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SAWADA Yasuyuki

RIETI

MASAKI Tatsujiro

Masaki Risk Management Institute

NAKATA Hiroyuki

RIETI

SEKIGUCHI Kunio

RIETI



Research Institute of Economy, Trade & Industry, IAA

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SAWADA Yasuyuki
University of Tokyo

MASAKI Tatsujiro
Masaki Risk Management Institute

NAKATA Hiroyuki
University of Leicester

SEKIGUCHI Kunio
Ehime Prefectural Government

Abstract

In this paper, we investigate the factors behind the low disaster insurance subscription rate in the Japanese corporate sector using unique firm-level data sets. According to our data, disaster insurance participation rates are 59.5% and 47.0% for large enterprises and small and medium enterprises, respectively. Corporate awareness of disasters, resulting adoption of business continuity planning/business continuity management (BCP/BCM), and insurance participation are systematically related to the commitment of corporate executives, reliance on self-finance against disaster losses, and potential exposure to and past experience of natural disasters. Particularly, firms tend to be aware of disasters, set BCP/BCM, and subscribe to disaster insurance after being exposed to disasters, suggesting that disaster preparedness is not necessarily sufficient in the Japanese corporate sector. Since high exposure to a variety of natural disasters is likely to undermine economic prospects, expansion of formal insurance mechanisms will be indispensable. Our empirical results imply that effective interventions are needed to stimulate awareness and the commitment of corporate management.

Keywords: Natural disasters, Disaster insurance, Risk finance

JEL classification: D22, Q54

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*This study is conducted as a part of the Project “An Empirical Study on Economic Resilience and Maintenance of Economic Strength Against Disasters,” undertaken at the Research Institute of Economy, Trade and Industry (RIETI). This study utilizes the micro data of the questionnaire information based on “Questionnaire Survey on Corporate Demand for Disaster Insurance” which is conducted by the Research Institute of Economy, Trade and Industry (RIETI). The authors are grateful to Asako Chiba and Hideyuki Suzuki for their superb research support and for helpful comments and suggestions by Discussion Paper seminar participants at RIETI.

1. Introduction

Natural disasters show distinct rising trends across the globe (Cavallo and Noy, 2011; Kellenberg and Mobarak, 2011; Strömberg, 2007). As is shown in Figure 1, Asia is the region with the highest occurrence of natural disasters according to long-term time series data on natural disasters compiled by the Centre for Research on the Epidemiology of Disasters (CRED) in Belgium (Guha-Sapir et al., 2015). Particularly, Japan is probably more at risk than many other countries in the region, encountering a variety of natural disasters such as earthquakes, tsunamis, volcanic eruptions, typhoons, floods, landslides, and avalanches. Of these natural disasters, earthquakes are the most serious and frequently occurring (Sawada, 2013). The continuous earthquake activity is due to the country's location on a subduction zone, where four of the more than ten tectonic plates covering the globe are crushed against each other. Indeed, of the 912 earthquakes with magnitude of 6.0 or greater that occurred in the world between 1996 and 2005, 190 occurred around Japan. This means that more than 20 percent of the world's large earthquakes have occurred around Japan (Figure 2).

High exposure to a variety of natural disasters is likely to undermine economic prospect. Indeed, a number of existing macroeconomic studies show the nexus between disasters and economic growth (Barro, 2006, 2009; Cavallo et al., 2013; Cavallo and Noy, 2011; DuPont et al., 2015; Kellenberg and Mobarak, 2011; Noy, 2009; Skidmore and Toya, 2002; Toya and Skidmore, 2007). To quantify the overall impact of disasters, Sawada et al. (2011) use a cross-country panel data set. Their analysis shows that the effects of disasters on a given country's economy differ, depending on factors such as the

length of time post-disaster, the disaster type, and the size of the country's GDP. Moreover, for short-term periods of between one to three years, natural disasters produce the largest downside impacts on per capita GDP. As such, a single natural disaster can lower per capita GDP by an annual rate of around 1%. Conflicts and wars cause the second largest effect on per capita GDP, both lowering the figure by an annual rate of 0.4 to 0.5%.

Nonetheless, the availability of formal insurance mechanisms is not necessarily sufficient, suggesting substantial market failures in disaster insurance globally (Figure 3). This might be a natural consequence of disasters which can be characterized by rare and unforeseen contingencies, making design of formal insurance products difficult. In Japan, Cabinet Office (2011) reports that the total property losses from the Great East Japan Earthquake (GEJE) in March 2011 would amount to more than \$US 200 billion, but according to Munich Re (2012) and the World Bank (2012), only \$US 40 billion or 20% of the overall damage was covered by market-based insurance. In the case of Japan's Great Hanshin-Awaji Earthquake that occurred in January 1995, the insurance coverage rate was even lower (Sawada and Shimizutani, 2008).² In the corporate sector, the disaster insurance subscription rate has been even lower than that of household sector. After GEJE, out of the total disaster insurance payouts of the \$US 40 billion, payouts for the household insurance and insurance cooperative by Japan Agriculture (JA) are \$US 12 billion and \$US 9 billion, respectively, indicating that the total insurance payments of \$US 19 billion for the corporate sector are lower than those for the household sector.

There are existing studies on natural disasters in Japan using firm-level data.

² These figures can be compared with the \$US 13 billion covered by private insurance out of the \$US 16 billion in total property losses in the case of the February 2011 earthquake in Christchurch, New Zealand.

For example Todo et al. (2015) examines how supply chain networks affected the resilience of firms to GEJE, particularly looking at the effects on the time period before resuming operations after the earthquake and sales growth from the pre- to the post-earthquake period. The results indicate that the positive diversification effect of supply chain networks on recovery exceeds the negative contagious effect for many types of network, implying that diversified supply chain networks lead to the resilience of firms to natural disasters. Based on micro data on firms and banks, Hosono et al. (2016) investigates the effect of banks' lending capacity on firms' capital investment by exploiting a natural experimental situation of the Great Hanshin-Awaji (Kobe) Earthquake in 1995, finding that the weakened lending capacity of earthquake-affected banks exacerbated the borrowing constraints on the investment of their undamaged client firms.

While these firm-level studies on the consequences of natural disasters in Japan are available, to the best of our knowledge, there has been no micro firm level study which investigates issues related to disaster insurance in Japan at least partially due to the lack of appropriate data. The goal of this paper is to bridge this gap in the existing literature by collecting and analyzing suitable data to uncover the causes of the low disaster insurance subscription rate in Japan empirically. By doing so, we identify the factors that are necessary to improve the subscription rate. To this aim, we design and conduct a large-scale survey on disaster risk financing in the corporate sector. With this unique data set, we quantitatively analyze the status quo and determinants of the corporate sector's demand for disaster risk financing and insurance.

The rest of the paper is composed of three sections followed by discussions. In Section 2, we describe our data set and overall summary statistics. Section 3 and 4 show

empirical results of disaster risk recognition and disaster risk financing, respectively. In the final section, we summarize our findings and discuss policy implications.

2. Data and Descriptive Statistics

In 2015, we design and conduct a large-scale survey on disaster risk financing in the corporate sector called "Questionnaire Survey on Corporate Demand for Disaster Insurance"

. Our population is the top 10,000 Japanese firms in terms of total assets whose financial statements in the last three years are available including all the listed companies (excluding those in the banking and financial industries).

