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On Property Liability Insurance Demand - Evidence from Small and Medium Enterprises

Yoshihiro Asai*

School of Commerce, Meiji University, Tokyo, Japan

Abstract

Insurance demand is widespread and common among small and medium enterprises (SMEs). While several empirical papers have attempted to clarify the insurance demand by listed firms, few articles have sought to analyze SME insurance demand due to data constraints. In this study, for the first time, we analyze SME insurance demand by utilizing a questionnaire survey. We find that the following factors are associated with SME insurance demand. First, SMEs with relatively weak relationships with their main banks tend to demand more insurance. Second, SMEs with tax incentives tend to demand more insurance. Third, SMEs with lower probabilities of bankruptcy tend to demand more insurance. The empirical evidence suggests that insurance demand plays an important role in SME financing.

* Yoshihiro Asai is an associate professor at Meiji University and a visiting scholar at California State University at Northridge.

1. Introduction

Corporate insurance demand remains a central issue in the insurance research field. Although household insurance demand is reasonably well explained by risk aversion, it has been argued that investors can hedge against insurable risks through diversified investment and that they therefore do not require corporate managers to purchase insurance. Thus, the corporate insurance demand mechanism has not been theoretically evident, although insurance purchasing by firms is widespread and common, regardless of firm size, industry and country.

In response to this gap, studies in the insurance field, such as Mayers and Smith (1982), Main (1983), Mayers and Smith (1987) and MacMinn (1987), have sought to theoretically explain why firms demand property liability insurance¹. These studies have improved our understanding of corporate insurance demand and have shown that insurance demand can increase firm value. These studies have found that the following factors are associated with firms' insurance demand.

First, corporate insurance demand is greater in the presence of strong tax incentives. A progressive tax schedule allows firms to raise their after-tax expected net cash flows by purchasing insurance. Thus, firms with tax-saving incentives tend to purchase more insurance to reduce the volatility of taxable income, which, in turn, reduces expected taxes and increases firm value.

Second, corporate insurance demand is associated with firms' bankruptcy probabilities. The purchase of insurance can help firms with higher probabilities of bankruptcy to avoid bankruptcy. However, particularly with small and medium enterprises (SMEs), firms with higher bankruptcy probabilities cannot afford to purchase insurance. Therefore, the impact of firms' bankruptcy probabilities on insurance demand can be positive or negative, which means that this is an empirical issue.

Third, corporate insurance demand is affected by ownership structure, which varies across firms. For example, ownership structure is dispersed in listed firms, and shareholders have a small portion at stake at such firms. Thus, shareholders may feel that there is little need for corporations to purchase insurance because they can eliminate insurable risks by holding diversified shares. However, in SMEs, the ownership structures are concentrated. In addition, some firms have parent companies, whereas other firms are independent. It is expected that ownership structure may have differential impacts on insurance demand.

Based on these theoretical studies, Yamori (1999) is the first attempt to provide empirical evidence on corporate insurance demand by using data on listed Japanese firms. Several empirical studies such as Hoyt and Khang (2000), Zou, Adams and Buckle (2003) and Regan and Hur (2007) follow Yamori (1999) to confirm the factors that are associated with insurance demand.

However, all of these prior studies focus only on *listed* corporations' demand for property insurance. That is, little empirical research addresses insurance demand among SMEs². Although the definition of SMEs

¹ Han and MacMinn (2006) and Hau (2006) also attempt to theoretically explain insurance demand for listed firms.

² Previous research provides evidence on insurance demand by using data on listed firms in various countries. Some recent studies provide evidence for the relationship between corporate governance and insurance

does not match perfectly across countries, SMEs account for a substantial fraction of economic activity in terms of number of firms and Gross Domestic Product (GDP) in every country in the world³. Thus, a significant part of corporate insurance demand has not been analyzed in previous studies because these studies do not focus on SME insurance demand. This focus may be simply because SMEs' financial statements are not disclosed, unlike the financial statements of listed firms, which makes it difficult for researchers to examine SME insurance demand.

