)	Investment target	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022
Comprehensive ESG Indexes							
FTSE Blossom Japan Index	Domestic equities	149	152	181	200	229	255
		5,266	6,428	9,314	14,906	983.0	10,305
MSCI Japan ESG Select Leaders Index	Domestic equities	252	268	248	231	222	249
		6,229	8,043	13,061	20,268	2,099.0	20,562
MSCI ACWI ESG Universal Index	Foreign equities	-	-	-	2,106	2,111	2,087
		-	-	-	11,784	1,618.7	16,550
FTSE Blossom Japan Sector Relative Index	Domestic equities	-	-	-	-	493	530
		-	-	-	-	800.0	10,016
ESG Thematic Indexes							
MSCI Japan Empowering Women Index	Domestic equities	208	213	305	298	352	374
		3,884	4,746	7,978	12,362	1,245.7	6,492
S&P/JPX Carbon Efficient Index	Domestic equities	-	1,738	1,725	1,844	1,855	5,206
		-	3,878	9,802	15,365	1,567.8	16,434
S&P Global LargeMidCap Carbon Efficient Index	Foreign equities	-	2,199	2,037	2,303	2,428	2,136
		-	12,052	17,106	28,239	3,390.6	34,770
Morningstar Developed Markets Ex-Japan Gender Diversity Index	Foreign equities	-	-	-	1,909	2,149	1,938
		-	-	-	3,438	419.5	4,884
Morningstar Japan ex-REIT Gender Diversity Tilt Index	Domestic equities	-	-	-	-	-	928
		-	-	-	-	-	5,206

Table 2 shows that each ESG index—comprehensive or thematic with investment targets for domestic or foreign equities—covers broad constituent firms and large amounts of assets under management. The ESG indices that the GPIF has adopted as ESG monitoring follow positive screening, and the evaluation is based on public information, as GPIF manifested in selecting three ESG indices

for the first time on July 3, 2017.

2.2. Literature on informational efficiency in market monitoring

Organizations' stakeholders generally behave to control an organization, either by voting with their feet when discontented with the organizational decision-making or by staying and trying to improve the object of their discontent. The generic dichotomy of insiders' behaviors between exit and voice was introduced by Hirschman (1970), who conceptually presented exit-versus-voice options for workers, consumers, or equity-holders to improve each organizational performance. Recently, Broccardo, Hart, and Zingales (2022) addressed the exit-vs-voice problem in a model of socially responsible investments, including those for ESG, where it depends on how many investors are socially responsible instead of purely selfish, which of exit or voice is a more effective strategy for inducing social impact decision-makings by firms.

Regarding corporate finance, market monitoring is similar to exit vs. voice options in investors' gathering information for efficient governance structure: active or passive monitoring (Tirole, 2006). Active monitoring is associated with exercising the control rights of a monitor or persuading a majority of the organizational board to go along with a given policy. Information that ought to be collected before these actions for active monitoring should be a strategic type of what bears on an optimal course of firms' decisions regarding prospective or value enhancement. The other form of passive monitoring typically rewards or punishes past managerial performance of firms instead of wishing to interfere with the firm's management. Information that measures past managerial performance should be a speculative picture of the value of the firm's assets at a given time, whether retrospective or value-neutral.

According to the classification of market monitoring, the index-based positive screening that GPIF has delegated to some ESG indices with the evaluation based on public information applies to the voice option of passive monitoring for speculative information. The ESG performance monitoring is thus a soft voice regarding how loud the effects would be on firms' managerial efforts to improve ESG-oriented outcomes.

Holmström and Tirole (1993) employed a heuristic model that empirically shows that the role of speculators enhances informational efficiency in market monitoring. Based on the three-period model, a firm's manager hired by inside owners makes ESG efforts on an incentive contract. Informed traders or speculators like GPIF can help monitor a firm's ESG fundamentals and trade on the information. Liquidity traders have to sell the shares or exit in unexpected liquidity events. As for the precision of a signal that speculators provide, the more precise the signal is, the more speculators invest dependently on the signal, so the equilibrium share price in a period $t = 1$ would be raised. The effects of informational efficiency in market monitoring on share prices are what we empirically show in the case of GPIF as a speculator monitoring information on investees' ESG performance.

The literature on relationships between ESG investments in financial markets and firms market values is growing.[1] Regarding the effects of the ESG scores on market values, Irawan and Okimoto (2021) empirically show that for constituent members of the S&P Global 1,200 index, the ESG scores of Refinitiv (level 1, ESG combined score and level 3, ESG pillars) have a more positive impact on Tobin's Q only after 2011. In contrast, Berg, Kölbel, and Rigobon (2022) compare six prominent ESG rating agencies: Kinder, Lydenberg, and Domini (KLD), Sustainalytics, Moody's ESG (Vigeo-Eiris), S&P Global (RobecoSAM), Refinitiv (Asset4), and MSCI. Their divergences are decomposed into contributions of measurement 56%, scope 38%, and weight 6%, which casts concern that investors' choice of ESG scores critically matters for evaluating firms' market values.