From the complete list, we adopted stratified random sample methods with prefecture as strata. Attaching smaller weights to large prefectures such as Tokyo and Osaka, we conducted a survey of 1717 firms (i.e. a response rate of 17.2%), out of which 44.78% and 55.22 % are small & medium sized enterprises and large enterprises, respectively.³

We then match our data with corporate database obtained from Teikoku Data Bank (TDB) COSMOS1 corporation information database which contains accurate and highly reliable corporate information gathered through corporate credit researches, and the database is the most extensive of its kind in Japan. The database contains detailed

³ Following the Tankan survey (Short-term Economic Survey of Enterprises in Japan) of Bank of Japan, sample enterprises are categorized into large, medium-sized, and small enterprises based on their capital: large enterprises are those with capital of 1 billion yen and more; medium-sized enterprises are those with capital of 100 million yen to less than 1 billion yen; and small enterprises are those with capital of 20 million yen to less than 100 million yen.

financial statements such as balance sheet, income statement, statements of change in net assets, statement of cash flows, together with firm characteristics including including location of the headquarters, category of business, and number of employees.

Descriptive Statistics

Key descriptive statistics of our matched data are shown in Tables 1-3. As for the natural disaster related firm characteristics, 68.6% of firms identify the disaster which is worst likely (Table 1 (1)); around a half of firms have estimation of the largest asset damages caused by the worst disaster (Table 1 (2)); 34.3% of firms estimate the largest financial damages arising from business suspension due to a natural disaster (Table 1 (3)); and 55.2% of firms observe management's commitment to disaster risk management (Table 1 (4)). In terms of business continuity plan (BCP) and business continuity management (BCM), 45.1% of firms, especially larger ones, establish BCP and/or BCM (Table 1 (5)).

As for formal insurance, disaster insurance participation rates are 58.9% and 47.0% for large enterprises and small & medium enterprises, respectively (Table 2 (1)). Disaster insurance in corporate sector is characterized disproportionately by property insurance with average 95% among insurers (Table 2 (2)), rather than business interruption insurance with only 33% among the insured (Table 2 (3)).

Possible reasons behind nonparticipation among the uninsured are summarized in Table 3. The top reason is the lack of knowledge especially among the small & medium enterprises (Table 3 (1)), followed by the high insurance premium (Table 3 (2)). Other factors which discourage firm insurance subscription include the limitation of the

coverage (Table 3 (3)) as well as the lack of sufficient insurance payouts to recover the damages caused by a natural disaster (Table 3 (4)).

In order to investigate overall patterns of risk finance behavior in the corporate sector, Table 4 summarizes the ranking of primary and secondary financial instruments to cope with the cash flow drops cause by a natural disaster for small & medium enterprises (Table 4 (1)), large enterprises (Table 4 (2)), and all enterprises (Table 4 (3)). As we can see from these tables, regardless of the firm size, combination of equity capital (i.e., self-finance) and bank loans or disaster insurance and equity capital the most popular coping devices against potential losses caused by a disaster. This suggest a problem of “over-reliance” on self-financing against potential disaster damages.

3. Disaster Risk Perception

In this section, we examine empirically determinants of the Japanese firms’ awareness of the potential disaster risks, preparedness against disasters by setting BCP and/or BCM, and belief formation of disaster probabilities.

3.1 Disaster Risk Awareness and Preparedness

First, we adopt the seemingly-unrelated regression (SUR) model for two regression equation, one for a binary dependent variable model of awareness of disaster risks; and the other for a binary dependent variable model for setting BCP and/or BCM. The use of SUR model is justified in our analysis because with the Breusch and Pagan’s

Lagrange multiplier statistics, we cannot reject a null hypothesis the correlation matrix of the residuals between these two equations are zero and they are independent in all specifications. We include a wide variety of firm characteristics, dummy variables for area-specific earthquake risk ranking by the General Insurance Rating Organization of Japan (GIROJ),⁴ industry fixed effects, and regional fixed effects.

Table 5 reports estimation results of the SUR model of disaster awareness and BCP/BCP adoption using all samples and by firm size categories of Financial Statement Statistics of Corporation by Industry of Ministry of Finance. According to the estimation results, the following firm-level factors are systematically related to the higher awareness of disasters: first, proactive action for disaster risk management committed by corporate executives; second, location of headquarter in the “zone 3” earthquake risk ranking in prefectural category determined according to GIROJ; third, past experience of earthquake and/or typhoon losses; fourth, written statement of risk management in the company’s corporate social responsibility (CSR) report; and, finally, internal reserves as a primary funding source in compensation for losses. In addition, our empirical results show that the lack of a firm’s mission statement and corporate philosophy is systematically related to the lack of disaster awareness.

⁴ The basic rating of earthquake insurance has been updated in July 2014.

As for the findings from the BCP/BCM equation in Table 5, we identify the following factors as determinants of BCP/BCM adoption: first, proactive action for disaster risk management committed by executive level; second, written statement of risk management in the CSR report; third, location of headquarter in Kanto area, i.e., the greater Tokyo and its surrounding areas and in Chubu area, i.e., Nagoya and surrounding area as well as in Shikoku island; and fourth, importance of internal reserves as a primary funding source in compensation for losses. Moreover, Table 5 shows there are multiple characteristics linked to the lack of BCM/BCP such as the lack of corporate mission statement and corporate philosophy, and the answers of this survey from accounting department.

3.2 Belief Formation of Disaster Probabilities

The second empirical model is a model of two-stage binary dependent variables. The first stage is for a firm to identify a disaster which is most likely to occur; and the second stage is to form probability belief over occurrence of the disaster. The model can be estimated by the sample selection probit model under an assumption of joint normality between the first stage binary dependent variable model for the disaster awareness and the second stage model for probability formation.

Table 6 reports the estimation results which reveal that the following factors are significantly related to a firm's belief formation on the disaster probabilities: first, location of headquarter in the "zone 3" in prefectural category set by the GIROJ, second, past experience of typhoon losses, and, third, higher fixed asset ratio to total asset which can be interpreted as high potential exposure to the disaster losses.

4. Disaster Risk Financing

In this section we examine how the firms are planning to finance the losses they would incur from natural disasters. The pecking order theory in the corporate finance literature predicts that firms rely on safer funding sources first, i.e. in the order of internal reserves or self-financing, debt, and finally equity. In our context, insurance payments would come first even before internal reserves or self-financing, insurance payments if the predictions of the pecking order theory hold; thus, the predicted order will be as follows: i) Insurance, ii) Internal reserves or self-financing, iii) Debt, including bank loans, and then iv) Equity.⁵

Table 7 reports the distribution of the two most important financing methods identified by the firms against the losses they would incur from natural disasters. Approximately 1/3 of the firms identify insurance as the primary source and internal

⁵ If the insurance market is not missing and the premium is fair (from the perspective of subscribers), all losses will be covered by insurance. Hence, insurance coverage will be prioritized over internal reserves or self-financing.

reserves or self-financing as the second source, regardless of the size of the firm. A slightly larger number of firms than such firms point to internal reserves as the primary and bank loans as the second method, again regardless of firm size. In contrast, very few firms suggest reverse pecking orders, i.e. internal reserves before insurance, or bank loans before insurance or internal reserves. Thus, the results are consistent with the predictions of the pecking order theory.

To verify if the firms that identify internal reserves as a primary funding source against shortfalls in the cash flow caused by natural disasters have indeed sufficient internal reserves, we report the proportions of firms that have more liquid assets than monthly turnover for varying combinations of primary and second funding sources in Table 7. It is clear from the table that firms with insurance – internal reserves combination tend to have more adequate liquid assets than those that rely on bank loans as a primary source, regardless of the firm size. However, smaller firms tend to have more abundant liquid assets than medium or large firms. This may be affected by the weaker credit worthiness among smaller firms or possibly the severer informational asymmetry between the investors and the firm for smaller firms. In either case, this does not contradict with the pecking order theory.

Now we examine what determines the pecking order --- in particular, if insurance is identified as the primary risk financing method, we examine the estimation results of the regression model(s) reported in Table 7.

According to the estimation results, insurance is the primary risk financing method among firms whose risk management is conducted by accounting department, and those in the real estate, transportation, and manufacturing sectors. Also, the results indicate that firms that had experienced losses from typhoons tend to pick insurance as

the primary method against the most serious natural disasters, while past experiences of earthquake losses do not affect inclusion of insurance as one of the primary methods. Note that the prevalence of past loss experience is not very different between typhoons and earthquakes --- about 1/3 of the firms experienced earthquake losses and 28% typhoon losses.