Therefore, the purpose of this article is to help fill this gap by providing empirical evidence on SME insurance demand *for the first time*. To achieve this aim, we depart from conventional approaches and directly analyze SME insurance demand. We use data from a survey that was sent to managers of SMEs across Japan. The survey combines a questionnaire with financial statements and enables us to obtain information on how and why insurance is purchased by SMEs. The survey method has been popular in recent corporate finance research (e.g., Graham and Harvey (2001)) and is particularly effective in analyzing SME financing (e.g., Ono and Uesugi (2009) and Uchida, Udell and Yamori (2012)) because the information that is disclosed by SMEs is more limited than the information that is disclosed by listed firms. The survey, which was conducted in Japan in January and February 2014, allows us to analyze data that were not available in previous studies.

In general, SMEs face stronger financial constraints than listed firms because they cannot raise funds by issuing stocks and bonds. As a result, bank borrowing is the main source of funding for SMEs. In fact, numerous studies examine the relationship between SMEs and banks and find that stronger banking relationships alleviate the financial constraints of SMEs. Accordingly, if SMEs cannot build strong relationships with banks, they will be financially constrained. In this situation, corporate insurance can be an important financial resource for SMEs that face financial constraints. That is, it is expected that SMEs with stronger financial constraints tend to demand more insurance⁴.

Thus, this article seeks to contribute to the existing literature on both relationship banking and insurance demand among SMEs by using a unique firm-level dataset of SMEs in Japan. In short, the unique contribution of this paper is that we can analyze the underlying mechanisms that drive insurance demand by considering various factors such as relationship banking, tax incentives, firm risk and ownership structure and show the role of insurance demand in SME financing.

To examine SME insurance demand, we utilize data that were obtained from SMEs in the Japanese

demand, whereas other studies focus on deductibles and limits (Aunon-Nerin and Ehling (2008), Zou (2010), Adams, Chen and Zou (2011) and Jia, Adams and Buckle (2011)). Thus, previous research does not provide empirical evidence regarding SME insurance demand.

³ For example, according to the Survey of Small Business Finances, firms with fewer than 500 employees are defined as SMEs in the U.S. In the manufacturing industry in Japan, firms with 300 or fewer employees are defined as SMEs. According to the Economic Census Survey in 2014, SMEs account for 99.7% and 70.1% of firms and employees, respectively, in Japan.

⁴ Property liability insurance premiums are based on risk with respect to disasters, not credit risk. Because of this characteristic of insurance, insurance can be an important financial source for SMEs that face financial constraints.

manufacturing industry. Japan is a desirable market to investigate SME insurance demand for the following reasons⁵. First, Japan is the one of the largest insurance markets worldwide. According to Sigma No.3/2017, Japan was the second largest insurance market in terms of total premium volume in US dollars in 2016. Thus, this article provides empirical evidence on one of the largest insurance markets in the world. Although Japan is one of the largest insurance markets, research on it is limited. In addition, prior research has mainly focused on the supply side of insurance, such as Yamori and Kobayashi (2002), Lai and Limpaphayom (2003), Jeng and Lai (2005), Pope and Ma (2005) and Takao, Yoshizawa, Hsu and Yamasaki (2013). Thus, this article seeks to provide evidence on the Japanese insurance market from the demand side. Second, Japan is generally considered to have a bank-based financial system (Rajan and Zingales (2003)). Thus, this study helps to improve our understanding of the roles of relationship banking and insurance demand in SME financing. Third, Yamori (1999) provides empirical results on insurance demand by using data from *listed* Japanese firms, and we will be able to better understand the characteristics of SME insurance demand by comparing our results to the results for listed firms. Additionally, because we focus on the manufacturing industry in Japan, we do not need to control for industry-specific factors. It is easy to imagine how property liability insurance is used in the manufacturing industry.

This article is structured as follows. Section 2 develops our empirical hypotheses, which are based on previous theoretical models and empirical research. Section 3 describes the data and variables that are used in this paper and explains our empirical model. Section 4 presents the results of our empirical analysis, and section 5 concludes.

