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# Environmental Awareness and Green Business Practices in the Small Business Sector: Empirical Evidence Using a Small and Medium-sized Enterprises Survey in Japan<sup>\*</sup>

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#### Abstract

This study argues that the heterogeneity in environmental awareness among business owners is a pivotal component in characterizing the implementation of green business practices in the small business sector. Specifically, using a large-scale survey of small and medium-sized enterprises (SMEs) throughout Japan, we show a gap between environmental awareness and green business practices in the small business sector; that is, SMEs are aware of environmental issues, but they do not practice green business to a large extent. Further, we quantitatively show that the environmental awareness of SMEs already practicing or attempting to practice green business tends to be greater than that of SMEs not practicing green business. Our empirical results support the link between environmental awareness as a business opportunity and green business practices. However, there is less evidence that environmental awareness divorced from management, such as the need to pass on a sustainable society to future generations, would be involved with green business practices in the small business sector. Our findings advocate that policymakers looking to strengthen environmental initiatives in the small business sector need to direct SMEs to build awareness of environmental issues related to their businesses.

#### JEL Classification: L21; Q56.

*Keywords*: green business practices; environmental awareness; small business sector; survey data; Japan

## 1 Introduction

It has been argued that the business sector needs to promote initiatives to address environmental issues to realize a sustainable society. In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) to realize an acceptable global environment and society for the next generation. The Global Reporting Initiative, the United Nations Global Compact, and the World Business Council for Sustainable Development have developed the SDG Compass as a guideline for corporate action to implement the SDGs.(GRI, UNGC, and WBCSD, 2015) To pass on a sustainable economy and society to the next generation, policymakers are encouraging the business sector to take steps to protect the environment.

In response, an increasing number of large companies are managing their operations, taking into consideration the impact of their business activities on the environment. In particular, they are keenly aware of the need to address environmental protection as part of corporate social responsibility.(Nishitani *et al.*, forthcoming, and studies therein) Non-financial information, such as environmental, social, and governance information, is increasingly recognized by investors as necessary information for companies to commit to long-term growth, and by companies as important information to attract these investors.(CDP, CDSB, GRI, IIRC, and SASB, 2020)

However, there may be challenges in encouraging firms in the small business sector to operate their businesses in an environmentally friendly manner. In particular, SMEs are likely to have less incentive to manage the environmental impact of their businesses compared to large companies. In general, people have a limit to their cognition; that is, they locate some information in their own limited cognitive memory and ignore others. According to the Attention Based View proposed by Ocasio (1997), based on the premise that a company is a collection of people's cognition, a company's decisions and actions depend on how it allocates the limited cognitive attention of decision makers. If a company has sufficient cognitive capacity regarding information for business continuity, it can recognize that it has to be reactive to environmental issues under the pressure of stakeholders such as policymakers and investors. However, SME owners are often forced to make business decisions based solely on their own cognition. They may focus more on managing day-to-day cash-flow and meeting the needs of their lifestyle and local communities and less on earning the long-term profits or solving global social problems (See Storey & Greene, 2010; Greene, 2020, and studies therein for the differences between large and small businesses). In such cases, despite the potential business benefits of environmental protection efforts, such as cost saving, business opportunity discovery, regulatory compliance, and reputation enhancement, some SMEs may not feel the need to proactively address environmental issues in their own business as compared to large companies (Bianchi & Noci, 1998).

In addition to quantitative differences in environmental awareness (Gadenne *et al.*, 2009), SME owners are likely to have qualitatively different attitudes toward environmental issues due to their heterogeneous business strategies and ethics. Even if they recognize that environmental protection is important for future generations, many of them may believe that they would have little impact on the environment because they, individually, have limited operations. Some SMEs may not feel the need to promote environmental protection efforts as corporate social responsibility, especially because their activities are not exposed to outsiders, such as financial intermediaries, as much as those of large companies. Other SMEs may assume that the progress of environmental protection initiatives is irrelevant to their business, and that it would not affect their business. Thus, SMEs may be unlikely to engage in environmentally friendly practices. Various attitudes toward environmental issues can be a barrier to encouraging SMEs to practice green business.

This study empirically investigates the relationship between environmental awareness and green business practices in the small business sector. Specifically, we use data from the Daido Life Survey, a large-scale questionnaire survey of SMEs in Japan, to quantitatively measure green business practices and environmental awareness. First, we describe the status of green business implementation and environmental awareness in Japan's small business sector. Then, we explore whether environmental awareness among SME groups already practicing or attempting to practice green business tends to be greater than SME groups that are not practicing green business.

This study contributes to the literature in two ways. First, it identifies a serious gap between environmental awareness and green business practices in the small business sector. Little progress has been made in green business in the small business sector; according to the survey, as of 2021, very few SMEs are already practicing green business in Japan, although there are a significant number of SMEs that are not practicing but are attempting to do so. Regarding environmental awareness, attention to environmental issues varies considerably among SMEs. According to the survey, most SMEs are aware of the environmental issues themselves; in addition, there is no lack of willingness among SMEs to tackle environmental issues within their businesses. However, few SMEs link environmental issues to their management, and they believe that environmental initiatives affect their business.

Second, we provide empirical evidence that small business owners have different environmental awareness depending on their green business practices. We find that there is a link between environmental awareness as a business opportunity and green business practices. In contrast, there is little evidence that environmental awareness divorced from management, such as the need to pass on a sustainable society to the next generation, is associated with green business practices in the small business sector.

The rest of this paper is organized as follows. In Section 2, we discuss the relationship between our research question and the literature. Section 3 explains our empirical framework using the SME survey. Section 4 presents the empirical results. Section 5 concludes the study.

## 2 Research question and related literature

Our research looks at how firms in the small business sector have different environmental awareness depending on the status of the implementation of green business practices. Specifically, we statistically test the following three hypotheses. **Hypothesis (1)** Willingness to tackle environmental problems is positively related to the implementation of green business. If the willingness to address environmental issues is related to the practice of green business, we expect that the percentage of SMEs that are willing to address environmental issues in their business is higher in SMEs that practice green business. **Hypothesis (2)** There are differences in the implementation of green business practices depending on the main reasons for interest in environmental issues. In particular, we expect that a higher percentage of SMEs that practice green business believe that there are business opportunities for environmental issues. However, even if they are interested in environmental issues for reasons that are unrelated to their business, they may not be related to the status of their green business practices. **Hypothesis (3)** SMEs that are aware of the impact of environmental issues on their businesses are more likely to practice green business. In particular, we expect that SMEs that practice green business are more aware of the impact of environmental issues on their businesses.

Many previous studies have highlighted the importance of an executive's/manager's aware-

ness of the environmental impact of the company's operations and corporate social responsibility in addressing environmental issues in businesses in the manufacturing industry.<sup>1</sup> In particular, they emphasize the role of stakeholder management in linking environmental practices with the main business.<sup>2</sup> As the environmental sensitivity of internal and external stakeholders increases, a company will become more responsive to environmental issues as part of its corporate social responsibility. Our interest, however, is to look quantitatively at environmental awareness and green business practices, not only in the manufacturing industry but also in service industries and other industries where environmental impacts are difficult to envision. Moreover, small business owners, including those of micro-enterprises with few employees, may be less aware of the negative impacts of their operations and lack interest in pursuing environmentally friendly practices.

Several studies empirically examine whether and to what extent small business owners' environmental awareness affects environmental practices. For example, Gadenne *et al.* (2009) define environmental awareness as owners' awareness of the environmental impact of their business and argue that increased environmental awareness among small business owners encourages them to take actions that reduce their impact on the environment.<sup>3</sup> The differences in the awareness of environmental issues among SMEs are, however, not only differences in degree but also *qualitative* differences associated with their relationship to their own business. We focus on the qualitative differences in environmental awareness among small business owners. In particular, the status of green business practices differs depending on whether SMEs consider environmental issues to be relevant to their management or not.