One possible explanation for the contrast between typhoons and earthquakes is that there is a supply side issue for earthquake insurance, which appears to be absent from flooding or wind storm insurance, whose coverage includes typhoon losses. Namely, firms that incurred losses from typhoons have been benefiting from insurance covering typhoon losses, while firms incurred earthquake losses were unable to subscribe to earthquake insurance. While it is possible that insurance for typhoon losses may be suffering from adverse selection, potential adverse selection issues may be even severer for earthquake losses than typhoons, leading to a missing market for earthquake insurance.

Another result reported in Table 7 that is worth paying attention is that adoption of BCP or BCM has no link with insurance subscription. This suggests that BCP or BCM is not incorporated in the contingency plans for cash flow issues that arise from natural disasters. While we are unable to provide further analyses on the cause of this lack of association between BCP or BCM and insurance subscription, one possibility is the corporate governance or organizational issues amongst Japanese firms.

5. Concluding Remarks

In this paper, we investigate the factors behind the low disaster insurance

subscription rate in the Japanese corporate sector using unique data set collected by the authors. According to our data, disaster insurance participation rates are 59.5% and 47.0% for large enterprises and small & medium enterprises, respectively due to the lack of knowledge on insurance especially among the small & medium enterprises, the high insurance premium, the limitation of the coverage, insufficiency of insurance payouts to recover the damages caused by a natural disaster.

Corporate awareness of disasters, resulting adoption of BCP/BCM and insurance participation are systematically related to commitment of corporate executives and reliance on self-finance against disaster losses, and potential exposure to and past experience of natural disasters. It is worth noting that firms tend to be aware of disasters, to set BCP/BCM and to subscribe disaster insurance after being exposed to disasters. This finding suggests that the disaster preparedness is not necessarily sufficient in the Japanese corporate sector.

Yet, we also find that adoption of BCP or BCM has no link with insurance subscription. This suggests that BCP or BCM is not incorporated in the contingency plans for cash flow issues that arise from natural disasters. While we are unable to provide further analyses on the cause of this lack of association between BCP or BCM and insurance subscription, one possibility is the corporate governance or organizational issues amongst Japanese firms.

Since high exposure to a variety of natural disasters is likely to undermine economic prospect, expansion of formal insurance mechanisms will be indispensable. Our empirical results implies that interventions are needed to enhance awareness and commitment of corporate management.

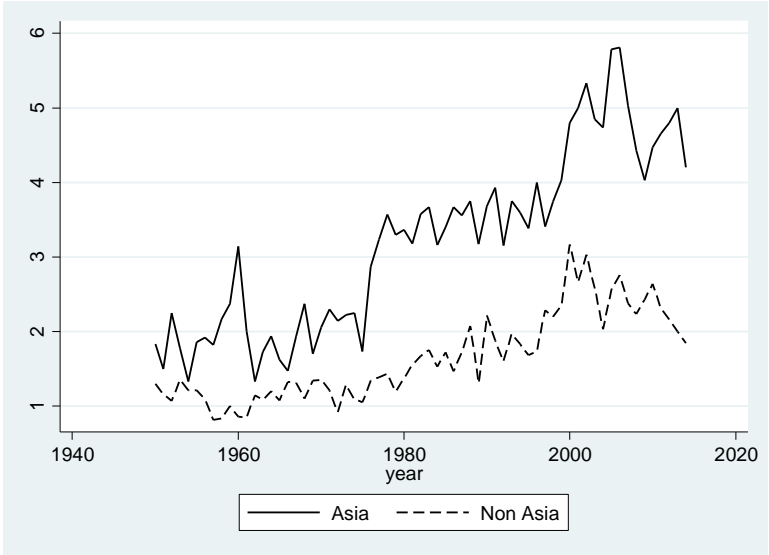
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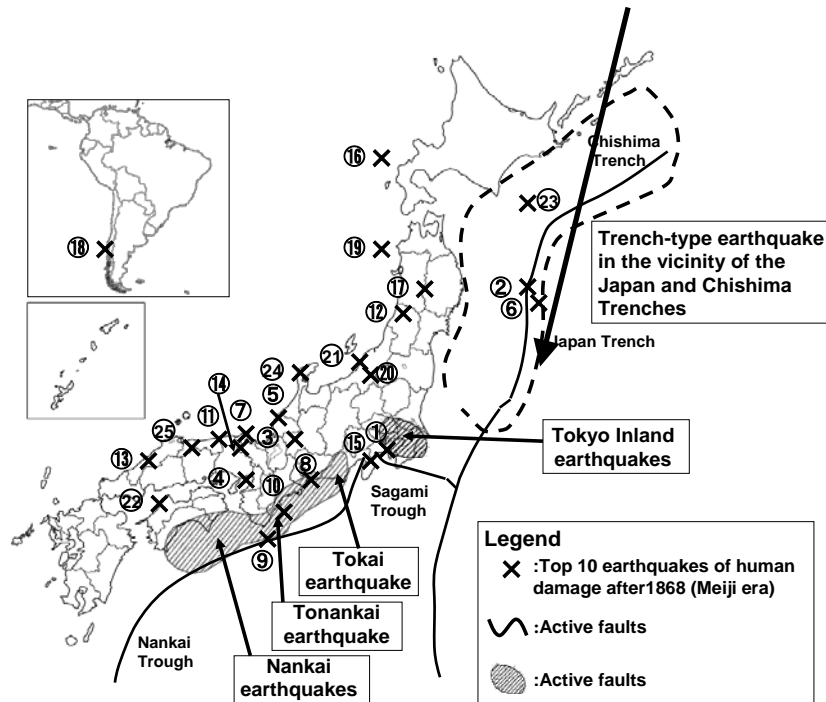
Figure 1 Average frequency of natural disasters per country in Asia and Non-Asia regions



Data source: Emergency Events Database (EM-DAT of CRED (2015)).

Figure 2 Locations of the 26 major earthquakes and tsunamis in Japan with seismic intensity of 6.0 or greater in the last 40 years

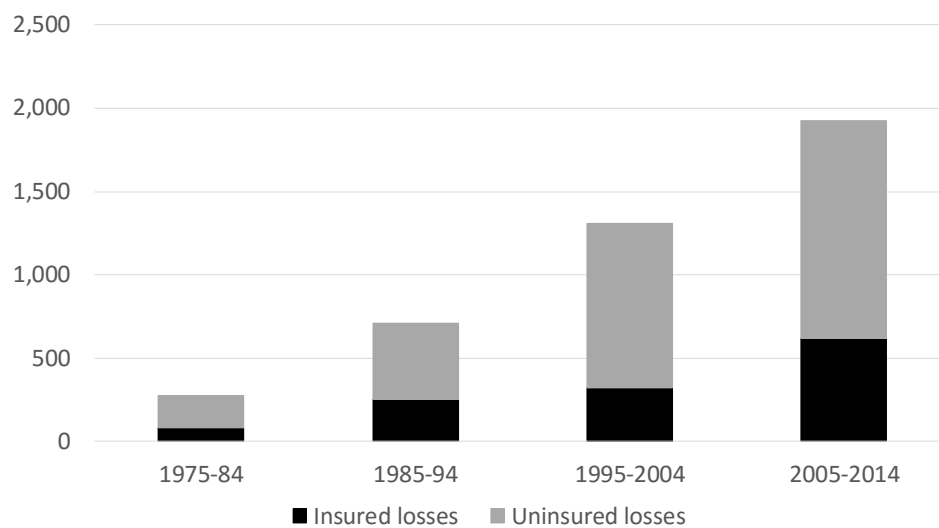
The Great East Japan Earthquake (Higashi Nihon Daishinsai)



Data source) Cabinet Office (2007, 2015), *Disaster management in Japan*.