On influences of the ESG beliefs of investors, Giglio, Maggiori, Stroebel, Tan, Utkus, and Xu (2023) surveyed a large panel of retail investors, showing that there is substantial heterogeneity across investors in their ESG return expectations and their motives for ESG investing: 45% of survey respondents do not see any reason to invest in ESG, 25% are primarily motivated by ethical considerations, climate hedging motives drive 22%, and 7% are motivated by return expectations. Among the heterogeneous ESG beliefs, investors who report ethics-driven investment motives have the highest ESG portfolio holdings among individuals. Gutsche and Ziegler (2019) surveyed German private financial decision-makers, resulting in a considerable willingness to pay for sustainable investment products.

Ghoul and Karoui (2017) found that higher-corporate-social-responsibility funds display poorer and more persistent performance and a weaker performance-flow relationship, consistent with investors in high-corporate-social-responsibility funds deriving utility from nonperformance attributes. Galema, Plantinga, and Scholtens (2008) also found that socially responsible investing measured with KLD monitoring impacts stock returns by lowering the book-to-market ratio and not by generating positive excess performance, which is consistent with a theory that socially responsible investing is reflected in demand differences between socially responsible investing stocks or the other. Similarly, Bofinger, Heyden, and Rock (2022) showed that market sentiment is especially relevant in misevaluation, as stronger sentiment toward sustainability strengthens the effect of ESG on firms' misvaluation.

Socially responsible institutions, those institutional investors with higher ESG scores in their holding portfolios, tend to focus more on investees' ESG performance and less on quantitative signals for standardized unexpected earnings. This situation results in abnormal returns associated with these mispricing signals, which are greater for stocks held more by socially responsible institutions (Cao, Titman, Zhan, and Zhang, 2020); this issue is the most similar to that addressed in this paper. The ESG-related information disclosure has been enhanced nonlinearly associated with a percentage of GPIF among shareholders for the Japanese TOPIX firms from 2011 to 2019 (Kato, 2022).

In a critical paper with the same motivation as ours, Becht, Franks, Miyajima, and Suzuki (2023) exploited a natural experiment where, in 2018, the GPIF promoted its active ownership stance by paying two of its passive managers separately for engaging with companies in the Japanese TOPIX index. They showed the positive impacts of a GPIF's passive portfolio manager's remunerated engagement program on Japanese firms" ESG scores. The empirical results of corporate engagement should be compared with our paper's findings concerning the effects of positive screening as a sustainable investing strategy.

3. Empirical analyses of the Japanese oil companies

This paper addresses the effects of positive ESG monitoring on corporate equity prices in Japan, where GPIF speculates on ESG investing with choices of ESG indices that monitor the Japanese oil companies' managerial activities. First, we measure changes in the Japanese oil companies' managerial attitudes toward ESG, with a method of natural language processing applied to ESG disclosure manifested in the annual *sustainability reports* they issued. Second, we take some regressions of the equity prices on date dummies representing the GPIF's index selections, conditional on the Nikkei index and the WTI crude oil price. Third, we conduct a DID analysis as a robustness check on estimation results.

3.1. Natural language processing on ESG disclosure

This paper examines the impact of GPIF's positive ESG monitoring on Japanese oil companies. For our target companies, we selected 13 firms combined with 11 oil-and-coal-products firms, 1 mining firm, and 1 wholesale firm. All firms were listed on the first section of the Tokyo Stock Exchange throughout our estimation period. Table 3 shows the names of these companies and their disclosures on ESG-related information from each company's web page. The mining and wholesale firms include oil in their company names.

Table 3. Data sources of the Japanese oil companies

	Corporates	IR page	CSR information	Sustainability Report	MSCI	FTSE
1	ENEOS Holdings	○	○	○	○	○
2	Yushiro Chemical Industry	○	×	×		
3	MORESCO	○	○	×		
4	Cosmo Energy Holdings	○	○	○		○
5	Idemitsu Kosan	○	○	○		
6	Toa Oil	○	○	×		
7	Nichireki	○	×	×		
8	Fuji Oil	○	○	○		
9	Nippon Coke & Engineering	○	×	×		
10	BP Castrol	○	×	×		
11	Nippon Seiro	○	×	×		
12	INPEX	○	○	○	○	○
13	San-Ai Oil	○	○	○		

Among the Japanese oil companies in our sample, corporate social responsibility information has been disclosed by eight companies, six of which have published annual *sustainability reports*. The *sustainability reports*, the publication of which is not legally mandatory but best effort for listed firms, provide information for investors concerning their ESG-related managerial activities. Typically beginning from management philosophy, the report documents quantitatively and qualitatively in detail the corporation's initiatives for each environmental, social, and governance policy. The report is often called an *integrated report* when integrated with financial statements, but this paper uses the name *sustainability report* (*SR* for short), which was common during the analysis period. In extracting information from the *SRs*, although some companies report documents in English, we used those written in Japanese.