2. Empirical Hypotheses

Previous theoretical studies have proposed factors that can be associated with firms' insurance demand, and prior empirical research has tested them by using data on *listed* firms in various countries. In this article, by using SME data, we will empirically test one new hypothesis regarding SMEs' financial constraints and two hypotheses that have already been introduced in previous studies.

2.1 Financial Constraints

It is well known that SMEs face stronger financial constraints than listed firms because they cannot issue stocks and bonds to raise funds. Previous research notes the possibility that close relationships reduce the financing problems that arise from asymmetric information between banks and firms. Empirical studies, such as Petersen and Rajan (1994) and Blackwell and Winters (1997), show that close relationships lead to lower interest rates and a greater availability of funds. In these studies, relationships between banks and SMEs are proxied by the number of banks that SMEs partner with. If SMEs cannot borrow sufficient funds from their main bank, they will borrow from other banks. Thus, SME borrowing from many banks suggests

⁵ For the Japanese insurance market, see Yamori (1999), Yamori and Kobayashi (2002) and Yamori and Okada (2009).

stronger financial constraints.

Therefore, SMEs that borrow from more banks tend to demand more insurance to prepare for property liability losses because they know that they will not be able to easily borrow funds from banks when they face large losses or disasters. Thus, our first hypothesis is as follows.

Hypothesis 1 (H1). Demand for insurance is higher among SMEs that face greater financial constraints. In particular, SMEs that borrow from many banks tend to demand more insurance.

2.2 Tax Incentives

Main (1983) shows that one strong motivation to purchase insurance relates to tax laws. This motivation originates from the fact that insurance premium payments are deductible from taxable profits. In addition, paying insurance premiums and obtaining claims works to stabilize diachronic earnings by reducing the volatility of taxable income. According to Graham and Smith (1999), the average tax savings from a five percent reduction in the volatility of taxable income is approximately 5.4 percent of expected tax liabilities.

Prior articles that analyze insurance demand by listed firms use the amount of taxes that were paid as a proxy for tax consideration. Fortunately, our survey method enables us to directly ask the respondent firms for the purpose of their insurance purchases and to utilize this information in our analysis. Therefore, we propose our second empirical hypothesis.

Hypothesis 2 (H2). Demand for insurance rises if firms purchase insurance for tax-saving purposes. Thus, we expect a positive relationship between tax incentives and insurance demand.

2.3 Bankruptcy Probability

Previous research has sought to determine whether bankruptcy probability is associated with insurance demand. SME financial statements from Teikoku Data Bank enable us to access firms' credit scores, which are indicative of bankruptcy probability. For example, lower credit scores imply that SMEs are more likely to go bankrupt. Therefore, firms' credit scores enable us to analyze the effects of bankruptcy probability on insurance demand⁶.

A firm's bankruptcy probability is likely to be positively associated with insurance demand. More specifically, SMEs with high bankruptcy probabilities tend to demand more insurance. To avoid bankruptcy, such firms are expected to demand more insurance. However, SMEs with high bankruptcy probabilities cannot afford to purchase sufficient insurance. It is possible that SMEs with high bankruptcy probabilities tend not to demand insurance because they lose less if they go bankrupt. Conversely, SMEs with low

⁶ Leverage is not a good indicator of bankruptcy probability among SMEs because they borrow funds from banks by using personal guarantees. Therefore, highly leveraged firms do not necessarily face higher bankruptcy risks. On the contrary, credit scores include this information.

bankruptcy probabilities may lose more if they go bankrupt; thus, they may demand more insurance. From this perspective, it is expected that higher credit scores may be associated with higher insurance demand.

Taken together, a firm's financial condition can work in both directions, and empirical tests are needed to resolve the issue. Because the demand for insurance by SMEs cannot be as sophisticated as the insurance demand of listed firms and may more closely resemble household insurance demand, we expect that among SMEs, firms that are in better financial condition tend to buy more insurance. Therefore, we propose our third empirical hypothesis.

Hypothesis 3 (H3). Demand for insurance is greater among SMEs in good financial condition. Thus, we expect a positive relationship between credit scores and insurance demand.