Note: Numbers in the figure indicate, respectively, 1 the Great Kanto earthquake; 2 the Meiji-Sanriku earthquake; 3 the Nobi earthquake; 4 the Great Hanshin-Awaji earthquake; 5 the Fukui earthquake; 6 the Syowa-Sanriku earthquake; 7 the North Tango earthquake; 8 the Mikawa earthquake; 9 the Nankai earthquake; 10 the Tonankai earthquake; 11 the Tottori earthquake; 12 the Syonai earthquake; 13 the Hamada earthquake; 14 the North Tajima earthquake; 15 the North Izu earthquake; 16 the Hokkaido-Nansei-oki earthquake; 17 the Rikuu earthquake; 18 the tsunami of the Great Chilean earthquake; 19 the Nihonkai-Chubu earthquake; 20 the Chuetsu earthquake; 21 the Chuetsu offshore earthquake; 22 the Geyo earthquake; 23 the Tokachi offshore earthquake; 24 the Noto Peninsula earthquake; 25 the Tottoriken-Seibu earthquake; and The Great East Japan Earthquake (Higashi Nihon Daishinsai).

**Figure 3 Insured vs uninsured economic losses caused by natural disasters,
1970–2015 (USD billion in 2015 prices)**



Data source) Swiss Re Economic Research & Consulting and Cat Perils.

Table1(1) Identification of the disaster which is most likely to occur (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	274	500	774
	35.4	64.6	100
Large	264	674	938
	28.14	71.86	100
Total	538	1,174	1,712
	31.43	68.57	100

Table1(2) Estimate the largest financial damage regarding assets due to the disaster (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	37	37	74
	50	50	100
Large	63	67	130
	48.46	51.54	100
Total	100	104	204
	49.02	50.98	100

Table1(3) Estimate the largest financial damage regarding shutdown due to the disaster (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	45	28	73
	61.64	38.36	100
Large	85	40	125
	68	32	100
Total	130	68	198
	65.66	34.34	100

Table1(4) Management's commitment to disaster risk management (top: number, bottom: percentage[%])

	No	Yes	Unknown	Total
S&M-sized	219	392	147	758
	28.89	51.72	19.39	100
Large	213	532	170	915
	23.28	58.14	18.58	100
Total	432	924	317	1,673
	25.82	55.23	18.95	100

Table1(5) BCP · BCM (top: number, bottom: percentage[%])

	BCM	BCP plan&training	BCP plan	Neither	Total
S&M-sized	31	120	138	471	760
	4.08	15.79	18.16	61.97	100
Large	57	195	217	451	920
	6.2	21.2	23.59	49.02	100
Total	88	315	355	922	1,680
	5.24	18.75	21.13	54.88	100

Table2(1) Insured against disaster (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	403	358	761
	52.96	47.04	100
Large	381	546	927
	40.49	58.9	100
Total	784	904	1,688
	46.45	53.55	100

Table2(2) Insurance with compensation for damage to assets (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	22	333	355
	6.2	93.8	100
Large	23	513	536
	4.18	95.71	100
Total	45	846	891
	5.05	94.95	100

Table2(3) Insurance with compensation for shutdown (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	225	103	328
	68.6	31.4	100
Large	323	174	497
	64.99	34.05	100
Total	548	277	825
	66.42	33.02	100

Table3(1) Reason for not taking out insurance: high insurance fee (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	268	119	387
	69.25	30.75	100
Large	243	123	366
	66.39	33.61	100
Total	511	242	753
	67.86	32.14	100

Table3(2) Reason for not taking out insurance: limited coverage (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	288	99	387
	74.42	25.58	100
Large	272	94	366
	74.32	25.68	100
Total	560	193	753
	74.37	25.63	100

Table3(3) Reason for not taking out insurance: little knowledge of accident insurance (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	223	164	387
	57.62	42.38	100
Large	222	144	366
	60.66	39.34	100
Total	445	308	753
	59.1	40.9	100

Table3(4) Reason for not taking out insurance: insufficiency to restart business (top: number, bottom: percentage[%])

	No	Yes	Total
S&M-sized	306	81	387
	79.07	20.93	100
Large	285	81	366
	77.87	22.13	100
Total	591	162	753
	78.49	21.51	100

Table4(1) Financial tools to compensate for lack of cash flow due to the disaster which is most likely to occur (S&M-sized) (top: number, bottom: percentage[%])

Secondary	Insurance	Equity capital	Loan	Other	Undetermined	Total
Primary						
Insurance	0	123	23	1	0	147
	0	32.71	6.12	0.27	0	39.10
Equity capital	38	0	137	8	4	187
	10.11	0	36.44	2.13	1.06	49.73
Loan	10	20	0	0	2	32
	2.66	5.32	0	0	0.53	8.51
Other	2	1	3	0	0	6
	0.53	0.27	0.80	0	0	1.60
Undetermined	2	2	0	0	0	4
	0.53	0.53	0	0	0	1.06
Total	52	146	163	9	6	376
	13.83	38.83	43.35	2.39	1.60	100

Table4(2) Financial tools to compensate for lack of cashflow due to the disaster which is most likely to occur (Large) (top: number, bottom: percentage[%])

Secondary	Insurance	Equity capital	Loan	Other	Undetermined	Total
Primary						
Insurance	0	143	37	3	5	188
	0	31.43	8.13	0.66	1.10	40.17
Equity capital	39	0	159	18	4	220
	8.57	0	34.95	3.96	0.88	47.01
Loan	5	30	0	2	2	39
	1.10	6.59	0	0.44	0.44	8.57
Other	0	1	1	0	1	3
	0	0.22	0.22	0	0.22	0.66
Undetermined	2	2	1	0	0	5
	0.44	0.44	0.22	0	0	1.10
Total	46	176	198	23	12	455
	10.11	38.68	43.52	5.05	2.64	100

Table4(3) Financial tools to compensate for lack of cashflow due to the disaster which is most likely to occur (All) (top: number, bottom: percentage[%])

Secondary	Insurance	Equity capital	Loan	Other	Undetermined	Total
Primary						
Insurance	0	266	60	4	5	335
	0	32.01	7.22	0.48	0.60	40.31
Equity capital	77	0	296	26	8	407
	9.27	0	35.62	3.13	0.96	48.98
Loan	15	50	0	2	4	71
	1.81	6.02	0	0.24	0.48	8.54
Other	2	2	4	0	1	9
	0.24	0.24	0.48	0	0.12	1.08
Undetermined	4	4	1	0	0	9
	0.48	0.48	0.12	0.00	0	1.08
Total	98	322	361	32	18	831
	11.79	38.75	43.44	3.85	2.17	100

Table 5. Determinants of identifying a disaster and adopting BCP/BCM (estimation method: seemingly unrelated regression)

The first dependent variable, “Disaster,” is an indicator variable which takes 1 if the company identifies the disaster which is most likely to occur; and 0 otherwise.

The second dependent variable, “BCP/BCM,” is an indicator variable which takes 1 if the company plans BCP or BCM; and 0 otherwise.