To the content of the *SRs*, we apply a topic model of statistical natural language processing where topics are the distribution of words, and documents have several topics as a distribution. Using Gibbs sampling, we estimate the topic model with the latent Dirichlet allocation (LDA) method (Blei, Ng, and Jordan, 2003). Words in the narratives may contain pro-ESG topics included in *SRs* observed across companies, which is a concern of this paper. Since each company independently sets the different formats and contents for SR, the reports also probably include company-specific topics. Considering the common and specific topics in the corporates' *SRs*, we set nine as the number of topics, an exogenously given parameter in the LDA estimation.

Tables 4.1–4.2 and Figures 1.1–1.2 show the topic analysis estimation result. Table 4.1 shows the top 40 words of each topic in Japanese, and Table 4.2 shows the same top 40 words in English translated from Japanese. Table 4.1 includes simple syllables and parts of words because, due to uniformly handling documents from multiple companies in different formats, it was impossible to find the breaks correctly in some Japanese words; however, topics one and five are primarily correct Japanese words, so they do not significantly impact our analysis.

Figure 1.1 shows a ratio of each topic with all documents of each company and each year on the horizontal axis. Among the nine topics extracted from the *SRs*, seven are company-specific, while topics one and five are shared across the companies. Figure 1.2 also shows only the ratios of topics one and five. In particular, since topic five is included at a high ratio in the SRs of a corporate INPEX with a high ESG rating, topic five can probably be interpreted as a pro-ESG topic. Since topic one moves opposite to topic five, topic one can also be identified as an anti-ESG topic.

Table 4.1. Top 40 words of each topic in *sustainability reports*

topic 1	topic 2	topic 3	topic 4	topic 5	topic 6	topic 7	topic 8	topic 9
石油	出光	JX	HSE	事業	or	コスモ石油	三愛石油	昭和シェル石油
月	石炭	JXTG	プロジェクト	グループ	開	コスモ	三愛	HSSE
（株）	Idemitsu	金属	LNG	環境	ro	コスモエネルギー	愛	Book
社員	お客	日鉱	取組	社会	キロ	財務	オブリガス	kL
製品	徳山	日石	INPEX	当社	里山	風力	羽田	showa
P	k	ENEOS	Sustainability	安全	オフィス	COSMO	お客	shell
化学	EL	ホールディングス	コントラクター	エネルギー	ep	エコ	航空	シェル
t	Lube	銅	オーストラリア	CSR	Oi	中期	LP	電池
原油	愛知製油所	各社	イクシス	ガス	eR	資産	支社	衛生
部門	鉱山	Report	Report	取締役	lG	アブダビ	ISO	profile
品質	IDEMITSU	ＪＸＴＧ	先住民	企業	mo	経常	人	太陽
事故	ベトナム	鉱山	インドネシア	会社	os	丸善石油化学	佐賀	フロンティア
安定	皆さま	童話	地元	取り組み	rp	千葉製油所	自然	出光興産
燃料	プライムポリマー	ブック	帝	地域	up	キャッシュ	キグナス石油	mp
株式会社	姉崎	素材	セーフティ	委員	at	ヘイル	新入	当所
価値	アグリ	ＥＮＥＯＳ	コーポレート	リスク	積	kl	森	四日市
お客様	出光興産	議長	汚職	情報	プ	堺	東京	袖ケ浦
工場	テック	電池	要領	体制	社	ココロ	國	体感
実績	PTY	非鉄	パイプライン	CO	ールングス	カタール	個人	アスファルト
SS	財産	ＪＸＴＧREPORT	ダーウィン	技術	ス	持株	オブリ	富士
産業	土佐	森林	直江津	目標	用紙	負債	顧客	CIS
株主	クレイ	休	オペレーター	マネジメント	意	タン	大会	東亜石油
利益	バレー	NIPPO	CORPORATION	方針	液体	コスモエネルギーホールディングス	九州	ボイラー
戦略	徳山製油所	日立	新潟	データ	発	首長	精神	CEO
倫理	滝上	ベトナム	メタン	可能	貨物	カード	空港	西部
需要	COAL	group	アブダビ	課題	肥料	四日市	本社	国富
中期	公司	サプライチェーンマネジメント	井	国内	ウインド	cosmo	車両	ＫＹ
商品	緑地	jx	LTIF	基本	陸運	コスモ松山石油	大切	所長
保安	ユニ	原料	IFC	制度	environment	HOLDINGS	東日本	LRQA
新た	PP	花束	医療	対象	興業	ENERGY	全国	薄膜
電力	じん	野球	州	役員	諸国	不具合	高知	MS
潤滑	美術館	マレーシア	北部	健康	Chapter	oil	カスタマーサービス	作家
油田	ナショナル	遵法	TRIR	海外	エ	体質	ルール	総量
危機	リン	無害	基地	業務	カ	洋上	工業	美術
概要	要綱	ステーション	文書	システム	安	TJ	支店	無事故
co	TM	チリ	単体	コンプライアンス	定量	ALA	サービスステーション	京浜
千葉	LIMITED	カセロネス	長岡	災害	進	会員	本山	窒素
材料	トライアル	ウェブサイト	Materiality	資源	ヘルスケア	基金	コンテスト	ばい
メッセージ	籍	日本石油	住民	人権	橘川	パラキシレン	フォーラム	ゴール
長期	愛知	バスケットボール	EITI	状況	アスファルト	ルブリカンツ	正直	ピッチ