3. Data

This study utilizes *The Management Survey of Corporate Insurance Issues* in Japan, which was conducted in January and February 2014. The survey asked SMEs about firm characteristics, insurance purchases, bank relationships, and the Great East Japan Earthquake. The survey distribution, data collection, and data aggregation were outsourced to Teikoku Data Bank (TDB), a business credit bureau that is similar to Dun and Bradstreet in the U.S.

Questionnaires were mailed to 3,500 manufacturing firms, which were chosen from TDB's database, across Japan. A total of 6,535 manufacturing firms matched our criteria, and we randomly chose firms considering the population size of the prefectural product and the number of enterprises. We chose manufacturing firms to control for industry effects. Additionally, we can easily observe risk management in manufacturing firms, particularly in relation to property liability insurance.

Smaller firms often use dwelling houses as factories and purchase household insurance, such as earthquake insurance. As a result, a sample with too many small firms may blur the boundaries between firms and households. Therefore, this survey also includes firms with 21 to 300 employees. By focusing on companies of a certain size and unlisted stock firms, we can examine the role of insurance in SME financing. TDB received 909 responses (by postal mail), which yielded a response rate of 26.0%. Of these 909 firms, 767 firms indicated their property liability insurance premiums⁷. We obtained SMEs' financial statements from TDB. In this article, we utilize the financial statements that pertain to one period before the questionnaire in January and February 2014. That is, we use the financial statements that were reported in 2013⁸.

Our dataset has three main advantages. First, the survey asked for the amount of property liability

⁷ Of 909 firms, 870 answered the question "Who answered the survey?" The answers are president (29.1%), head of the financial unit (27.2%) and head of general affairs (34.8%). Thus, the top managers answered the survey at more than 90% of the SMEs, which makes the survey highly reliable.

⁸ We use data from the financial statements in 2012 for 32 of the 909 firms because they did not report financial statements in 2013.

insurance that was purchased, which enables us to analyze the insurance demand activities in SME financing. Information on property liability insurance is not usually disclosed. If it is disclosed to credit research firms such as TDB, it often includes both the amount of life insurance premiums and the amount of property liability premiums. The survey method, however, enables us to access only information on property liability premiums. Second, the survey method allows us to investigate in depth why and how SMEs purchase insurance. Third, by matching the survey results with the financial statements that were obtained from TDB, we can control for SME characteristics in examining the determinants of insurance demand.

Although our dataset contains the most detailed data that are available on insurance demand in Japan, caveats must be mentioned. As is often the case with surveys, our survey data relate only to surviving firms. Additionally, although we effectively clarify the boundary between firms and households by focusing on relatively large SMEs, we are unable to focus on the insurance demand among smaller firms such as firms with 20 or fewer employees.

4. Variables

A list of the variables that are used in our empirical analysis and their definitions are provided in Table 1, and Table 2 presents the summary statistics of these variables.

4.1 Dependent Variable

In this article, the dependent variable is SME insurance demand, where insurance demand is defined as property liability insurance premiums divided by insurable assets. Insurable assets are defined as tangible assets minus land value, following prior research on insurance demand such as Hoyt and Kang (2000), Zou, Adams and Buckle (2003) and Regan and Hur (2007)⁹.

4.2 Independent Variables

4.2.1 Key Variables

Bank Relationship

To test Hypothesis 1, bank relationships are proxied by the number of banks that SMEs transact with, which is a common metric of relationships between banks and firms. According to the relationship banking literature (Petersen and Rajan (1994) and Blackwell and Winters (1997)), when the number of banks that a firm borrows from is greater, its relationship with each bank is weaker.

We use the number of banks to measure the relationship between SMEs and banks. Bank relationships are measured by the number of banks that a firm transacts with. The financial data from TDB enable us to access information on the number of banks that a firm transacts with. Firms that lack a strong relationship

⁹ Yamori (1999) defines the amount of insurance premiums as insurance demand.

with their main bank are unable to borrow sufficient funds and tend to transact with more banks. Thus, the number of banks (*Banks*) is one of the most common variables that is used to measure the relationships between firms and banks. That is, we expect that when an SME borrows from more banks, the SME's demand for insurance will be greater to prepare for financial constraints.