	All		Financial Statements Statistics of Corporations by Industry					
	All		Small		Medium		Large	
	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM
Outside director	0.0699 (0.0602)	0.0877 (0.0610)	-0.0682 (0.123)	0.0104 (0.109)	0.210** (0.0954)	-0.0519 (0.0970)	-0.101 (0.109)	0.00894 (0.122)
Risk management: with manager's commitment	0.208*** (0.0278)	0.331*** (0.0282)	0.217*** (0.0467)	0.246*** (0.0415)	0.210*** (0.0449)	0.396*** (0.0456)	0.179*** (0.0580)	0.253*** (0.0647)
Risk management: no manager's commitment	-0.0550 (0.0360)	0.0267 (0.0365)	-0.0325 (0.0549)	0.00804 (0.0489)	-0.115* (0.0591)	0.0534 (0.0601)	0.0644 (0.0848)	0.00961 (0.0946)
Risk management: cross-sectoral	-0.0510* (0.0273)	0.00207 (0.0277)	-0.102* (0.0566)	-0.0140 (0.0504)	-0.0430 (0.0409)	0.108*** (0.0416)	-0.0195 (0.0484)	-0.0757 (0.0540)
Risk manager: accounting	0.0619 (0.0751)	-0.0121 (0.0761)	0.121 (0.118)	0.0753 (0.105)	0.00499 (0.114)	0.167 (0.116)	0.0353 (0.239)	-0.0143 (0.267)
Risk finance: cross-sectoral	-0.00165 (0.0313)	0.0273 (0.0317)	0.0635 (0.0609)	0.0213 (0.0542)	0.0269 (0.0480)	-0.0723 (0.0488)	-0.158*** (0.0610)	0.109 (0.0680)
Risk finance: accounting	0.0125 (0.0337)	0.0386 (0.0342)	0.0210 (0.0649)	-0.0941 (0.0577)	0.0342 (0.0551)	-0.00137 (0.0561)	-0.0439 (0.0605)	0.139** (0.0675)
Earthquake risk: middle	0.0327 (0.0441)	-0.0258 (0.0447)	0.00652 (0.0715)	0.0120 (0.0636)	0.0621 (0.0661)	-0.0992 (0.0672)	0.00693 (0.107)	-0.0159 (0.120)
Earthquake risk: high	0.0839* (0.0432)	-0.0122 (0.0438)	0.0352 (0.0709)	0.0186 (0.0631)	0.161** (0.0667)	-0.0550 (0.0678)	-0.0293 (0.0996)	0.00909 (0.111)

	All		Financial Statements Statistics of Corporations by Industry					
	All		Small		Medium		Large	
	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM
Experience: earthquake	0.0480*	0.0361	0.0141	0.00399	0.0677*	0.0321	0.0582	0.0399
	(0.0258)	(0.0262)	(0.0495)	(0.0440)	(0.0403)	(0.0410)	(0.0449)	(0.0501)
Experience: typhoon	0.0494*	-0.00456	0.0873*	0.0441	-0.0114	-0.0545	0.0845*	-0.125**
	(0.0267)	(0.0271)	(0.0459)	(0.0409)	(0.0453)	(0.0461)	(0.0494)	(0.0551)
Experience: other disasters	0.0156	-0.0141	0.0440	-0.0655	-0.00265	-0.0479	0.00501	0.146**
	(0.0312)	(0.0316)	(0.0570)	(0.0508)	(0.0510)	(0.0519)	(0.0552)	(0.0616)
Motto: with risk management	-0.0151	-0.0293	-0.0816	0.0457	-0.00601	-0.100**	0.0610	-0.00480
	(0.0303)	(0.0307)	(0.0607)	(0.0541)	(0.0453)	(0.0461)	(0.0527)	(0.0588)
Motto: unknown	-0.0102	-0.140**	-0.0637	-0.0930	0.0767	-0.204**	-0.0898	0.0210
	(0.0540)	(0.0548)	(0.0879)	(0.0782)	(0.0868)	(0.0883)	(0.126)	(0.140)
Motto: no motto	-0.116**	-0.152***	-0.148*	-0.109	-0.112	-0.208***	-0.0845	-0.0208
	(0.0466)	(0.0472)	(0.0753)	(0.0671)	(0.0768)	(0.0781)	(0.0987)	(0.110)
CSR: with risk management	0.126***	0.191***	0.161***	0.165***	0.141***	0.193***	0.0645	0.200***
	(0.0295)	(0.0299)	(0.0555)	(0.0494)	(0.0457)	(0.0465)	(0.0528)	(0.0589)
CSR: unknown	0.142***	0.0701	0.188**	0.0374	0.0877	0.0802	0.139	-0.00131
	(0.0467)	(0.0473)	(0.0875)	(0.0779)	(0.0689)	(0.0700)	(0.0952)	(0.106)
CSR: no CSR	0.0131	0.0283	-0.0247	-0.0719	0.0399	0.117**	0.0812	0.0957
	(0.0344)	(0.0349)	(0.0555)	(0.0494)	(0.0584)	(0.0594)	(0.0665)	(0.0742)
Operating profit ratio	-0.000560	-0.00184	0.000116	0.000208	-0.00126	-0.00112	-0.00121	-0.00404
	(0.00161)	(0.00164)	(0.00313)	(0.00279)	(0.00275)	(0.00280)	(0.00264)	(0.00295)
Sector: construction	0.0719	-0.109	-0.172	0.109	0.0909	0.00983	0.166	-0.0737
	(0.301)	(0.305)	(0.115)	(0.102)	(0.298)	(0.303)	(0.122)	(0.136)

	All		Financial Statements Statistics of Corporations by Industry					
	All		Small		Medium		Large	
	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM
Sector: infrastructure	0.130 (0.331)	-0.000660 (0.336)			0.0523 (0.415)	-0.0591 (0.422)	0.251 (0.171)	-0.107 (0.191)
Sector: manufacturing	0.156 (0.300)	-0.129 (0.304)	-0.0748 (0.108)	0.0965 (0.0961)	0.166 (0.297)	-0.0602 (0.302)	0.194* (0.0998)	-0.0914 (0.111)
Sector: steel	0.179 (0.391)	0.256 (0.397)					0.376 (0.255)	0.295 (0.285)
Sector: real estate	0.0208 (0.302)	-0.240 (0.306)	-0.185 (0.124)	-0.0187 (0.110)	-0.0241 (0.301)	-0.209 (0.306)	0.0367 (0.124)	-0.176 (0.139)
Sector: retailing	0.0537 (0.300)	-0.232 (0.304)	-0.142 (0.107)	0.0410 (0.0953)	0.0316 (0.296)	-0.145 (0.301)	0.133 (0.102)	-0.265** (0.114)
Sector: service	0.0654 (0.301)	-0.142 (0.305)	-0.181 (0.112)	0.0767 (0.0995)	0.0635 (0.298)	0.0379 (0.303)	0.157 (0.112)	-0.208* (0.125)
Sector: transportation	0.145 (0.303)	-0.195 (0.307)			0.142 (0.304)	-0.232 (0.309)		
Area: Tohoku	0.130 (0.0796)	0.0726 (0.0806)	0.0624 (0.134)	0.130 (0.120)	0.210* (0.110)	-0.0216 (0.112)	-0.0184 (0.272)	-0.228 (0.303)
Area: Kanto	0.0140 (0.0709)	0.180** (0.0718)	-0.00678 (0.117)	0.282*** (0.104)	0.0143 (0.103)	0.0806 (0.104)	0.123 (0.243)	-0.419 (0.271)
Area: Chubu	0.0103 (0.0676)	0.131* (0.0685)	-0.0958 (0.110)	0.267*** (0.0978)	0.0836 (0.0961)	0.0603 (0.0977)	0.138 (0.240)	-0.496* (0.268)
Area: Kinki	-0.00490 (0.0682)	0.0746 (0.0691)	0.00388 (0.111)	0.193* (0.0989)	-0.0243 (0.0993)	-0.0893 (0.101)	0.0775 (0.240)	-0.440* (0.267)