Table 4.2. Top 40 words of each topic in *sustainability reports* in English (translated)

topic 1	topic 2	topic 3	topic 4	topic 5	topic 6	topic 7	topic 8	topic 9
oil	Idemitsu	JX	HSE	business	or	Cosmo Oil	San-Ai Oil	Showa Shell Oil
month	coal	JXTG	project	group	open	Cosmo	San-Ai	HSSE
Co., Ltd.	Idemitsu	metal	LNG	environment	ro	Cosmo energy group	love	Book
employee	customer	Nikko	effort	society	kilo	finance	Obbligas	kL
products	Tokuyama	Nisseki	INPEX	our company	Satoyama	wind power	Haneda	showa
P	k	ENEOS	Sustainability	safety	office	COSMO	customer	shell
chemistry	EL	holdings	contractor	energy	ep	ecology	aviation	shell
t	Lube	copper	Australia	CSR	Oi	middle-term	LP	battery
crude oil	Aichi Refinery	companies	Ichthys	gas	eR	assets	Branch office	hygiene
department	mine	Report	Report	director	lG	Abu Dhabi	ISO	profile
quality	IDEMITSU	JXTG	indigenous people	company	mo	ordinary	man	sun
accident	Vietnam	mine	Indonesia	company	os	Maruzen Petrochem	Saga	frontier
stability	everyone	fairy tale	local	attempt	rp	Chiba Refinery	nature	Idemitsu Kosan
fuel	prime polymer	book	emperor	region	up	cache	Cygnus oil	mp
Co., Ltd.	Anegasaki	material	safety	committee member	at	hale	new	our office
value	Agri	ENEOS	corporate	risk	product	kl	forest	Yokkaichi
customer	Idemitsu Kosan	chairman	corruption	information	pu (syllable)	Sakai	Tokyo	Sodegaura
factory	tech	battery	Details	System	company	heart	country	experience
achievements	PTY	non-ferrous metal	pipeline	C.O.	Rurungs (part of a word)	Qatar	individual	asphalt
SS	property	JXTGREPORTESG	Darwin	technology	su (syllable)	share holding	obry	Fuji
industry	Tosa	forest	Naoetsu	goal	paper	liabilities	client	CIS
shareholder	clay	closed	operator	management	meaning	Tan	convention	Toa Oil
profit	valley	NIPPO	CORPORATION	policy	liquid	Cosmo Energy Holdi	Kyushu	boiler
strategy	Tokuyama Refinery	Hitachi	Niigata	data	departure	chief	spirit	CEO
ethics	Takigami	Vietnam	methane	possible	cargo	card	airport	western
demand	COAL	group	Abu Dhabi	assignment	fertilizer	Yokkaichi	main office	national wealth
medium-term	company	supply chain manage	well	domestic	wind	cosmo	vehicle	K.Y.
commodity	green space	jx	LTIF	basic	land transportation	Cosmo Matsuyama Oil	important	chief
security	uni	material	IFC	system	environment	HOLDINGS	Eastern Japan	LRQA
new	PP	bouquet	medical care	subject	entertainment industry	ENERGY	nationwide	thin film
electric power		baseball	state	board member	countries	defect	Kochi	M.S.
lubrication	art musium	Malaysia	northern	health	Chapter	oil	Customer service	writer
oil field	national	law compliance	TRIR	abroad	e (syllable)	constitution	rule	total amount
crisis	phosphorus	harmless	base	business	ka (syllable)	at sea	manufacturing	art
overview	outline	station	documents	system	cheap	T.J.	branch	no accidents
Co., Ltd.	TM	Chile	single unit	compliance	quantitative	ALA	service station	Keihin
Chiba	LIMITED	Caserones	Nagaoka	disaster	Susumu	member	Motoyama	nitrogen
material	trial	website	Materiality	resource	healthcare	fund	contest	bai (part of a word)
message	registration	Nippon Oil	residents	human rights	Kitsukawa	paraxylene	forum	goal
long-term	Aichi	basketball	EITI	situation	asphalt	lubricants	honesty	pitch