Few empirical studies have analyzed the environmental practices of firms in the small business sector across one country or multiple countries. Hoogendoorn *et al.* (2015) is one of the few exceptions and uses data from about 8,000 SMEs in European countries and the U.S. obtained from a large-scale SME survey (Eurobarometer survey) to investigate environmental practices

 $<sup>^{1}</sup>$ Sun & Sun (forthcoming) and studies therein present empirical evidence that increasing executives' awareness affects environmental practices of firms in the manufacturing industry. They follow the concept of an attentionbased view in which an executive allocates limited time and attention to enterprise problems, and state that the strength of the relationship between environmental awareness and green business practices depends on firmspecific resource flexibility and financial constraints.

 $<sup>^{2}</sup>$ For example, Nishitani *et al.* (forthcoming) clarify the influence of stakeholder pressure on a company's implementation of environmentally friendly practices using data on Vietnamese companies. Nishitani (2009) finds that the stronger pressure of foreign customers and long-term shareholders positively influences the environmental practices in Japanese manufacturing companies.

<sup>&</sup>lt;sup>3</sup>Gadenne *et al.* (2009) utilize principal component analysis to construct an aggregate measure for the degree of environmental awareness among SMEs from various Likert scale questions.

in the small business sector. In particular, they explicitly distinguish two types of environmental practices—green operational processes and green business practices—and find that different firm characteristics have dissimilar influences on both environmental practices.<sup>4</sup> In this study, the analysis is limited to green business practices as an environmental practice. Our research interest is not in the firm heterogeneity of green business practices due to the number of employees, industry, financial condition, etc., which is of interest to Hoogendoorn *et al.* (2015), but in the differences in the environmental awareness of SME owners.

## **3** Empirical framework

We quantitatively depict the characteristics of green business practices and environmental awareness in Japan's small business sector. To capture the overall picture of firms in the small business sector throughout Japan, we use data from a large-scale questionnaire survey of Japanese SMEs. Based on the survey results, we select the SMEs that responded to the questionnaire regarding the implementation status of environment-related investment and product development and awareness of environmental issues, and categorize the SMEs by green business practices and environmental awareness. We calculate the percentage of firms' responses regarding green business practices and environmental awareness in the small business sector. We then use a simple regression model to quantitatively analyze the association between the status of green business practices and the difference in the awareness of environmental issues.

### 3.1 The Daido Life Survey

We used the results of the Daido Life Survey (DLS) to collect data. The DLS is a monthly survey of small business owners in Japan conducted by Daido Life Insurance Co.<sup>5</sup> They conduct a questionnaire survey on the business sentiment of SMEs and their efforts to solve management issues to understand the business environment of a wide range of SMEs in real time. A feature of the DLS is the response rate, which is extremely high, while the response rate for questionnaires for micro-, small-, and medium-sized enterprises tends to be quite low in general.(Cycyota &

<sup>&</sup>lt;sup>4</sup>Environmental practices generally refer to activities undertaken by firms aimed at reducing the impact of their business on the environment. We refer to green business practices as involvement in greening products and service offerings, such as offering organically produced and eco-designed products. Environmental practices include not only green business practices but also practices related to greening operational processes, such as minimizing waste, saving on resources, and recycling in operational processes.

<sup>&</sup>lt;sup>5</sup>https://www.daido-life.co.jp/knowledge/survey/

Harrison, 2006; Pielsticker & Hiebl,  $2020)^6$ 

As shown in subsection 3.3, the DLS is characterized by the fact that the survey targets micro-enterprises (five or fewer employees) and SMEs throughout Japan. Therefore, analyzing DLS data is well aligned with the aim of this study, which is to capture the development of green business practices and the awareness of environmental issues in the small business sector in Japan.

# 3.2 Categorizing SMEs by green business practices and environmental awareness

We focus on the SMEs that responded to questionnaires in the DLS about their implementation of environment-related investment and product development and their awareness of environmental issues. Then, we categorize the SMEs by green business practices and environmental awareness.

#### 3.2.1 Green business practices

We collect data on the SMEs that responded to the monthly DLS in January 2021 on the specific theme "Development of sales channels and new products and services in the time of COVID-19." (Daido Life Insurance, 2021a) The survey included the following: "Please select one item that applies to your future capital investment and product development with environmental protection in mind." Respondents answered with one of the following: "Already working on capital investment," "Preparing for capital investment/development," "Feel it is necessary and will consider it in the future," "Have no plans to take action," or "Don't know."

We categorize responding SMEs into three groups according to the status of practicing green business. The first category is a group of SMEs that are already practicing green business, namely *Already-Environmental Practices (A-EP)*; we categorize the group of firms that answered "Already working on capital investment/development" or "Preparing for capital investment/development" to the question as A-EP. The second category is a group of SMEs that

<sup>&</sup>lt;sup>6</sup>This might be because Daido Life Insurance asks its customers (new and existing) to cooperate with the survey while conducting sales activities to small business owners. Approximately 60% of the responding SMEs have contracts with Daido Life Insurance. This is consistent with the argument by Cycyota & Harrison (2006), who used meta-analytic procedures to find that topicality and sponsorship by organizations and people in the executive's social network led to a higher response rate. However, note that there are some differences in the population of responding SMEs in the DLS from that of the small business sector in Japan, as the responding SMEs are clients of Daido Life Insurance. For more information on the differences, see the Appendix.

is potentially trying to implement green business practices, namely *Potentially-Environmental Practices (P-EP)*; we categorize the group of firms that answered "Feel it is necessary and will consider it in the future" to the question as *P-EP*. The third category is a group of SMEs that has not tried to implement green business practices, namely *None-Environmental Practices (N-EP)*; we categorize the group of firms that answered "Have no plans to take action" or "Don't know" to the question as *N-EP*.

## 3.2.2 Environmental awareness: Willingness to address environmental issues in business

We collect data on the SMEs that responded to the monthly DLS in December 2019 on the specific theme "Review of 2019, expectations for 2020, and interest in environmental issues." (Daido Life Insurance, 2019) The survey included the question, "Do you want to address environmental issues in your firm's business activities in the future? Please select one that applies." Respondents answered with one of the following: "Want to proactively address," "Want to address," or "No plans to work on (not related to the project)."

According to the results, we categorize the willingness to address environmental protection in business into three groups: *Proactive*, *Desirable*, and *No-Plans*.

# 3.2.3 Environmental awareness: The primary reason for interest in environmental issues

We collect data from SMEs that responded to the monthly DLS in December 2019. The survey also included the following: "Please select the one that best describes your reasons for being interested in environmental issues." Respondents answered with one of the following: "Environmental preservation is important for the next generation," "Necessary to take action as corporate social responsibility," "Because we see environmental issues as a business opportunity," "For the provision of environmentally friendly products, etc., and technology development projects," "To be required by business partners to address environmental issues," "To comply with legal regulations," "To improve corporate image," "To improve employee motivation," "Others," or "Not interested in any particular environmental issue."

We categorize responding SMEs into five groups according to the primary reason for interest in environmental issues. The first category is a group of SMEs that considers the importance of protecting the environment for future generations as the primary reason for interest in environmental issues, namely *Next-gen*. The second category is a group of SMEs that considers corporate social responsibility as the primary reason, namely *CSR*. The third category is a group of SMEs that considers the relevance of business as the primary reason, namely *Business*; we categorize the group of firms that answered "Because we see environmental issues as a business opportunity," "For the provision of environmentally friendly products, etc., and technology development projects," "To be required by business partners to address environmental issues," "To comply with legal regulations," "To improve corporate image," or "To improve employee motivation" to the question as *Business*. The fourth and fifth categories are groups of SMEs that answered "Others" and "Not interested in any particular environmental issue," respectively.