Tax Incentive

To test Hypothesis 2, we use *Tax Incentive* to measure the incentive to purchase insurance for tax-saving reasons. The survey asked SMEs "Why does your firm purchase property liability insurance?" The answers consisted of the following choices: 1. To mitigate the impacts on profits; 2. To secure funds for the restoration of losses; 3. To secure funds for working capital; 4. To obtain the knowledge that is necessary to respond to accidents; 5. It is required by a bank or business partner; 6. Accountability to shareholders; 7. Accountability within the firm; 8. Tax savings; 9. Social responsibility; 10. Experience from past disasters; and 11. Other. Multiple answers were allowed. If the firm answered "We purchase property liability insurance for tax savings", then the independent variable takes a value of 1; otherwise, it is 0. Main (1983) notes that taxes are a strong motivation to purchase insurance because insurance premium payments are deductible from taxable profits. Therefore, if firms purchase property liability insurance for tax savings, we expect that insurance demand will be greater.

The Japanese corporate tax rate is unrelated to the amount of profit, and the interest on bonds, losses, and almost all property liability insurance premiums is deductible, which reduces the corporate income that is taxable. Until recently, the corporate tax rate was approximately 40 percent in Japan. In fact, Asai (2017) indicates that 12.2% of SMEs purchase property liability insurance and that 38.2% purchase life insurance for tax-saving purposes. Thus, tax incentives can be a key variable in explaining insurance demand.

Firms' Riskiness

To test Hypothesis 3, we use *Credit Score* to measure a firm's riskiness. Mayers and Smith (1990) maintain that purchasing insurance can reduce the transaction costs of bankruptcy by shifting the risk to insurance companies. That is, riskier firms tend to purchase insurance because they are relatively prone to bankruptcy; thus, they purchase insurance to avoid bankruptcy. However, risky firms, particularly SMEs, may not have the capacity to purchase sufficient insurance. In addition, SMEs in poor financial condition may not have anything to lose, while SMEs in good financial condition may have a lot to lose, such as reputation, if they go bankrupt. In this way, SMEs in poor financial condition are expected to demand less insurance, whereas SMEs in good financial condition are expected to demand more insurance. Because the impacts of SME financial condition on property liability insurance can be positive or negative, these effects must be empirically analyzed.

Previous empirical studies have used variables such as leverage to measure firm riskiness. In fact, previous empirical studies have obtained varied empirical results. For instance, Yamori (1999) shows that

firm riskiness is not significantly associated with insurance demand, while Hoyt and Kang (2000) and Zou and Adams (2003) find that firm riskiness is positively associated with insurance demand.

For listed firms, leverage can be one option in a firm's financial strategy, and such firms can choose appropriate levels of leverage. For example, firms that focus on increasing Return on Equity (ROE) attempt to reduce equity as much as possible. If these firms purchase more insurance instead of using sufficient equity as a buffer, even high-leverage firms may be evaluated as low-risk firms. Thus, leverage is not a good indicator of firm riskiness.

Fortunately, we can access accurate data on firms' financial conditions in the form of credit scores that are published by TDB in their financial reports. The credit scores from TDB enable us to accurately measure SME riskiness because they include both hard information, such as financial statements, and soft information. In fact, Ono and Uesugi (2009), Uchida, Udell and Yamori (2012) and many other researches use credit scores to measure firm riskiness, and we follow the previous research on SME financing in this regard.

In addition, some SMEs in Japan borrow large amounts of money by using personal guarantees. As a result, SMEs may become capital deficient on financial statements. Therefore, it is difficult to use leverage as a proxy for firm riskiness among the SMEs in Japan.

2.2 Other Variables

In addition to the key variables that are mentioned above, we follow previous research in controlling for the SME characteristics with which property liability insurance demand may be associated.

Size

Prior studies identify two possible firm size effects on the corporate demand for insurance. For example, Mayers and Smith (1990) maintain that because direct bankruptcy costs are not proportional to size, smaller firms suffer much more than larger firms in cases of bankruptcy. Considering bankruptcy costs, it is expected that smaller firms tend to demand more insurance than larger firms.