Figure 1.1. The topic ratio of each *sustainability report*

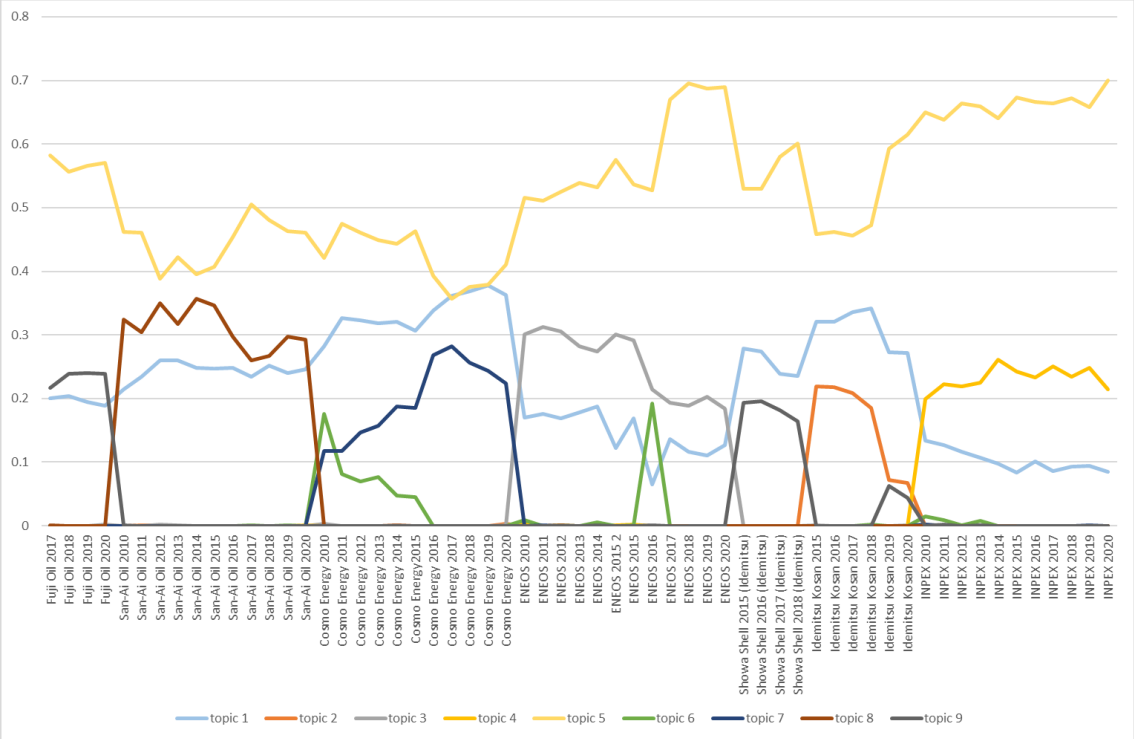


Figure 1.2. Topics one and five ratios of each *sustainability report*

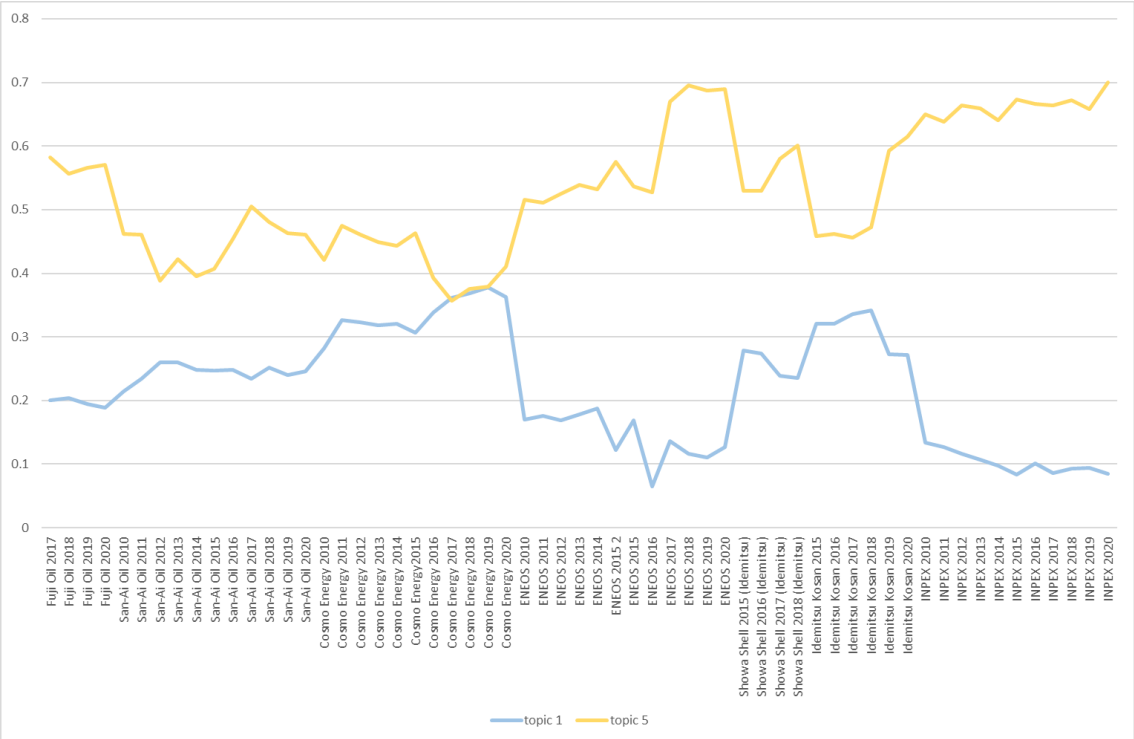
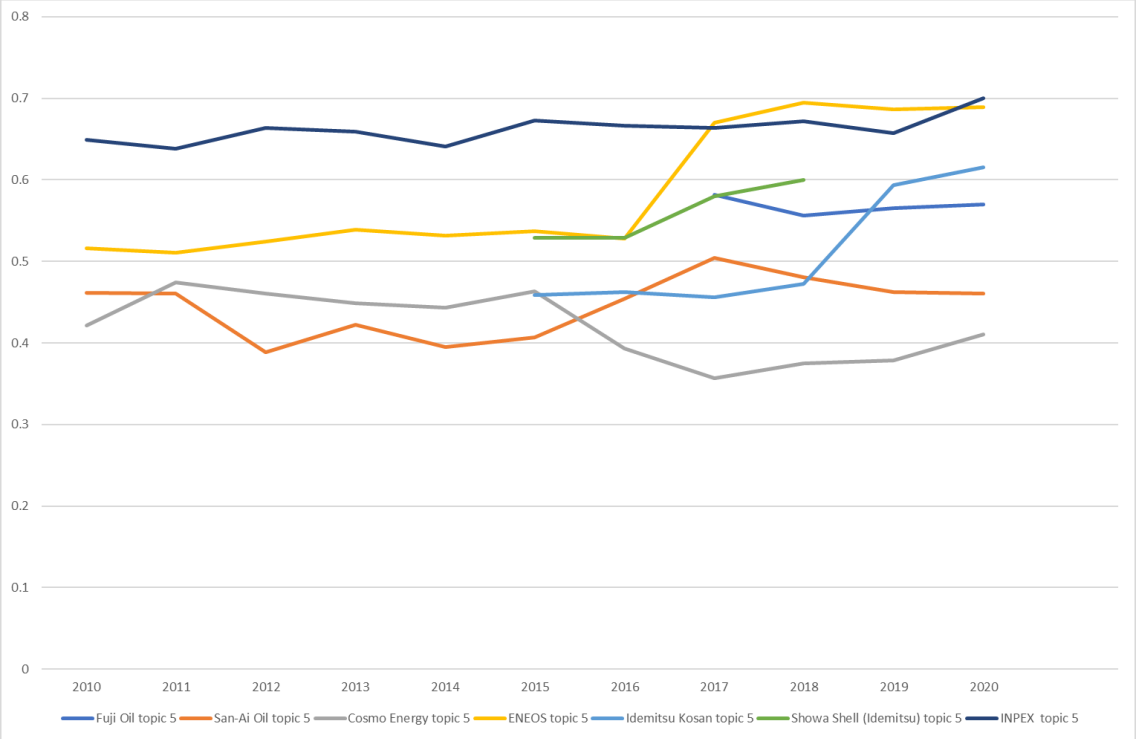