#### 3.2.4 Environmental awareness: Greening as a matter influencing business

We collect data on the SMEs that responded to the Daido Life Survey in April 2021 on the specific theme "Impact of the Second Emergency Declaration and Business Development during COVID-19." (Daido Life Insurance, 2021b) The survey included the following: "Please select up to three events that you feel will have an impact on the implementation of your business activities over the next year." Respondents answered with up to three of the following: "Environmental protection initiatives, such as the SDGs and a decarbonized society," "Spreading COVID-19 vaccination," "Hosting the Tokyo Olympics and Paralympics," "International affairs, such as U.S.-China relations, etc.," "Promoting a digital society," or "None in particular."

We categorize the group of firms that answered "Environmental protection initiatives, such as the SDGs and a decarbonized society" as the SMEs that regarded greening as a matter influencing their business activity, namely Influence business: *Greening*.

#### 3.3 Descriptive statistics of the sample of SMEs in the Daido Life Survey

We describe the characteristics of the sample of SMEs responding to the DLS. Table 1 shows the descriptive statistics of the sample in the DLS of December 2019, January 2021, and April 2021. A total of 7,311 SMEs responded to the DLS in December 2019, 8,419 in January 2021, and 10,973 in April 2021.

As shown in Table 1, data from the sample of SMEs responding to the DLS capture the

Category	Dec. 2019	Jan. 2021	Apr. 2021
Region			
Hokkaido	221 [3%]	315 [4%]	$388 \ [4\%]$
Tohoku	456[6%]	710 [8%]	727 [7%]
North Kanto	592[8%]	823 [10%]	1,033 [9%]
South Kanto	1,540 [21%]	1,586 [19%]	2,375 $[22%]$
Hokuriku/Koshinetsu	559 [8%]	832 [10%]	931 [8%]
Tokai	608 [8%]	852 [10%]	1,142 [10%]
Kansai	1,482 [20%]	1,362 [16%]	1,987 [18%]
Chugoku	544 [7%]	850 [10%]	1,003 [9%]
Shikoku	$276 \ [4\%]$	300 [4%]	$233 \ [2\%]$
Kyushyu	1,033 [14%]	789 [9%]	1,154 [11%]
Industry			
Construction	1,304~[18%]	$1,614\ [19\%]$	2,140 [20%]
Manufacturing	1,620 $[22%]$	$1,913\ [23\%]$	2,420 [ $22%$ ]
Wholesale/Retail	$1,\!659~[23\%]$	$1,845 \ [22\%]$	2,402 [ $22%$ ]
Service	2,224 [ $31%$ ]	2,555~[31%]	$3,\!400[31\%]$
MISCELLANEOUS	407 [6%]	437 [5%]	$515 \ [5\%]$
Number of employees			
Less than 5 employees	3,385~[47%]	3,938~[47%]	$5,\!101~[47\%]$
6-20  employees	2,475~[34%]	2,798~[34%]	$3,\!648[34\%]$
More than 21 employees	$1,\!343~[19\%]$	$1,\!605\ [19\%]$	$2,\!104~[19\%]$
Firm age			
Less than 10 years	922~[13%]	978~[12%]	$1,218\ [11\%]$
10 to less than $30$ years	1,825~[26%]	2,069~[25%]	$2,\!671\ [25\%]$
30 to less than $50$ years	$2,\!180~[31\%]$	2,535~[31%]	$3,\!287~[31\%]$
50 to less than $100$ years	1,978~[28%]	2,355~[29%]	$3,\!174\ [30\%]$
More than 100 years	237~[3%]	307~[4%]	391~[4%]
Owner age			
Less than 50 years old	1,915~[27%]	2,272~[27%]	2,799~[26%]
50 to less than $60$ years old	2,030~[28%]	$2,346\ [28\%]$	$3,\!219[30\%]$
60 to less than $70$ years old	1,964~[27%]	2,235~[27%]	2,794 [26%]
More than 70 years old	1,283 [18%]	$1,471 \ [18\%]$	2,026 [19%]

Table 1: Descriptive statistics of SMEs responding to the Daido Life Survey.

Source: Authors' calculations using data from the Daido Life Survey (December 2019, January 2021, and April 2021).

*Notes:* The figure indicates the number of SMEs responding to the Daido Life Survey in December 2019, January 2021, or April 2021 by category described in the left header. MISCELLANEOUS includes "Agriculture, Forestry, and Fisheries" and "Information and communications." The percentages of SMEs in each category are in brackets.

characteristics of the population of firms in the small business sector in Japan as a whole.<sup>7</sup> In particular, (1) There is a regional difference in the number of firms, with a relatively large number of firms in urban areas such as South Kanto and Kansai, and a small number in rural areas such as Tohoku, Chugoku, and Shikoku. (2) SMEs in the manufacturing sector do not account for a large share of the total, while the service sector has a higher percentage.<sup>8</sup> (3) The percentage of micro-businesses, such as SMEs with five or fewer employees, is high. (4) The firm age in the small business sector in Japan is high; only about 10% of the firms are younger than 10 years, and more than 30% of the firms are more than 50 years old. (5) The aging of owners in Japan's small business sector is serious, with approximately 27% of young owners under the age of 50 and nearly 20% of elderly owners over the age of 70.

Note that SMEs surveyed in the DLS are not necessarily the same ones surveyed every month; there are 1,340 firms that responded to both the December 2019 and January 2021 surveys, and 3,337 firms that responded to both the January 2021 and April 2021 surveys. Nevertheless, we confirm that SMEs that responded to both of the monthly surveys also tended to be sampled from a similar population as the group of firms that were surveyed monthly.<sup>9</sup>

Although the DLS was conducted for a different group of SMEs each month, the data used in the analysis were not drawn from different populations each month of the survey. As seen by comparing each line in Table 1, there is no meaningful difference in the monthly descriptive statistics. This means that SMEs are sampled every month without any bias toward the population of a group of firms when conducting the survey.

# 3.4 Regression model for the association between the status of green business practices and the difference in the awareness of environmental issues

We consider a regression model to quantitatively assess the correlation between the environmental awareness and green business practices in the small business sector. Let  $AEP_i$  and  $PEP_i$ be dummy variables that are set to 1 if SME *i* belongs to the *A*-*EP* and *P*-*EP* groups, respectively, and 0 otherwise. Furthermore, let  $EA_i^k$  be a dummy variable that is set to 100 if SME *i* is responding to environmental awareness *k*, and 0 otherwise. Then, consider the following

<sup>&</sup>lt;sup>7</sup>See the Appendix for the characteristics of the population of the SMEs around Japan based on Economic Census for Business Frame of Japan conducted on the full set of economic units.

<sup>&</sup>lt;sup>8</sup>For more detailed descriptive statistics by industry, see Table A3 in the Appendix.

<sup>&</sup>lt;sup>9</sup>For descriptive statistics of the sample in the DLS that responded to both the December 2019 and January 2021 surveys or both the January 2021 and April 2021 surveys, see Table A4 in the Appendix.

linear regression model for each environmental awareness k;

$$EA_i^k = \alpha^k + \beta^k AEP_i + \gamma^k PEP_i + \epsilon_i^k, \tag{1}$$

where  $\epsilon_i^k$  is an error term with mean-zero and variance  $\sigma_{\epsilon_k}^2$ . The constant term  $\alpha^k$  represents the unconditional percentage mean of the environmental awareness k for SMEs that have not tried to practice green business, N-EP. The coefficients,  $\beta^k$ ,  $\gamma^k$ , can be interpreted as the percentage difference in the probability of environmental awareness for the green business SMEs relative to the SMEs in the N-EP category. We also test the null hypothesis  $\beta^k = \gamma^k$  regarding whether there is a difference in the probability of environmental awareness for those business owners who respond to either status of green business practices, A-EP or P-EP.