However, O'Sullivan (1997) shows that large firms tend to purchase directors and officers insurance. That is, a large firm tends to have a complex structure that prevents shareholders from adequately monitoring the management of the firm. Thus, shareholders expect that insurers examine the firm and require the firm to purchase insurance. In terms of agency costs, it is expected that larger firms tend to demand more insurance. Therefore, the size effect can work both ways, and empirical tests are needed. In this article, we use the natural logarithm of assets to measure the effects of size on SME insurance demand.

Growth

Previous research, such as Hoyt and Khang (2001) and Zou and Adams (2006), examines the effects of growth expectations on insurance demand. If firms with high growth expectations encounter accidents or

disasters and face a shortage of funds, they must forgo promising investment opportunities. The costs of forgoing investment opportunities are greater for firms with higher growth prospects. That is, a higher insurance demand can reduce the incidents of cash flow shortfall that follow accident or disaster losses. Thus, we expect that firms with high growth opportunities are more likely to demand insurance than firms with low growth opportunities.

In our study, we can directly access the information on SMEs' estimations of their growth prospects by using the survey that is mentioned above. The survey asked SMEs about future management prospects. The answers consisted of the following choices: 1. We expect substantial growth; 2. We expect some growth; 3. We expect the status quo to be maintained; 4. We expect shrinkage; and 5. We do not know. In our article, we introduce a variable that takes a value of one if an SME chooses either 1 ("We expect substantial growth") or 2 ("We expect some growth"). We expect that firms with high growth opportunities are more likely to demand insurance.

Disasters

Japan has been damaged by large-scale earthquakes, for instance, the Great Hanshin-Awaji Earthquake in 1995 and the Great Hanshin-Awaji Earthquake in 2011, which were estimated by the Cabinet Office to have resulted in approximately \$100 and \$170 billion dollars in damage and 6,400 and 16,000 deaths, respectively. More recently, the losses that resulted from the Kumamoto earthquake in April 2016 have been estimated at \$37 billion dollars and 247 people killed. Additionally, according to the Japan Meteorological Agency, Japan was affected by 5.5 typhoons on average per year from 1980 to 2010. Because Japan is subject to frequent natural disasters, it is necessary to introduce a new variable to control for the effects of disasters when utilizing Japanese data.

Property liability insurance demand may be positively associated with natural disasters. Although firms are expected to purchase some insurance regardless of past disaster experiences, decisions by SMEs to purchase insurance may be behaviorally affected by past disasters. The behavioral economics research on insurance, such as Browne and Hoyt (2000), shows that insurance demand at the household level is affected by past experience. Main (1983) notes the possibility that the insurance demand structure of SMEs is similar to the insurance demand structure of households rather than listed firms. Thus, past disaster experience may be associated with property liability insurance demand among SMEs.

Additionally, it is often difficult for SMEs to move to different locations even if they experience serious disasters because they have business partners in a given area. In such cases, it is expected that SMEs that experienced serious natural disasters in the past will not move but will instead rationally cover future losses from disasters by purchasing more property liability insurance. Thus, we examine the impact of past disaster experience on SME insurance demand. We expect that firms with past disaster experience tend to demand more insurance.

As discussed above, we can access information (through the survey question, "Why does your firm

purchase property liability insurance?") on why SMEs purchase property liability insurance, including past disaster experience. Thus, we introduce a variable that takes a value of 1 if SMEs purchase property liability insurance based on past disaster experience. We expect that past disaster experience is positively associated with property liability insurance demand.

Requests from Banks

Doherty (2000) illustrates how insurance can alleviate problems between banks and stockholders. Previous research suggests that banks request SMEs with riskier project options to purchase property liability insurance to reduce risks. Previous studies have utilized financial statements, which do not provide access to soft information such as insurance purchase requests from banks. In this paper, we depart from conventional approaches, which enables us to examine the effects of the requests by banks on SME insurance demand.

As mentioned above, the survey asked firms why they purchased property liability insurance. We introduce a new variable that takes a value of 1 if a bank requested an SME to purchase property liability insurance when it borrowed funds. We introduce this new variable and attempt to control for the cases in which banks require the purchase of insurance by fully utilizing the features of the survey method. We expect that those firms that were requested by banks to purchase insurance tend to demand more property liability insurance.