	All		Financial Statements Statistics of Corporations by Industry					
	All		Small		Medium		Large	
	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM
Area: Chugoku	0.00867 (0.0825)	0.0357 (0.0836)	-0.158 (0.134)	0.233* (0.120)	0.128 (0.120)	-0.152 (0.122)	0.0248 (0.267)	-0.205 (0.298)
Area: Shikoku	0.0437 (0.0923)	0.227** (0.0935)	-0.0201 (0.142)	0.291** (0.127)	0.00426 (0.148)	0.253* (0.150)	0.116 (0.301)	-0.107 (0.336)
Area: Kyushu	0.0297 (0.0774)	-0.00854 (0.0784)	-0.0955 (0.123)	0.0621 (0.110)	0.151 (0.118)	-0.0608 (0.120)	0.0633 (0.250)	-0.477* (0.279)
Fixed asset ratio	0.000139 (0.000542)	-0.000529 (0.000550)	-0.000350 (0.000950)	-0.000318 (0.000846)	0.00116 (0.000899)	1.26e-05 (0.000914)	-0.000561 (0.00103)	-0.00239** (0.00115)
Determinant of insurance: area risk	0.219*** (0.0571)	-0.0201 (0.0578)	0.312*** (0.0966)	0.124 (0.0860)	0.265*** (0.0873)	-0.114 (0.0888)	-0.0882 (0.124)	-0.136 (0.139)
Determinant of insurance: business risk	0.135** (0.0534)	0.00719 (0.0541)	0.146 (0.0909)	0.116 (0.0809)	0.185** (0.0800)	-0.127 (0.0814)	-0.123 (0.117)	0.0211 (0.130)
Determinant of insurance: financial damage	0.135*** (0.0514)	-0.0651 (0.0521)	0.168* (0.0863)	0.0426 (0.0768)	0.132* (0.0784)	-0.188** (0.0797)	-0.0628 (0.111)	-0.0668 (0.124)
Respondent: accounting	0.0724 (0.0535)	-0.238*** (0.0542)	0.0736 (0.0837)	-0.0925 (0.0745)	0.0583 (0.0848)	-0.402*** (0.0862)	0.0360 (0.153)	-0.165 (0.171)
Respondent: risk management/ insurance	0.0255 (0.143)	0.209 (0.145)	0.304 (0.450)	-0.124 (0.401)	0.466 (0.431)	0.116 (0.438)	-0.0931 (0.149)	0.198 (0.166)
Respondent: Other	5.96e-05 (0.0271)	0.00968 (0.0275)	-0.00815 (0.0460)	-0.0112 (0.0409)	-0.0112 (0.0425)	-0.0170 (0.0432)	0.0347 (0.0528)	0.122** (0.0589)
First compensation: equity capital	0.166*** (0.0250)	0.0686*** (0.0254)	0.159*** (0.0453)	0.0767* (0.0403)	0.175*** (0.0392)	0.0455 (0.0399)	0.157*** (0.0452)	0.00752 (0.0505)

	All		Financial Statements Statistics of Corporations by Industry					
	All		Small		Medium		Large	
	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM	Disaster	BCP/BCM
Constant	0.156 (0.308)	0.297 (0.312)	0.438** (0.182)	-0.189 (0.162)	-0.00556 (0.314)	0.491 (0.319)	0.468 (0.291)	1.031*** (0.325)
Observations	1,456	1,456	537	537	578	578	341	341
R-squared	0.182	0.269	0.199	0.257	0.217	0.315	0.193	0.269

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6 Determinants of Disaster Awareness and Belief Formation (estimation method: sample selection probit)

The first stage dependent variable in the selection equation, “Identify,” is an indicator variable which takes 1 if the company identifies the disaster which is most likely to occur; and 0 otherwise.

The second stage dependent variable, “Probability,” is an indicator variable which takes 1 if the company estimate the probability of the most likely disaster; and 0 otherwise.

	Coef.	Robust Std. Err.
<u>Determinants of “Probability”</u>		
<u>in the second stage</u>		
Earthquake risk:		
middle	0.16115	(0.089846)*
high	0.312952	(0.107739)***
Experience of earthquake	0.124009	(0.093915)
Experience of typhoon	0.189179	(0.096163)**
Motto:		
with risk management	0.195091	(0.204665)
unknown	0.17373	(0.141513)
no motto	-0.14416	(0.139063)
fixed asset ratio	0.004393	(0.001611)***
constant	-1.25964	(0.298428)***
<u>Determinants of “Disaster”</u>		
<u>in the first stage</u>		
Earthquake risk:		

	Coef.	Robust Std. Err.
middle	0.171182	(0.125373)
high	0.252256	(0.104554)**
Experience of earthquake	0.21994	(0.061461)***
Experience of typhoon	0.222955	(0.076891)***
Motto:		
with risk management	0.653962	(0.076497)***
unknown	0.182219	(0.121269)
no motto	-0.09841	(0.076621)
fixed asset ratio	0.001768	(0.00139)
constant	-0.07415	(0.114859)
Correlation between the error terms in the first and second stages	0.649274	0.83106
Number of observation	1,648	

Table 7 Pecking Order of Risk Financing (estimation method: linear probability model)

The first dependent variable, “Order 1,” is an indicator variable which takes one if primary for compensation is insurance; and zero otherwise.

The second dependent variable, “Order 2,” is an indicator variable which takes one if primary financing tools for compensation is insurance and secondary is equity capital; and zero otherwise.

The third dependent variable, “Order 3,” is an indicator variable which takes one if primary and secondary financing tools for compensation are insurance and equity capital; and zero otherwise.

Block Independent variables	All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry		
	Order 1	Small Order 1	Medium Order 1	Large Order 1	Order 2	Small Order 2	Medium Order 2	Large Order 2	Order 3	Small Order 3	Medium Order 3	Large Order 3
Estimation of loss on assets	-0.138 (0.116)	-0.458** (0.194)	-0.0999 (0.218)	-0.194 (0.238)	-0.00863 (0.121)	0.434 (0.350)	-0.0255 (0.221)	-0.300 (0.259)	0.123 (0.131)	0.170 (0.391)	0.0293 (0.245)	0.00863 (0.273)
Estimation of loss on business	0.0525 (0.122)	0.476** (0.201)	-0.0305 (0.215)	-0.138 (0.198)	-0.0779 (0.125)	-0.590* (0.351)	-0.0496 (0.235)	0.0415 (0.220)	-0.125 (0.138)	-0.400 (0.394)	0.00309 (0.229)	0.0127 (0.276)
Missing dummy on assets	-0.735*** (0.107)	-0.865*** (0.311)	-0.0435 (0.150)	-0.947*** (0.273)	-0.248 (0.262)	0.00348 (0.328)	-0.0556 (0.145)	-0.655** (0.298)	-0.0670 (0.212)	0.105 (0.371)	-0.0930 (0.183)	-0.319 (0.320)
Missing dummy on business	0.731*** (0.109)	0.864** (0.345)		0.920*** (0.244)	0.240 (0.265)	-0.133 (0.395)		0.558** (0.275)	-0.00706 (0.217)	-0.314 (0.429)		0.155 (0.296)
Outside director	0.0236 (0.101)	0.00944 (0.216)	0.121 (0.168)	-0.0826 (0.247)	-0.0812 (0.111)	-0.124 (0.229)	-0.0540 (0.185)	-0.0556 (0.322)	-0.194* (0.116)	-0.271 (0.242)	-0.249 (0.188)	0.132 (0.337)
Identification of disaster	0.0786 (0.0885)	0.175 (0.172)	0.0221 (0.171)	-0.0667 (0.186)	0.0851 (0.0972)	0.261 (0.216)	0.0185 (0.167)	0.0331 (0.218)	0.106 (0.103)	0.350 (0.235)	-0.0852 (0.200)	0.0421 (0.237)
Risk management: with manager's commitment	0.0356 (0.0484)	-0.0938 (0.0827)	-0.0188 (0.0862)	0.368*** (0.0986)	0.00293 (0.0534)	-0.00741 (0.0923)	-0.0638 (0.0993)	0.305** (0.130)	0.0278 (0.0555)	0.0550 (0.0970)	-0.0652 (0.101)	0.258* (0.149)
Risk management:	0.0494	-0.0508	0.0683	0.0207	0.0448	-0.0338	0.0449	0.208	0.00264	-0.00748	-0.0813	0.179