Based on the hypotheses described in section 2, we create dummy variables for groups by their environmental awareness and test the null hypothesis  $\beta^k = 0$ ,  $\gamma^k = 0$ , or  $\beta^k = \gamma^k$ . First, with respect to **Hypothesis (1)**, we create dummy variables  $EA_i^{Proactive}$  and  $EA_i^{Desirable}$  for the willingness to tackle environmental problems in business. If willingness to tackle environmental problems is related to green business practices, then  $\beta^{Proactive}$  and  $\gamma^{Proactive}$  are expected to be positive and statistically significant. Furthermore, there may be a difference in willingness between SMEs that are already practicing green business and those planning to do so. In that case, it is expected that quantitative differences exist statistically between  $\beta^{Proactive}$ ,  $\gamma^{Proactive}$ ,  $\beta^{Desirable}$ , and  $\gamma^{Desirable}$ .

With respect to **Hypothesis** (2), we create dummy variables  $EA_i^{Next-gen}$ ,  $EA_i^{CSR}$ , and  $EA_i^{Business}$  for the primary reasons for interest in environmental issues. We test whether  $\beta^{Business}$  and  $\gamma^{Business}$  are positive and statistically significant to examine the link between environmental awareness as a business opportunity and green business practices. We also test the null hypotheses  $\beta^{Next-gen} = 0$ ,  $\gamma^{Next-gen} = 0$ ,  $\beta^{CSR} = 0$ , and  $\gamma^{CSR} = 0$  separately to check whether environmental awareness, which is not closely related to business, is associated with green business practices.

With respect to **Hypothesis** (3), we create a dummy variable  $EA_i^{Greening}$  on whether SMEs consider their business activity to be influenced by greening. If SMEs that are aware of the impact of environmental issues on their business are more likely to practice green business,  $\beta^{Greening}$  and  $\gamma^{Greening}$  are expected to be positive and statistically significant.

We also consider a regression model that adds firm-specific variables to equation (1). In particular, we predict that the status of green business practices is significantly related to the different firm characteristics due to the number of employees, industry, and so on (Hoogendoorn *et al.*, 2015). Then, we have a concern that the relationship obtained in the regression (1) would be spurious; obtained dependences between environmental awareness and green business practices are merely due to such firm heterogeneity. Therefore, we also report the results of testing the above hypotheses by adding various firm-specific dummies such as region, industry, number of employees, firm age, and owner age as control variables to equation (1).

### 4 Empirical results

In this section, we report the empirical results obtained using data from the DLS on green business practices and environmental awareness among SMEs in Japan. First, we show the results of calculating the percentage of firms' responses to questions about green business practices and environmental awareness. We then present empirical evidence on the association between the status of green business practices and the difference in awareness of environmental issues obtained using regressions.

#### 4.1 Green business practices among Japanese SMEs

In this subsection, we discuss the progress of green business practices in the small business sector in Japan. Figure 1 indicates the percentage of SMEs that responded "Already working on/Preparing for," "Feel necessary and will consider in the future," or "No plans/Don't know" to the question in the DLS of January 2021 on capital investment and product development with environmental protection in mind.

There are very few SMEs in Japan that are already practicing green business. As of January 2021, only 6% of all SMEs are investing in or developing products with environmental protection in mind.

A good number of SMEs are not practicing, but *potentially* trying to implement green business. The figure indicates that about 28% of SMEs feel the need for future capital investment and product development with environmental protection in mind, and will consider it in the future.





Source: Authors' calculations using data from the Daido Life Survey (January 2021). Notes: The figure indicates the percentage of firms that responded "Already working on/Preparing for," "Feel necessary and will consider in the future," or "No plans/Don't know" to the question on capital investment and product development with environmental protection in mind. Number of responding firms: 7,572

#### 4.2 Environmental awareness among Japanese SMEs

First, we determine how many SMEs are willing to tackle environmental protection in their business activities. Figure 2 indicates the percentage of SMEs that responded "Want to proactively address," "Want to address," or "No plans to work on (not related to the project)" to the question in the DLS of December 2019 "Do you want to address environmental issues in your business activities?"

There is no lack of willingness among SMEs to tackle environmental issues within their businesses. The figure shows that more than 70% of SMEs want to address environmental issues in their business activities in the future. This suggests that there is a gap between the willingness to address environmental issues in business and green business practices, in the sense that while there are few SMEs that are practicing or trying to practice green business, there are many SMEs that have a desire to address environmental issues.



Figure 2: Percentage of SMEs by the degree of willingness to address environmental protection in business activities as of December 2019

Source: Authors' calculations using data from the Daido Life Survey (December 2019). Notes: The figure indicates the percentage of SMEs that responded "Want to proactively address," "Want to address," or "No plans to work on (not related to the project)" to the question "Do you want to address environmental issues in your business activities?" (%). Number of responding SMEs: 6,686

However, few SMEs want to immediately address environmental issues in their business. Only 13% of SMEs responded that they are proactively willing to work on environmental issues, and 61% of SMEs seem to have only a desire to work on environmental issues. This suggests that the majority of SMEs that want to address environmental issues in their business only have a desire but not an immediate intention to do so.

Next, we examine the primary reason small business owners are interested in environmental issues. Figure 3 indicates the percentage of SMEs that responded "Environmental preservation is important for the next generation," "Necessary to take action as a corporate social responsibility," "To be related to the business," "Others," or "Not interested in any particular environmental issue" to the question "Why are you interested in environmental issues?"

SMEs are not uninterested in environmental issues themselves. Over 90% of SME owners are interested in some kind of environmental issues. In addition, 60% of them are interested



Figure 3: Percentage of SMEs by the primary reason for interest in environmental issues as of December 2019

Source: Authors' calculations using data from the Daido Life Survey (December 2019).

*Notes*: The figure indicates the percentage of SMEs that responded "Environmental preservation is important for the next generation," "Necessary to take action as a corporate social responsibility," "To be related to the business," "Others," or "Not interested in any particular environmental issue" to the question "Why are you interested in environmental issues?" Number of responding SMEs: 6,876

in environmental issues because of the importance of environmental protection for the next generation as their primary reason.

However, not many SMEs are interested in environmental issues because of their corporate social responsibility and relevance to their business. Only 11% of firms are concerned about environmental issues with corporate social responsibility as the primary reason. Further, only 12% of SMEs chose one of "Because we see environmental issues as a business opportunity," "For the provision of environmentally friendly products, etc., and technology development projects," "To be required by business partners to address environmental issues," "To comply with legal regulations," "To improve corporate image," or "To improve employee motivation." This suggests that, although they are interested in environmental issues, few SMEs link them to their management.



Figure 4: Percentage of SMEs responding to what matters influence business as of April 2021

Source: Authors' calculations using data from the Daido Life Survey (April 2021). Notes: The figure indicates the percentage of SMEs that responded "Environmental protection initiatives, such as the SDGs and a decarbonized society," "Spreading COVID-19 vaccination," "Hosting the Tokyo Olympics and Paralympics," "International affairs, such as U.S.-China relations, etc.," "Promoting a digital society," or "None in particular" to "Matters that you feel will have an impact on the implementation of your business activities over the next year." Number of responding SMEs: 10,413

Finally, we see if small business owners believe that environmental initiatives are important enough to influence their business activities. Figure 4 indicates the percentage of SMEs that responded "Environmental protection initiatives, such as the SDGs and a decarbonized society," "Spreading COVID-19 vaccination," "Hosting the Tokyo Olympics and Paralympics," "International affairs, such as U.S.-China relations, etc.," "Promoting a digital society," or "None in particular" to "Matters that you feel will have an impact on the implementation of your business activities over the next year."

Many SMEs do not consider the progress of environmental initiatives as matters that affect their business. As of April 2021, less than 20% of SMEs feel that environmental initiatives would have an impact on the implementation of their business activities in the coming year. Since the survey was conducted during the COVID-19 pandemic, we can understand that the spread of the COVID-19 vaccine was of high interest for their management. Nevertheless, this suggests that while policymakers are actively encouraging the business sector to take action on environmental issues, many SMEs do not believe that this is important enough to have an impact on their operations.