Figure 2. Topic five ratio of each company



Regarding the pro-ESG topic five, Figure 2 shows each percentage of the topic five included in each company's *SR* by year. It indicates that the pro-ESG topic rose significantly in 2017 for companies such as ENEOS and Showa Shell, which Idemitsu Kosan later merged. The surges in the pro-ESG topic in 2017 coincide with GPIF's ESG investment announcement in 2017, which plausibly influenced the ESG managerial behaviors of Japanese companies in the oil industry.

3.2. Effects of the ESG Index choices on equity prices

We next examine how changes in the ESG-related corporate behavior that appear in *SRs* have affected the market evaluation of those corporates" stock prices. We use daily stock price data for the 13 companies. Our estimation period is from April 1, 2016, to March 31, 2021, which includes two GPIF announcement dates. The dependent variable is the log difference of the stock price from the previous day's closing to the current day's closing. We control the effects of the Nikkei Stock Average (the log difference from the previous day's closing to the current day's closing), which reflects the average market sentiment in the Japanese stock markets. We also control the impacts of crude oil prices on the stock prices of the oil-related companies, with another independent variable of the log difference of the WTI from the previous day's closing to the current day's closing. All the following estimations include both control variables of growth rates of the Nikkei Stock Average and the WTI.

We take advantage of three dummy variables in a set of panel data to capture differential effects of either timing when the GPIF announced to start the passive investment using the ESG ratings, the corporate rating of the ESG index that the GPIF selected as positive screening devices, or the pro-ESG score measured with the LDA estimation of the publications of *SRs*.

The first dummy ($dummy1_{it}$) takes a value of 1 or otherwise 0, dates t on July 3, 2017, and September 25, 2018, when the GPIF announced to start the passive investment using their selected ESG ratings and if company i was listed in the ESG ratings. We also create additional dummies equal to 1 for a period t of two, three, four, or five consecutive days after each announcement date.

The second dummy ($dummy2_{it}$) takes a value of 1 if the first dummy is 1 and if the pro-ESG topics of a corporate i are estimated with LDA to have a share of 0.6 or higher in *SR*. To check robustness, we also create a dummy with a value of 1 for company i whose share of the pro-ESG topics is 0.5 or higher.

The third dummy ($dummy3_{it}$) takes a value of 1 on the day t when the company i with a pro-ESG topic of 0.6 or higher releases the *SR*. Additionally, we created dummies with 1 for a period t of two, three, four, or five consecutive days after each release date.