Table 1 Definition of Variables

Variable	Definition
Dependent Variable	
<i>Insurance Demand</i>	Insurance premium divided by firm's insurable assets
<i>Log Insurance Demand</i>	Natural logarithm of insurance premium divided by firm's insurable assets
Independent Variables	
Bank Relationship	
<i>Banks</i>	Number of banks the borrower firm has transactions with
Tax Incentive	
<i>Tax</i>	1 if the firm answers that it purchases property liability insurance for tax savings, 0 otherwise
Firm's riskiness	
<i>Credit Score</i>	TDB credit score (0-100)
Firm Characteristics	
<i>Log Assets</i>	Natural logarithm of assets
<i>Growth</i>	1 if the firm answers that it will grow (substantially or somewhat), 0 otherwise
<i>Disaster</i>	1 if the firm answers that it has experienced losses from natural disasters, 0 otherwise
<i>Requests from Bank</i>	1 if banks requested SMEs to purchase property liability insurance when they borrowed funds, 0 otherwise

4.3 Empirical Models

To test Hypotheses 1, 2, and 3, we estimate the following equation:

$$\text{Insurance Demand} = f(\text{Bank Relationship}, \text{Tax Incentive}, \text{Credit Score}, \text{Log Assets}, \text{Growth}, \text{Disaster}, \text{Request from banks})$$

To investigate the link between SME insurance demand and bank relationships, we run a simple ordinary least squares (OLS) regression, following Yamori (1999) and Hoyt and Khang (2000). *Insurance Demand* is defined as the value of property liability insurance premiums that are paid divided by insurable assets. However, as Table 2 indicates, *Insurance Demand* is skewed. Therefore, we also use the natural logarithm of insurance demand as *Log Insurance Demand*. The numeric values of the natural logarithm of insurance demand range from negative to positive values. However, the sample distortion problem is mitigated by using the natural logarithm of insurance demand. The results of the regression that uses both *Insurance Demand* and *Log Insurance Demand* are provided in Tables 3, 5 and 6. In this paper, a hypothesis is accepted when we find significance in both regressions.

Banks is defined as the number of banks that SMEs transact with. *Tax Incentive* is a variable that indicates whether SMEs purchased property liability insurance for tax-saving purposes. *Credit Score* is a firm's credit evaluation as published by TDB in its financial reports. *Log Assets* is the natural logarithm of assets that is used to measure a firm's size. *Growth* is a measure of an SME's growth expectation. *Disaster* takes a value of 1 if an SME experienced natural disasters in the past. Finally, *Requests from Bank* takes a value of 1 if a bank requested that an SME purchase property liability insurance when it borrowed funds.

Table 2 Descriptive Statistics

	Number in Sample	Average	Median	Max	Min
Dependent Variables					
<i>Insurance Demand</i>	767	5.166	1.961	411.562	0
<i>Log Insurance Demand</i>	756	2.087	1.998	8.095	-8.995
Independent Variables					
<i>Banks</i>	905	4.945	5	10	1
<i>Tax Incentive</i>	905	0.122	0	1	0
<i>Credit Score</i>	904	54.208	54	72	29

<i>Log Assets</i>	904	6.145	6.134	7.270	4.834
<i>Growth</i>	896	0.502	1	1	0
<i>Disaster</i>	898	0.062	0.000	1.000	0.000
<i>Requests from Bank</i>	898	0.118	0	1	0

5. Empirical Results

5.1 Full Sample

Table 3 reports the OLS estimation and shows the determinants of SME insurance demand¹⁰. As Table 2 indicates, the dependent variable, *Insurance Demand*, is skewed. Therefore, we also use *Log Insurance Demand* (Model 1) by employing the natural logarithm of *Insurance Demand* (Model 2) to provide empirical evidence that the skewness does not disturb the results. The results are presented in Tables 3, 5 and 6. In this paper, if the coefficients of the independent variables are significantly associated with insurance demand in both Models 1 and 2, then we interpret the results to suggest that the independent variables are significantly associated with insurance demand.