# 4.3 Association between environmental awareness and green business practices

In this subsection, we explore the association between environmental awareness and green business practices. We focus on the status of the practices: Already-Environmental Practices (A-EP), Potentially-Environmental Practices (P-EP), and None-Environmental Practices (N-EP). Although the number of A-EP is very small, as shown in the previous subsections, P-EP SMEs that attempt to practice green business in the future may have a similar propensity for environmental awareness as A-EP SMEs. However, it is also expected that A-EP SMEs have different environmental awareness than P-EP SMEs. We run a linear regression (1) of each of the various dummy variables, for the categories of environmental awareness on the two dummy variables of green business practices, to examine how small business owners have different environmental awareness depending on their status of green business practices.

Table 2 presents the results of these regressions (1). The first row "Constant" reports the constant from each regression,  $\alpha^k$ . The next two rows show the coefficients of the green business practice dummy variables,  $\beta^k, \gamma^k$ . The fourth row shows the difference between the coefficients of the two dummy variables,  $\beta^k - \gamma^k$ . This can be interpreted as the difference in the probability of environmental awareness for those business owners who respond to either status of green business practices, A-EP or P-EP. For example, SMEs who are already practicing green business are 17.5% more likely to be proactively willing to address environmental issues in their business than those who are not practicing it but are trying to do so.

There is a difference in the degree of willingness to address environmental issues in their business between SMEs that are already practicing green business and those that are potentially attempting to do so. The first and second columns of the table indicate that, as expected, both SMEs that are already practicing green business and attempting to do so tend to be willing to address environmental issues in their business. More importantly, SMEs that are already practicing green business are highly motivated and want to proactively address environmental

	Willingn for EIs in	ess to do business:	Prin int	nary reaso terest in E	n for Als:	Influence business:
	Proactive	Desirable	Next-gen	CSR	Business	$\overline{Greening}$
Constant $(N-EP)^a$	7.1**	63.7**	64.2**	11.1**	8.8**	12.3**
	(0.9)	(1.7)	(1.7)	(1.1)	(1.0)	(0.7)
Coefficient on green	business pra	ctice dummy	<i>,b</i>			
A-EP	$28.3^{**}$	-5.2	$-11.1^{\dagger}$	4.1	$10.9^{*}$	$19.4^{**}$
	(6.0)	(6.3)	(6.4)	(4.6)	(5.0)	(3.5)
P- $EP$	$10.7^{**}$	$9.2^{**}$	-2.7	$3.4^{\dagger}$	$5.5^{**}$	$13.6^{**}$
	(2.1)	(2.8)	(2.9)	(2.1)	(2.0)	(1.6)
Difference between c	oefficients					
	17.5	-14.4	-8.5	0.6	5.4	5.8
	[0.01]	[0.03]	[0.20]	[0.90]	[0.30]	[0.12]
Number of SMEs	1,289	1,289	1,308	1,308	1,308	3,236

Table 2: Association between environmental awareness and green business practices.

Source: Authors' regressions using data from the Daido Life Survey (December 2019, January 2021, and April 2021).

Notes: We run regressions (1) of each dummy variable described in the upper header on the two dummy variables of green business practices. White (1980) heteroskedasticity-robust standard errors are indicated in parentheses. <sup>\*\*</sup>, <sup>\*</sup>, and <sup>†</sup>denote significance at the 1, 5, and 10% levels, respectively. The figures in brackets show the p value of a two-sided test for equality of the two coefficients,  $\beta^k$  and  $\gamma^k$ .

a. Represents the mean for SMEs who have not tried to practice green business (N-EP).

b. Variable equals 100 if the SMEs belong to each category described in the left header, and 0 otherwise.

issues in their businesses. This suggests that SMEs that do not practice—but are attempting to do so—green business tend not to seriously address environmental issues in their business, but only to have aspirations.

The primary reason for interest in environmental issues differs between SMEs that are already practicing or trying to practice green business and those that are not trying to practice. As shown in the fifth column of the table, both SMEs that are already practicing green business and attempting to do so tend to be interested in environmental issues because of the following: "To be related to their business." This suggests that having environmental awareness closely linked to their management is related to the practice of green business.

However, the percentage of A-EP and P-EP SMEs that believe that "Environmental protection is important for the next generation" and "Necessary to take action as corporate social responsibility" as the primary reason is not much different from that of N-EP SMEs. This suggests that considering the environmental impact of their business, such as the need to pass on a sustainable society to the next generations and corporate social responsibility, is not a strong motivation for them to implement green business practices.

SMEs that are already practicing green business and trying to practice are more likely to believe that the progress of environmental initiatives has an impact on the implementation of their business activities. As shown in the sixth column of the table, they tend to feel that "Environmental protection initiatives such as SDGs and decarbonization" affect their business. This suggests that understanding how environmental issues affect their business is strongly related to green business practices.

These results are robust when considering differences across firm-specific categories.<sup>10</sup> Table 3 presents the results of the regressions with the following firm category dummies as control variables: the number of employees dummy (6 to 20, 21 or more), firm age dummy (10 to 30 years, 30 to 50 years, 50 to 100 years, 100 years or more), owner age dummy (50 to 60, 60 to 70, 70 or more), industry dummy (Construction, Manufacturing, Information and communications, Transport and postal activities, Wholesale, Retail, Real estate and goods rental and leasing, Accommodations, eating and drinking, Medical, Education, learning support, Living-related and personal and amusement, Scientific research, professional and technical, Services, N. E. C, MISCELLANEOUS), and region dummy (Tohoku, North Kanto, South Kanto, Hokuriku/Koshinetsu, Tokai, Kansai, Chugoku, Shikoku, Kyushu). We can confirm that they are qualitatively and quantitatively similar to the results in Table 2.

Based on the empirical results, we can infer that the awareness of business opportunities in the environmental field is crucial for SMEs to practice green business. For example, we can quantitatively measure the extent to which SMEs are already practicing green business if they believe that the progress of environmental initiatives affects their business. The estimated unconditional probability that the average SME perceives that progress in environmental initiatives has an impact on their business is approximately 16%, while the conditional probability of an SME already practicing green business is 32% ( $\simeq 12.3+19.4$ ), which means that the likelihood ratio is approximately twice ( $\simeq 32/16$ ) as high. This implies SMEs that believe environmental initiatives affect their business are about twice as likely as the average SME to already practice green business.

<sup>&</sup>lt;sup>10</sup>We find that there are large differences in green business practices and environmental awareness among SMEs by firm categories. In particular, (1) SMEs in the manufacturing industry have a relatively high percentage of environmental awareness and green business practices, and those in the retail and service industries have a low percentage. (2) Green business practices and awareness of micro-enterprises are extremely low. (3) Lower firm age tends to have lower levels of green business practices and awareness. See the Appendix in the empirical results for the heterogeneity.

	Willingn for EIs in	ess to do business:	Prima inte	ary rease erest in 1	on for EIs:	Influence business:
	Proactive	Desirable	Next-gen	CSR	Business	$\overline{Greening}$
Coefficient on gree	n business p	ractice dum	my <sup>b</sup>			
A-EP	$27.1^{**}$	-7.1	-9.7	1.2	$11.2^{*}$	$16.1^{**}$
	(6.1)	(6.4)	(6.4)	(4.3)	(5.1)	(3.5)
P- $EP$	$10.4^{**}$	8.4**	-0.3	1.9	$4.8^{*}$	$11.9^{**}$
	(2.2)	(2.9)	(3.0)	(2.2)	(2.0)	(1.6)
Difference between	$\alpha$ coefficients					
	16.7	-15.5	-9.3	-0.8	6.3	4.2
	[0.01]	[0.02]	[0.16]	[0.87]	[0.23]	[0.26]
Number of SMEs	1,284	1,284	1,302	1,302	1,302	3,199

Table 3: Association between environmental awareness and green business practices (with control variables).