Block Independent variables	All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry		
	Order 1	Small Order 1	Medium Order 1	Large Order 1	Order 2	Small Order 2	Medium Order 2	Large Order 2	Order 3	Small Order 3	Medium Order 3	Large Order 3
no manager's commitment	(0.0577)	(0.0931)	(0.0961)	(0.149)	(0.0670)	(0.100)	(0.114)	(0.231)	(0.0721)	(0.107)	(0.121)	(0.239)
Risk management: cross-sectoral	0.0212 (0.0433)	-0.158 (0.0957)	0.0255 (0.0665)	0.102 (0.0998)	0.00125 (0.0479)	-0.137 (0.112)	-0.0173 (0.0849)	0.119 (0.116)	-0.00857 (0.0502)	-0.103 (0.117)	-0.0678 (0.0889)	0.135 (0.114)
Risk manager: accounting	0.454*** (0.159)	0.356 (0.241)	0.432 (0.314)	0.804** (0.313)	0.337* (0.189)	0.156 (0.228)	0.383 (0.354)	0.547 (0.391)	0.269* (0.161)	-0.139 (0.206)	0.592*** (0.173)	0.731* (0.380)
BCP/BCM	-0.0261 (0.0219)	-0.0633 (0.0436)	-0.0401 (0.0371)	0.0177 (0.0470)	-0.0356 (0.0241)	-0.0370 (0.0461)	-0.0630 (0.0433)	-0.00528 (0.0595)	-0.0290 (0.0260)	0.0460 (0.0538)	-0.0395 (0.0465)	-0.0355 (0.0576)
Risk finance: cross-sectoral	0.0579 (0.0476)	0.242** (0.103)	0.0632 (0.0753)	-0.0643 (0.111)	0.0548 (0.0526)	0.175 (0.121)	0.0764 (0.0863)	-0.135 (0.130)	0.0257 (0.0556)	0.0999 (0.123)	0.113 (0.0933)	-0.240* (0.135)
Risk finance: accounting	-0.0590 (0.0533)	-0.0769 (0.119)	0.0626 (0.0942)	-0.208* (0.107)	-0.0168 (0.0615)	-0.00812 (0.146)	0.0561 (0.103)	-0.175 (0.130)	0.000916 (0.0639)	0.0931 (0.146)	0.0873 (0.111)	-0.222 (0.139)
Earthquake risk: middle	-0.146** (0.0708)	-0.229* (0.127)	-0.102 (0.116)	-0.104 (0.215)	-0.122 (0.0769)	-0.241* (0.140)	-0.0454 (0.129)	-0.0648 (0.222)	-0.150* (0.0816)	-0.214 (0.152)	-0.0589 (0.133)	-0.119 (0.217)
Earthquake risk: high	-0.0429 (0.0788)	-0.178 (0.139)	0.0485 (0.138)	-0.0487 (0.196)	-0.0518 (0.0857)	-0.181 (0.156)	0.0297 (0.149)	-0.225 (0.214)	-0.108 (0.0862)	-0.155 (0.163)	0.0272 (0.145)	-0.226 (0.201)
Experience: earthquake	-0.0196 (0.0413)	-0.0756 (0.0770)	-0.0423 (0.0697)	0.0885 (0.0840)	0.00216 (0.0446)	-0.0224 (0.0838)	-0.0823 (0.0763)	0.182* (0.102)	0.0282 (0.0465)	0.000512 (0.0870)	-0.0182 (0.0836)	0.210* (0.108)
Experience: typhoon	0.138*** (0.0440)	0.0605 (0.0762)	0.201*** (0.0765)	0.0193 (0.0908)	0.130*** (0.0467)	0.0636 (0.0802)	0.173** (0.0864)	0.0986 (0.0997)	0.178*** (0.0501)	0.203** (0.0897)	0.180* (0.0930)	0.0685 (0.108)
Experience: other disasters	0.0901* (0.0508)	0.199* (0.101)	0.0321 (0.0886)	0.115 (0.0994)	0.0838 (0.0548)	0.221** (0.106)	0.0581 (0.100)	0.0108 (0.115)	0.00383 (0.0565)	0.0997 (0.114)	-0.0411 (0.0976)	0.0731 (0.121)
Motto: with risk management	0.0448	0.122	0.0825	-0.0589	0.0621	0.130	0.112	-0.0857	0.0205	0.0670	0.0453	-0.133

Block	All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry		
	Order 1	Small Order 1	Medium Order 1	Large Order 1	Order 2	Small Order 2	Medium Order 2	Large Order 2	Order 3	Small Order 3	Medium Order 3	Large Order 3
Motto: unknown	(0.0480) -0.217**	(0.107) -0.0713	(0.0810) -0.209	(0.0858) -0.400*	(0.0514) -0.203**	(0.106) -0.240*	(0.0919) -0.0136	(0.106) -0.669**	(0.0535) -0.207**	(0.109) -0.137	(0.0967) -0.116	(0.112) -0.791***
Motto: no motto	(0.0878) -0.0902	(0.139) -0.186*	(0.154) 0.136	(0.238) -0.392***	(0.0947) -0.0781	(0.124) -0.167	(0.170) 0.0317	(0.301) -0.271*	(0.104) 0.0693	(0.158) 0.0584	(0.174) 0.181	(0.279) -0.185
CSR: with risk management	(0.0667) 0.0189	(0.0952) 0.00452	(0.135) 0.00344	(0.144) -0.00770	(0.0752) -0.0257	(0.112) -0.174*	(0.149) 0.0386	(0.158) -0.0129	(0.0910) -0.0317	(0.143) -0.203*	(0.172) 0.0644	(0.206) -0.00108
CSR: unknown	(0.0482) 0.229***	(0.0935) 0.0118	(0.0789) 0.157	(0.0980) 0.577***	(0.0505) 0.112	(0.0948) 0.00198	(0.0871) 0.0567	(0.117) 0.449**	(0.0546) 0.136	(0.107) -0.0402	(0.0938) 0.125	(0.124) 0.445**
CSR: no CSR	(0.0801) -0.0584	(0.144) -0.0979	(0.121) -0.116	(0.157) 0.0307	(0.0866) -0.0639	(0.142) -0.117	(0.124) -0.1000	(0.220) -0.0132	(0.0885) -0.0468	(0.150) -0.0514	(0.131) -0.0452	(0.194) -0.0530
Operating profit ratio	(0.0527) 3.22e-06	(0.0849) 0.00578	(0.0821) -0.00545	(0.147) -0.00272	(0.0584) 0.00506*	(0.0973) 0.00986**	(0.0989) -0.00453	(0.166) 0.00161	(0.0640) 0.00551*	(0.108) 0.0107**	(0.119) -0.00299	(0.164) 0.00246
Sector: construction	(0.00264) 0.116	(0.00422) 0.0540	(0.00507) -0.00735	(0.00431) 0.352	(0.00297) 0.312	(0.00419) 0.0946	(0.00585) -0.514*	(0.00632) 0.640**	(0.00307) 0.290	(0.00500) 0.164	(0.00621) -0.330	(0.00663) 0.346
Sector: infrastructure	(0.0762) 0.0233	(0.116) (0.209)	(0.126) 0.638**	(0.242) 0.164	(0.307) (0.291)	(0.119) (0.228)	(0.288) (0.228)	(0.318) (0.228)	(0.328) (0.228)	(0.151) (0.228)	(0.284) (0.228)	(0.332) (0.228)
Sector: manufacturing	(0.207***) (0.0785)	0.0544 (0.118)	0.0955 (0.138)	0.384** (0.186)	0.359 (0.301)	0.0487 (0.119)	-0.450 (0.276)	0.583* (0.297)	0.313 (0.322)	0.0693 (0.142)	-0.238 (0.278)	0.361 (0.310)
Sector: steel	(0.183**) (0.0826)				-0.0407 (0.313)			0.153 (0.351)	-0.152 (0.336)			-0.135 (0.375)
Sector: real estate	0.312***	0.171	0.164	0.575***	0.346	0.0906	-0.413	0.670*	0.193	0.0335	-0.380	0.366