As a benchmark case, we estimate a fixed-effects panel model where a rate of change in the stock price of a company $i = \{1, \cdots, 13\}$ at a date $t = \{\text{April } 1, 2016 \text{ to March } 31, 2021\}$ depends on the growth rates of the Nikkei Stock Average and the WTI. We alternately add some dummy variables to the benchmark, as follows, to examine the impact on the stock prices of both GPIF's announcements concerning the choice of ESG ratings and their influence on the companies' behavior reflected in the *SRs*:

$$stock\_price_{it} = \beta_0 + \beta_1 nikkei\_price_t + \beta_2 wti\_price_t + \beta_{31} dummy1_{it} + \beta_{32} dummy2_{it}$$

where $stock\_price_{it}$ denotes a rate of change in the stock price of a company i at the market close of a day t from the previous day's closing. Additionally, $nikkei\_price_t$ is similarly a rate of change in the Nikkei Stock Average at the closing of a day t, and wti_price_t is also a rate of daily change in the WTI.

Table 5 shows the estimation results. Coefficients on the first dummy are statistically significant and positive on the day and two days after; however, the coefficients are statistically insignificant for more than three days. In any case of the second dummy, the coefficients are also statistically insignificant.

Table 5. Estimation results of panel regression analysis

stock_price	coeff		t	coeff		t	coeff		t	coeff		t	coeff		t
constant	-0.0002		-1.62	-0.0003	*	-1.68	-0.0002		-1.63	-0.0002		-1.58	-0.0002		-1.59
nikkei_price	0.8056	***	65.18	0.8055	***	65.18	0.8057	***	65.18	0.8057	***	65.18	0.8056	***	65.18
wti_price	0.0214	***	4.67	0.0214	***	4.67	0.0214	***	4.68	0.0214	***	4.69	0.0214	***	4.68
dummy1 (1day)	0.0140	**	1.99												
dummy2 (1day)	-0.0222	*	-1.89												
dummy1 (2days)				0.0119	**	2.38									
dummy2 (2days)				-0.0075	*	-0.91									
dummy1 (3days)							0.0040		0.98						
dummy2 (3days)							-0.0033		-0.49						
dummy1 (4days)										-0.0001		-0.02			
dummy2 (4days)										-0.0019		-0.33			
dummy1 (5days)													0.0007		0.22
dummy2 (5days)													-0.0023		-0.45

The results show that even for two days, the GPIF's choice of the ESG ratings pushed up the stock price of the companies that the selected ESG ratings had listed. The GPIF's soft voice in the corporates' pro-ESG managerial efforts was loud enough to cause temporary increases in the stock prices through positive screening of the ESG indices selected by GPIF; however, no additional impacts affected the stock prices of the companies whose *SRs* indicated a high share of the pro-ESG topics. The transient and differential effects of the GPIF's market monitoring are ineffective for the corporates whose *SRs* reveal information on their ESG-related good performances.

Next, we add the third dummy to the previous specification.

$$stock\_price_{it} = \beta_0 + \beta_1 nikkei\_price_t + \beta_2 wti\_price_t + \beta_{31} dummy1_{it} + \beta_{32} dummy2_{it} + \beta_{33} dummy3_{it}$$

The estimates of the panel regressions are shown in Table 6. While the coefficients on the first and second dummies show no significant differences from the previous specification, the coefficients on the third dummy are insignificant; therefore, the release of *SRs* has no further effect on raising the growth rate of stock prices than the contents of the reports.

Table 6. Estimation results of panel regression analysis with dummy 3

stock_price	coeff		t	coeff		t	coeff		t	coeff		t	coeff		t
constant	-0.0002		-1.60	-0.0002		-1.64	-0.0002		-1.57	-0.0002		-1.53	-0.0002		-1.57
nikkei_price	0.8055	***	65.17	0.8054	***	65.17	0.8057	***	65.19	0.8057	***	65.18	0.8056	***	65.18
wti_price	0.0214	***	4.67	0.0214	***	4.67	0.0214	***	4.69	0.0215	***	4.69	0.0214	***	4.68
dummy1 (1day)	0.0140	**	1.99												
dummy2 (1day)	-0.0222	*	-1.89												
dummy3 (1day)	-0.0054		-0.91												
dummy1 (2days)				0.0119	**	2.38									
dummy2 (2days)				-0.0075		-0.91									
dummy3 (2days)				-0.0044		-1.05									
dummy1 (3days)							0.0040		0.98						
dummy2 (3days)							-0.0034		-0.50						
dummy3 (3days)							-0.0044		-1.27						
dummy1 (4days)										-0.0001		-0.02			
dummy2 (4days)										-0.0020		-0.34			
dummy3 (4days)										-0.0023		-0.76			
dummy1 (5days)													0.0007		0.22
dummy2 (5days)													-0.0024		-0.45
dummy3 (5days)													-0.0005		-0.17

Since *SR* is a document on a company's ESG activities in the previous year, the ESG ratings include some or all of the information regarding the company's pro-ESG activities. Since the ESG indices GPIF has adopted as ESG monitoring evaluate a company's ESG activities based on publicly available information, our finding that the ESG ratings accurately capture the content of SRs is considered consistent with the GPIF's objective in choosing the ESG indices.