Source: Authors' regressions using data from the Daido Life Survey (December 2019, January 2021, and April 2021).

*Notes:* We run regressions of each dummy variable described in the upper header on the two dummy variables of green business practices and control variables. White (1980) heteroskedasticity-robust standard errors are indicated in parentheses. \*\*, \*, and <sup>†</sup>denote significance at the 1, 5, and 10% levels, respectively. In the estimation, the following dummies are added as control variables: the number of employees dummy (6 to 20, 21 or more), firm age dummy (10 to 30 years, 30 to 50 years, 50 to 100 years, 100 years, or more), owner age dummy (50 to 60, 60 to 70, 70 or more), industry dummy (Construction, Manufacturing, Information and communications, Transport and postal activities, Wholesale, Retail, Real estate and goods rental and leasing, Accommodations, eating and drinking, Medical, Education, learning support, Living-related and personal and amusement, Scientific research, Professional and technical, Services, N. E. C, MISCELLANEOUS), and region dummy (Tohoku, North Kanto, South Kanto, Hokuriku/Koshinetsu, Tokai, Kansai, Chugoku, Shikoku, Kyushu). b. Variable equals 100 if the SMEs belong to each category described in the left header, and 0 otherwise.

## 5 Concluding remarks

This study provides two major lines of empirical evidence that characterize green business practices and environmental awareness in the small business sector. First, there exists a serious gap between environmental awareness and green business practices in the small business sector; despite a reasonably high level of environmental awareness, there are few green business practices. Second, small business owners differ in their environmental awareness depending on their green business practices; while there is a link between environmental awareness as a business opportunity and green business practices, there is little evidence that environmental awareness divorced from management, such as the need to pass on a sustainable society to future generations and corporate social responsibility is associated with green business practices in the small business sector.

We believe that our findings have important implications for policymakers looking to boost

environmental efforts in the small business sector. Historically, Japanese companies, especially manufacturing companies, have been aware of the environmental impact of their operations and have promoted the greening of operational processes as a response to environmental pollution as a social problem.(Organisation for Economic Co-operation and Development, 1994)<sup>11</sup> While the global awareness of environmental issues, such as global warming, in recent years has led to continued efforts by policymakers, however, as shown in this paper, SMEs have not made much progress in managing their businesses in consideration of environmental issues. Our empirical results suggest that the key environmental awareness for SMEs to practice green business is not to recognize that environmental issues are a challenge for the next generation and society, but to understand how environmental issues affect their business. This environmental awareness would be more critical in the small business sector than in the large business sector, where it is easier to assume that their business has an impact on the environment. We argue that for policymakers and intermediaries to promote environmental protection efforts among SMEs, they need to direct SMEs to build awareness that there are business opportunities in environmental issues, which have not yet been widely recognized among SMEs.

Therefore, an important future research question is to quantitatively clarify to what extent the support of policymakers and intermediaries in changing SMEs' environmental awareness can encourage SMEs to practice green business. Although the empirical analysis in this paper showed a correlation between environmental awareness and the status of green business practices, it is necessary to investigate the causal influence of changing environmental awareness on the green business practice. According to the results of this paper, qualitative differences in support may lead to significant differences in the degree of practice.

Clearly, the difference in the environmental awareness of business owners would be the only component in characterizing the implementation of green business practices in the small business sector. In particular, green business practices may be related to the growth potential and productivity of SMEs; green business practices can be used as a means to differentiate themselves from their competitors by promoting innovation.(Porter & van der Linde, 1995)

<sup>&</sup>lt;sup>11</sup>Organisation for Economic Co-operation and Development (1994) highly praised Japan's efforts in environmental conservation. After World War II, Japan experienced rapid economic growth but also experienced serious environmental pollution, which became a major social problem. In response, policymakers developed the Basic Law on Pollution Control (enacted in 1967) and other environmental laws. As discussed by Organisation for Economic Co-operation and Development (1994), these policy responses have been successful in overcoming pollution. This is mainly because manufacturers and large corporations have been promoting management that considers the environmental impact of their business activities and advances green operation processes such as minimizing waste, energy conservation, and recycling.

Thus, it would be useful to explore the macro relationship between green business practices and the products, services, and resources managed by SMEs. The existing and potential challenges of SMEs in product development, channel expansion, risk perception and response, technological innovation, human resource development, and financing are expected to differ depending on the status of green business practices. In such cases, policymakers and intermediaries should ensure that measures are in place to support SMEs at different stages of green business practices. Though beyond the scope of this study, this is worthy of future research.

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## Appendix

# A.1 The population of Japanese SMEs based on the 2014 Economic Census for Business Frame of Japan

We briefly introduce the characteristics of the small business-sector population in Japan. Table A1 shows the descriptive statistics of the SMEs around Japan as of 2014 based on the 2014 Economic Census for Business Frame of Japan conducted on the full set of economic units.

Category	Census 2014
Region	
Hokkaido	153,216~[4%]
Tohoku	$279,\!836\ [7\%]$
North Kanto	388,344 $[10%]$
South Kanto	776,483 $[20%]$
Hokuriku/Koshinetsu	$300,\!650[8\%]$
Tokai	$476,751\ [13\%]$
Kansai	$636,\!855\ [17\%]$
Chugoku	$223,\!928\ [6\%]$
Shikoku	$132,\!144\ [3\%]$
Kyushyu	$441,272\ [12\%]$
Industry	
Construction	$455,\!481\ [12\%]$
Manufacturing	$413,\!938[11\%]$
Wholesale/Retail	$902,\!034\ [24\%]$
Service	1,970,538~[52%]
MISCELLANEOUS	$67,\!488~[2\%]$
The number of employees	
1-4 employees	2,580,732 [ $68%$ ]
5-9  employees	$677,\!384\ [18\%]$
10-29  employees	419,574 $[11%]$
More than 30 employees	$128,\!383[3\%]$
Seconded or dispatched only	$3,\!406[0\%]$

Table A1: Descriptive statistics of the SMEs around Japan (as of 2014).

Source: Authors' calculations based on the 2014 Economic Census for Business Frame of Japan. Notes: The figure indicates the total of "Individuals" and "Companies" ("Sole Proprietorship" + "Head Of-fice/Headquarters"). Excludes public and financial services. MISCELLANEOUS includes "agriculture, forestry," "fishery," "mining, quarrying, gravel extraction," "electricity, gas, heat supply, water supply," and "information and communication." The percentages of SMEs in each category are in brackets.

From the table, we can confirm the following three features of the small business-sector population in Japan: (1) There is a regional difference in the number of firms, with a relatively large number of firms in urban areas such as South Kanto and Kansai, and a small number in rural areas such as Tohoku, Chugoku, and Shikoku. (2) SMEs in the manufacturing sector do not account for a large share of the total, at approximately 11%. Construction and wholesale/retail industries account for 12% and 24%, respectively, while the service sector has a higher percentage. (3) The percentage of micro-businesses is high, with the majority of SMEs having four or fewer employees.

With respect to the population of the group of firms surveyed monthly by the Daido Life Survey, we find that a comparison of Table A1 and Table 1 regarding regional differences shows that the survey is conducted in a manner consistent with the population of Japan as a whole. In terms of industry, the population of SMEs in the DLS has a slightly higher percentage of manufacturing and construction firms and a lower percentage of service firms. In terms of the number of employees, the percentage of small businesses with five or fewer employees is slightly lower. This implies that the DLS has a smaller proportion of micro-service firms than the overall Japanese population.

## A.2 Heterogeneity in the green business practices and environmental awareness within SMEs

In this subsection, we report the heterogeneity in green business practices and environmental awareness within SMEs by firm category. Specifically, we ran a linear regression of each dummy variable for the categories of green business practices and environmental awareness on each of the dummy variables of industry, number of employees, firm age, and owner age.