Block Independent variables	All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry		
	Order 1	Small Order 1	Medium Order 1	Large Order 1	Order 2	Small Order 2	Medium Order 2	Large Order 2	Order 3	Small Order 3	Medium Order 3	Large Order 3
Sector: retailing	(0.106) 0.155**	(0.176) 0.0188	(0.177) 0.0336	(0.201) 0.397**	(0.311) 0.294	(0.177) 0.0454	(0.350) -0.549*	(0.340) 0.651**	(0.331) 0.210	(0.189) 0.00802	(0.354) -0.363	(0.350) 0.359
Sector: service	(0.0780) 0.180**	(0.108)	(0.133) 0.100	(0.184) 0.471**	(0.303) 0.359	(0.116)	(0.298) -0.406	(0.289) 0.743**	(0.323) 0.275	(0.146)	(0.301) -0.330	(0.304) 0.539
Sector: transportation	(0.0831) 0.254**	(0.107)	(0.131) 0.0562	(0.202) 0.728***	(0.309) 0.305	(0.314) 0.194	(0.323) -0.504	(0.330) 0.453	(0.330) 0.217	(0.317) 0.0768	(0.350) -0.356	(0.350) 0.503
Area: Tohoku	(0.111) -0.140	(0.157) -0.0254	(0.171) -0.0862	(0.249) -0.699***	(0.312) -0.166	(0.220) -0.138	(0.317) 0.0192	(0.441) -0.0366	(0.332) -0.114	(0.244) -0.0595	(0.320) 0.0380	(0.428) -0.153
Area: Kanto	(0.128) -0.176	(0.218) 0.213	(0.196) -0.327*	(0.243) -0.600**	(0.134) -0.145	(0.240) 0.0659	(0.200) -0.219	(0.229) 0.628**	(0.141) -0.133	(0.254) -0.0672	(0.210) -0.191	(0.226) 0.542*
Area: Chubu	(0.119) -0.107	(0.202) 0.0816	(0.187) -0.101	(0.270) -0.465*	(0.123) -0.0570	(0.228) 0.0318	(0.195) -0.0295	(0.311) 0.706**	(0.130) -0.0562	(0.233) -0.0895	(0.205) -0.00954	(0.314) 0.602*
Area: Kinki	(0.113) -0.214*	(0.185) 0.0123	(0.175) -0.339*	(0.265) -0.531**	(0.116) -0.199*	(0.217) -0.138	(0.178) -0.261	(0.299) 0.565**	(0.122) -0.158	(0.218) -0.172	(0.186) -0.188	(0.305) 0.502*
Area: Chugoku	(0.113) -0.266*	(0.176) -0.0898	(0.185) -0.240	(0.241) -0.790**	(0.118) -0.149	(0.201) -0.0372	(0.194) -0.106	(0.280) 0.336	(0.126) -0.227	(0.216) -0.147	(0.205) -0.0462	(0.288) 0.0977
Area: Shikoku	(0.138) -0.336**	(0.237) -0.0692	(0.226) -0.355	(0.328) -1.211***	(0.151) -0.284**	(0.279) -0.119	(0.249) -0.418*	(0.393) 0.319	(0.159) -0.207	(0.296) -0.316	(0.252) -0.0902	(0.405) 0.133
Area: Kyushu	(0.150) -0.102	(0.235) 0.128	(0.260) -0.187	(0.263) -0.440	(0.140) -0.0524	(0.257) 0.0433	(0.251) -0.124	(0.260) 0.659**	(0.165) -0.0674	(0.274) 0.0367	(0.292) -0.147	(0.268) 0.554*
Fixed asset ratio	(0.126) -0	(0.227) -1.42e-09	(0.200) -2.56e-09	(0.282) -7.10e-11	(0.135) 9.03e-11	(0.255) -3.62e-09	(0.225) -3.66e-09	(0.322) 1.89e-10*	(0.140) 0	(0.264) -2.86e-09	(0.233) 3.52e-09	(0.297) 8.53e-11

Block Independent variables	All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry		
	Order 1	Small Order 1	Medium Order 1	Large Order 1	Order 2	Small Order 2	Medium Order 2	Large Order 2	Order 3	Small Order 3	Medium Order 3	Large Order 3
	(0)	(1.01e-08)	(3.21e-09)	(5.94e-11)	(1.18e-10)	(1.02e-08)	(4.46e-09)	(1.13e-10)	(1.21e-10)	(1.24e-08)	(4.69e-09)	(1.29e-10)
Determinant of insurance: area risk	0.135 (0.0832)	0.172 (0.144)	0.296* (0.170)	0.0353 (0.193)	0.255** (0.110)	0.170 (0.284)	0.482*** (0.158)	0.411** (0.200)	0.184 (0.132)	-0.0177 (0.312)	0.431** (0.186)	0.285 (0.316)
Determinant of insurance: business risk	0.0575 (0.0775)	0.0538 (0.150)	0.148 (0.133)	0.105 (0.167)	0.149 (0.103)	-0.0790 (0.277)	0.412*** (0.128)	0.331* (0.171)	0.0785 (0.122)	-0.153 (0.290)	0.313* (0.165)	0.211 (0.280)
Determinant of insurance: financial damage	0.114 (0.0729)	0.109 (0.143)	0.148 (0.129)	0.181 (0.167)	0.200** (0.0985)	0.0352 (0.282)	0.359*** (0.113)	0.461*** (0.152)	0.140 (0.120)	-0.00909 (0.299)	0.315** (0.158)	0.309 (0.273)
Respondent: accounting	0.131* (0.0765)	0.247** (0.116)	0.0905 (0.136)	-0.0918 (0.208)	0.119 (0.0862)	0.299** (0.133)	0.00551 (0.155)	0.164 (0.262)	0.103 (0.0917)	0.193 (0.136)	0.0412 (0.177)	0.141 (0.249)
Respondent: risk management/ insurance	-0.0442 (0.132)	-0.240 (0.235)	0.659*** (0.228)	-0.137 (0.140)	-0.129 (0.162)	-0.0632 (0.271)	-0.417 (0.272)	-0.195 (0.219)	0.106 (0.208)	-0.233 (0.289)	-0.292 (0.277)	0.0969 (0.269)
Respondent: Other	-0.0264 (0.0571)	0.0558 (0.0867)	-0.138 (0.0954)	0.0834 (0.161)	-0.0129 (0.0579)	0.0431 (0.0950)	-0.124 (0.111)	0.0586 (0.187)	0.0190 (0.0625)	0.111 (0.0965)	-0.0772 (0.112)	0.0390 (0.187)
		-			-	-	-	-	-	-	-	-
		-	-	-		-	-			-	-	
		-				-				-		
			-								-	
Constant	0.145	0.182	0.344	0.217	-0.112	0.303	0.705*	-1.372**	0.154	0.335	0.704*	-0.682

	All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry			All	Financial Statements Statistics of Corporations by Industry		
Block Independent variables	All Order 1	Small Order 1	Medium Order 1	Large Order 1	All Order 2	Small Order 2	Medium Order 2	Large Order 2	All Order 3	Small Order 3	Medium Order 3	Large Order 3
	(0.164)	(0.315)	(0.248)	(0.397)	(0.362)	(0.427)	(0.374)	(0.537)	(0.388)	(0.442)	(0.389)	(0.624)
Observations	693	235	280	178	571	199	226	146	571	199	226	146
R-squared	0.136	0.261	0.179	0.347	0.125	0.266	0.181	0.332	0.114	0.247	0.176	0.338

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$