3.3. Robustness check with DID analysis

It is evident from the panel regressions applied to a long-time sample period that the GPIF's announcements positively affect the rise in stock prices of the Japanese oil companies with ESG ratings. To check the robustness, we estimate the effects of the GPIF's decisions with a DID estimation where a GPIF's announcement made on July 3, 2017, is a treatment in the case of a short-time sample period from May 1, 2017, to October 27, 2017. The treatment group is the companies with an ESG rating at the July 3, 2017 announcement. Those without any ESG ratings are the control group. The treatment is regarded as persisting either on the announcement day for two, three, or four days from the announcement day.

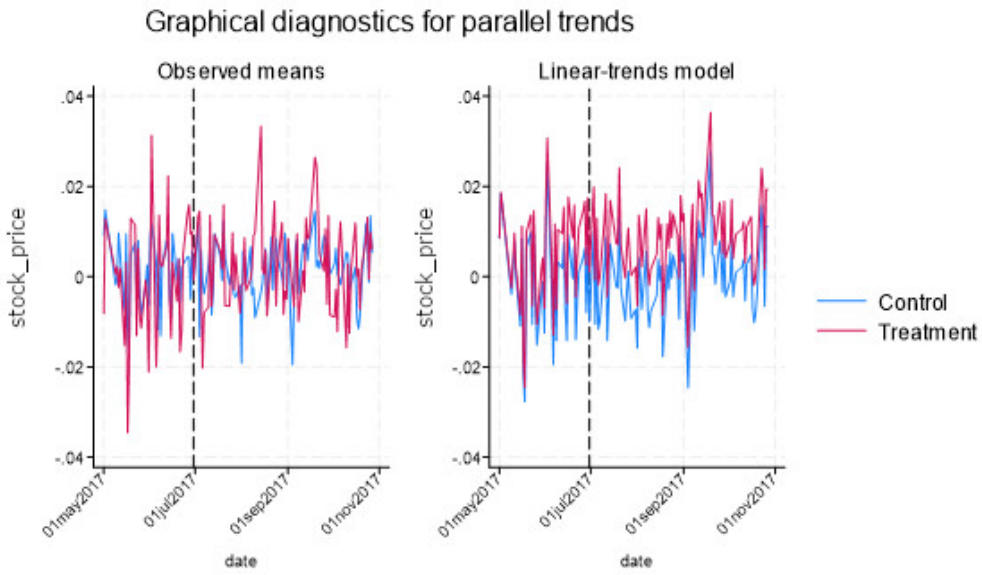
Table 7 presents the mixed results of DID analyses. Each row in Table 7 shows the average treatment effect on the treatment (ATET), where the treatment is assumed to take one day, two days, three days, and four days. The last column in Table 7 shows the results of the parallel trend test. An estimation of the two-day treatment indicates statistical significance at the 5% level, and a test for parallel trends in the DID estimation with the two-day treatment cannot reject the assumption. The average treatment effects for both groups are shown in Figure 3, where the observed mean is located

on the left, and the linear trend model is on the right. In the linear trend model, an increase in the treatment group is depicted after the treatment; however, it also indicates that the differential between the control and the treatment groups occurred before the treatment. The observation suggests that some information may have been disseminated before the GPIF announcement, requiring further robustness checks.

Table 7. Estimation results of DID analysis

					Parallel-trends test (pretreatment time period)			
					H0: Linear trends are parallel			
stock_price	Coefficient	t	P-value		Prob > F =			
ATET								
1day								
(1 vs 0)	0.00113	0.19	0.855		0.7197			
ATET								
2days								
(1 vs 0)	0.0145569	2.3**	0.04		0.1834			
ATET								
3days								
(1 vs 0)	0.0071863	1.28	0.225		0.2017			
ATET								
4days								
(1 vs 0)	0.0005154	0.13	0.896		0.6797			

Figure 3. Test for parallel trends between control and treatment groups



4. Conclusion

While a growing body of empirical studies analyses the effects of the ESG scores on market values, whether the role of speculators enhances informational efficiency in market monitoring has yet to be understood solely in theory (Holmström and Tirole, 1993). The theory shows informed traders or speculators play a voice role in monitoring firms' ESG fundamentals and promoting equity trades on the information (Hirschman, 1970; Broccardo, Hart, and Zingales, 2022). The more precise the informational signal is, the more speculators invest dependently on the signal, so a corporation's share price would be higher. Our paper empirically showed the effects of informational efficiency in market monitoring on share prices in a case of positive screening through GPIF's choice over the ESG indices based on public information.

The panel regressions indicate that the GPIF's soft voice in the corporates' pro-ESG managerial efforts was loud enough to cause temporary increases in stock prices; however, the transient effects of the GPIF's market monitoring are differential in that the effects are ineffective for the corporates whose *sustainability reports* reveal information on their ESG-related good performances. We find that the ESG ratings accurately capture the content of *sustainability reports*, consistent with the GPIF's objectives of positive screening based on public information in choosing the ESG indices.

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