Table A2 presents the results of these regressions. The first row "Constant" in each panel reports the constant from each regression. This represents the unconditional percentage mean of green business practices and environmental awareness for the SMEs belonging to the baseline category described in parentheses. The remaining rows in each panel show the coefficients of the category dummy variables described in the left header. These coefficients can be interpreted as the percentage difference in the probability of green business practices and environmental awareness relative to respondents in the baseline category.

SMEs in the manufacturing industry have a relatively higher percentage of environmental awareness and green business practices than average. In contrast, SMEs in the retail and service industries, such as "Real estate and goods rental and leasing," "Accommodations, eating and drinking," "Medical," and "Education, learning support," have a lower percentage of green business practices and environmental awareness.

The results in panel (b) show that the green business practices and environmental awareness of micro-enterprises are extremely low. Among SMEs with five or fewer employees, only 3% belong to A-EP and approximately 20% belong to P-EP. Regarding awareness, considerably fewer firms responded that they wanted to work on environmental issues. The number of firms that responded that environmental initiatives affected their business is also quite low. Relatively few firms answered CSR or Business as the primary reason for their interest in environmental issues, while more firms tended to answer Next-gen.

In the results in panel (c), we find that SMEs with lower firm age tend to have lower levels of green business practices and environmental awareness. While there is less heterogeneity in the primary reason for interest in environmental issues, younger SMEs tend to be relatively unwilling to address environmental issues in their business and do not believe that environmental initiatives affect their business.

The results in panel (d) show that there is less heterogeneity in green business practices and environmental awareness by owner age.

	Green b	ousiness	Willingn	ess to do	Prim	ary reaso:	n for	Influence
	Pract	tices:	for EIs in	business:	int	erest in E	Is:	business:
	A- $EP$	P- $EP$	Proactive	Desirable	Next-gen	CSR	Business	Greening
(a) By industry								
Constant (Manufacturing) <sup><math>a</math></sup>	$7.8^{**}$	$31.8^{**}$	$10.7^{**}$	$63.3^{**}$	$58.2^{**}$	$12.6^{**}$	$13.0^{**}$	$20.8^{**}$
	(0.7)	(1.2)	(0.9)	(1.4)	(1.4)	(0.0)	(1.0)	(0.0)
Coefficient on industry $\operatorname{dummy}^{b}$								
Construction	-2.0*	-5.0**	$3.3^{**}$	-1.3	$3.6^{\dagger}$	$-2.1^{\dagger}$	-1.7	-7.6**
	(0.0)	(1.6)	(1.3)	(1.9)	(1.9)	(1.2)	(1.3)	(1.1)
Wholesale	-1.8	-3.0	1.2	-0.6	0.1	-1.7	0.9	-2.1
	(1.1)	(2.0)	(1.5)	(2.3)	(2.3)	(1.5)	(1.6)	(1.5)
Retail	-4.5**	-5.4**	0.0	-3.9†	1.1	-3.9**	-2.0	-5.9**
	(0.0)	(1.9)	(1.4)	(2.2)	(2.2)	(1.4)	(1.4)	(1.4)
Information and communications	-2.0	$-6.3^{\dagger}$	-1.3	$-10.2^{*}$	0.2	0.3	-3.9	-5.6*
	(1.9)	(3.5)	(2.7)	(4.6)	(4.5)	(3.1)	(2.7)	(2.7)
Transport and postal activities	0.9	4.8	1.5	3.2	-7.5*	1.6	0.4	-3.5
	(1.9)	(3.3)	(2.3)	(3.4)	(3.5)	(2.4)	(2.4)	(2.1)
Real estate and goods rental and leasing	-3.8**	-9.4**	0.6	-8.8**	$7.6^{**}$	-0.9	-6.2**	$-10.9^{**}$
	(1.1)	(2.3)	(1.8)	(2.8)	(2.7)	(1.8)	(1.5)	(1.5)
Accommodations, eating and drinking	-0.1	$-11.0^{**}$	0.9	-1.4	-2.0	-1.6	-3.4	$-11.3^{**}$
	(2.1)	(3.3)	(2.8)	(4.2)	(4.3)	(2.8)	(2.6)	(1.9)
Medical	-4.0**	-11.8**	$5.6^*$	-10.7**	5.6	-5.0*	-2.5	$-13.5^{**}$
	(1.6)	(3.2)	(2.7)	(3.7)	(3.6)	(2.1)	(2.3)	(1.8)
Education, learning support	-3.5	-12.3*	1.3	-9.3	$21.8^{**}$	$-6.6^{\dagger}$	-9.0**	-3.8
	(3.1)	(6.0)	(4.7)	(7.2)	(5.8)	(3.5)	(2.9)	(5.2)
Living-related and personal and amusement	-2.2	-4.3	0.1	4.1	-5.6	1.5	0.4	$-11.0^{**}$
	(1.7)	(3.2)	(2.9)	(4.4)	(4.5)	(3.1)	(3.1)	(1.9)
Scientific research, professional and technical	$-4.6^{**}$	-8.7**	3.9	-7.6*	5.0	-1.2	-2.6	-1.4
	(1.4)	(3.1)	(2.7)	(3.8)	(3.7)	(2.5)	(2.4)	(2.4)
							)	(continued)

Table A2: Green business practices and environmental awareness among SMEs by firm category.

	Green b	usiness	Willingne	ess to do	Prim	ary reaso	n for	Influence
	Pract	ices:	for EIs in	business:	inte	erest in E	Is:	business:
	A- $EP$	P- $EP$	Proactive	Desirable	Next-gen	CSR	Business	Greening
Services, N.E.C	-4.1**	-3.4	$3.6^{*}$	$-4.0^{\dagger}$	2.2	-3.3*	-1.1	-5.1**
	(1.0)	(2.1)	(1.6)	(2.4)	(2.3)	(1.5)	(1.6)	(1.5)
Agricultures, Forestry, and Fisheries	0.9	0.8	-0.2	6.8	-5.7	-7.7**	1.8	6.9
	(4.2)	(7.0)	(4.2)	(6.2)	(6.6)	(2.9)	(4.6)	(6.6)
MISCELLANEOUS	$-3.2^{\dagger}$	-7.6*	2.6	-4.5	3.0	-3.5	0.3	-2.8
	(1.7)	(3.5)	(2.7)	(3.9)	(3.8)	(2.3)	(2.7)	(2.6)
Number of SMEs	7,528	7,528	6,613	6,613	6,799	6,799	6,799	10,336
(b) By the number of employees								
Constant(More than 21 employees) <sup><math>a</math></sup>	$10.7^{**}$	$40.0^{**}$	$17.0^{**}$	$65.7^{**}$	$55.0^{**}$	$16.3^{**}$	$14.4^{**}$	$25.6^{**}$
	(0.8)	(1.3)	(1.1)	(1.3)	(1.4)	(1.0)	(1.0)	(1.0)
Coefficient on number of employees $\operatorname{dummy}^{b}$								
Less than 5 employees	-7.0**	-19.1**	-6.8**	-8.6**	$7.9^{**}$	-8.8**	$-4.9^{**}$	$-13.9^{**}$
	(0.0)	(1.4)	(1.2)	(1.6)	(1.6)	(1.1)	(1.1)	(1.1)
6-20 employees	$-5.1^{**}$	-9.9**	-4.0**	$-2.8^{\dagger}$	$3.8^{*}$	-4.4**	-1.6	$-10.1^{**}$
	(0.0)	(1.6)	(1.3)	(1.7)	(1.7)	(1.2)	(1.2)	(1.1)
Number of SMEs	7,518	7,518	6,614	6,614	6,798	6,798	6,798	10,320
(c) By firm age								
Constant (More than 100 years) <sup><math>a</math></sup>	$8.1^{**}$	$33.7^{**}$	$12.6^{**}$	$68.5^{**}$	$59.9^{**}$	$9.7^{**}$	$17.2^{**}$	$20.4^{**}$
	(1.6)	(2.8)	(2.2)	(3.1)	(3.3)	(2.0)	(2.5)	(2.1)
Coefficient on firm age dummy <sup><math>b</math></sup>								
Less than 10 years	-2.8	$-9.1^{**}$	-0.1	$-10.9^{**}$	-1.3	-1.0	-3.1	-7.4**
	(1.8)	(3.2)	(2.5)	(3.5)	(3.7)	(2.2)	(2.8)	(2.3)
10-less than 30 years	-3.6*	-8.5**	-0.9	-9.7**	-0.3	0.1	$-6.1^{*}$	-8.2**
	(1.7)	(3.0)	(2.4)	(3.3)	(3.5)	(2.1)	(2.6)	(2.2)
30-less than 50 years	-2.7	-7.3*	0.4	-6.8*	-0.1	1.5	-6.5*	-5.0*
	(1.7)	(2.9)	(2.4)	(3.3)	(3.4)	(2.1)	(2.6)	(2.2)
50-less than 100 years	-1.2	-1.6	-0.2	$-6.4^{\dagger}$	1.2	2.3	-5.9*	-0.5
							$\sim$	(continued)

	Green b Pract	usiness cices:	Willingn for EIs in	ess to do business:	Prim int	lary reaso erest in F	n for JIs:	Influence business:
	A- $EP$	P- $EP$	Proactive	Desirable	Next-gen	CSR	Business	Greening
	(1.7)	(3.0)	(2.4)	(3.3)	(3.4)	(2.1)	(2.6)	(2.2)
Number of SMEs	7,454	7,454	6,572	6,572	6,754	6,754	6,754	10,234
(d) By owner age								
Constant (More than 70 years old) <sup><math>a</math></sup>	$5.3^{**}$	$26.8^{**}$	$14.5^{**}$	$58.8^{**}$	$63.9^{**}$	$10.0^{**}$	$9.4^{**}$	$13.5^{**}$
	(0.6)	(1.2)	(1.0)	(1.4)	(1.4)	(0.0)	(0.8)	(0.8)
Coefficient on owner age dummy <sup><math>b</math></sup>								
Less than 50 years old	0.0	0.4	-1.7	2.3	-7.1**	0.6	$3.4^{**}$	$2.7^{*}$
	(0.8)	(1.6)	(1.3)	(1.9)	(1.8)	(1.1)	(1.2)	(1.1)
50-less than 60 years old	0.2	0.8	-2.8*	1.5	-5.9**	1.4	$2.6^*$	$2.4^*$
	(0.8)	(1.6)	(1.3)	(1.8)	(1.8)	(1.1)	(1.1)	(1.0)
60-less than 70 years old	1.0	2.0	-2.9*	$3.4^{\dagger}$	-1.3	0.6	$2.0^{\dagger}$	$3.1^{**}$
	(0.8)	(1.6)	(1.3)	(1.8)	(1.8)	(1.1)	(1.1)	(1.1)
Number of SMEs	7,455	7,455	6,601	6,601	6,785	6,785	6,785	10,237

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*Notes:* We run regressions of each dummy variable described in the upper header on the category dummy variables by (1) industry, (2) the number of employees, (3) firm age, or (4) owner age. White (1980) heteroskedasticity-robust standard errors are indicated in parentheses. \*\*, \*, and <sup>†</sup>denote significance at the 1, 5, and 10% levels, respectively.

a. Represents the mean for the SMEs in the category described in parentheses.

b. Variable equals 100 if the SMEs belong to each category described in the left header, and 0 otherwise.

# A.3 Descriptive statistics of the SMEs responding to the Daido Life Survey in details

Table A3: Descriptive statistics of the SMEs responding to the Daido Life Survey by industry.

Category	Dec. 2019	Jan. 2021	Apr. 2021
Industry			
Construction	$1,\!620\ [22\%]$	1,913~[23%]	$2,\!420~[22\%]$
Manufacturing	$1,\!304~[18\%]$	$1,\!614\ [19\%]$	$2,\!140~[20\%]$
Wholesale	$774 \ [11\%]$	$829\ [10\%]$	$1,075\ [10\%]$
Retail	$885 \ [12\%]$	1,016~[12%]	1,327~[12%]
Transport and postal activities	$257 \ [4\%]$	278~[3%]	402~[4%]
Real estate and goods rental and leasing	466 [6%]	522~[6%]	671~[6%]
Accommodations, eating and drinking	$161 \ [2\%]$	207~[2%]	310~[3%]
Medical	$220 \ [3\%]$	207~[2%]	$272 \ [3\%]$
Education, learning support	$53 \ [1\%]$	$51 \ [1\%]$	60  [1%]
Living-related and personal and amusement	$144 \ [2\%]$	255~[3%]	342~[3%]
Scientific research, professional and technical	$204 \ [3\%]$	$247 \ [3\%]$	344~[3%]
Services, N.E.C	$719\ [10\%]$	788  [9%]	999~[9%]
Agricultures, Forestry, and Fisheries	$67 \ [1\%]$	$52 \ [1\%]$	53  [0%]
Information and communications	138~[2%]	189~[2%]	$214 \ [2\%]$
MISCELLANEOUS	$202 \ [3\%]$	$196 \ [2\%]$	$248 \ [2\%]$

Source: Authors' calculations using data from the Daido Life Survey (December 2019, January 2021, and April 2021).

*Notes:* The figure indicates the number of SMEs responding to the Daido Life Survey in December 2019, January 2021, or April 2021 by category described in the left header. The percentage of SMEs is in brackets.

Category	Dec. 2019	Apr. 2021
Region		
Hokkaido	57 [4%]	112 [3%]
Tohoku	93[7%]	290[9%]
North Kanto	112 [8%]	348 [10%]
South Kanto	184 [14%]	573[17%]
Hokuriku/Koshinetsu	150 [11%]	334 [10%]
Tokai	124 [9%]	326[10%]
Kansai	277 [21%]	548 [16%]
Chugoku	134 [10%]	389 [12%]
Shikoku	79[6%]	87 [3%]
Kyushyu	130 [10%]	330 [10%]
Industry		
Construction	307~[23%]	749~[23%]
Manufacturing	$284 \ [21\%]$	$671 \ [20\%]$
Wholesale/Retail	320~[24%]	$742 \ [22\%]$
Service	337~[25%]	996~[30%]
MISCELLANEOUS	80  [6%]	$165 \ [5\%]$
The number of employ	vees	
Less than 5 employees	516~[39%]	1,524~[46%]
6-20  employees	$490 \ [37\%]$	1,099~[33%]
More than 21 employees	$321 \ [24\%]$	$700 \ [21\%]$
Firm age		
Less than 10 years	$131 \ [10\%]$	$365 \ [11\%]$
10-less than $30$ years	$312 \ [24\%]$	$807 \ [24\%]$
30-less than $50$ years	$416 \ [31\%]$	1,007~[30%]
50-less than $100$ years	$411 \ [31\%]$	992~[30%]
More than 100 years	$55 \ [4\%]$	138~[4%]
Owner age		
Less than 50 years old	383~[29%]	865~[26%]
50-less than $60$ years old	391~[29%]	1,004~[30%]
60-less than $70$ years old	371~[28%]	$874 \ [26\%]$
More than 70 years old	$184 \ [14\%]$	$578\ [17\%]$

Table A4: Descriptive statistics for the SMEs responding to the January 2021 DLS on green business practices.

Source: Authors' calculations using data from the Daido Life Survey (December 2019, January 2021, and April 2021).

*Notes:* The figure indicates the number of SMEs responding to the Daido Life Survey in December 2019 or April 2021 among those responding to the question on capital investment and product development with environmental protection in mind in the Daido Life Survey January 2021 by category described in the left header. MISCELLANEOUS includes "Agriculture, Forestry, and Fisheries" and "Information and communications." The percentages of SMEs in each category are in brackets.