The results in Table 3 are based on the full sample. Note that Table 3 shows that the coefficient for *Banks* is positive and significant in both Models 1 and 2. Thus, Hypothesis 1 that SMEs that borrow from many banks tend to demand more insurance is accepted. That is, our empirical results indicate that the SMEs that do not have strong relationships with banks tend to demand more property liability insurance. As noted above, firms that do not have strong relationships with banks are considered to be financially constrained because they may be unable to borrow sufficient funds in case of accident or disaster. Our empirical results suggest that the firms that have weaker relationships with banks tend to demand sufficient property liability insurance to cope with the problems that are associated with financial constraints¹¹.

Table 3 also shows that the coefficient for *Tax Incentive* is positive and significant in both Models 1 and 2. Hypothesis 2 that states that demand for insurance is higher among firms that purchase insurance for tax-saving purposes is accepted. That is, firms that have tax-saving incentives tend to demand more property liability insurance.

Table 3 Factors Affecting Insurance Demand

¹⁰ The multicollinearity problem among the independent variables is not serious.

¹¹ A distance from a bank to a main bank branch is also often used as the measure of bank relationship. If we use it, the results does not change.

Variables	Coefficient	Standard	t-value		Coefficient	Standard	t-value	
	<i>Insurance Demand</i>				<i>Log Insurance Demand</i>			
Constant	64.399	11.249	5.725	***	5.203	0.331	15.739	***
Banks	0.523	0.297	1.760	*	0.028	0.009	3.246	***
Tax	4.468	2.100	2.128	**	0.221	0.062	3.597	***
Credit Score	0.355	0.102	3.464	***	0.018	0.003	6.152	***
Log Assets	-13.411	1.661	-8.072	***	-0.980	0.049	-20.087	***
Growth	1.494	1.319	1.133		-0.003	0.039	-0.086	
Disaster	2.121	1.522	1.394		-0.029	0.045	-0.640	
Requests from Bank	4.186	2.069	2.024	**	0.008	0.061	0.131	
Number of Sample	766				757			
Adjusted R^2	0.099				0.366			

***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Previous research that uses the amount of tax paid as a proxy for tax incentives has not found that tax incentives are significantly associated with property liability insurance demand. This finding is presumably because firms that face higher taxes and have tax-saving incentives already take measures to save taxes to reduce the amount of taxes paid. As a result, previous research does not find a significant relationship between tax incentives and insurance demand. In this study, we utilize the results of the questionnaire, as it directly asks why SMEs purchase insurance. In addition, SMEs have stronger tax-saving incentives because their managers tend to have a larger stake in their firms than the managers of listed firms. In this study, we find that tax incentives are positively and significantly associated with insurance demand.

Table 3 shows that the coefficient for *Credit Score* is positive and significant in Models 1 and 2. Hypothesis 3 that states that demand for insurance is greater among SMEs that are in better financial condition is accepted. Although previous studies suggest that the impact of firms' financial condition on property liability insurance demand could be positive or negative among SMEs, our empirical results indicate that SMEs in better financial condition tend to demand more property liability insurance. This result can be interpreted to suggest that SMEs with lower bankruptcy probabilities have much to lose if bankruptcy occurs; therefore, they demand more insurance to avoid it. As Main (1982) indicates, the insurance demand among SMEs may be similar to household insurance demand because the SMEs that have something to lose tend to demand more insurance.

Turning to the other control variables, we find that *Log Assets* is negatively and significantly associated with insurance demand, which implies that larger firms demand relatively less insurance than smaller firms. This result can be interpreted as consistent with the bankruptcy cost hypothesis and inconsistent with the agency cost hypothesis. That is, bankruptcy cost is an important factor in insurance demand, and insurance demand is greater among smaller firms.

Previous studies have proposed that firms' growth expectations are positively associated with insurance

demand because cash flow shortfalls that follow accidents or disasters will particularly damage firms with growth prospects. However, Table 3, which contains the results of the full sample, indicates that *Growth* is not significantly related to SME insurance demand.

In this paper, we utilize data for SMEs in the Japanese manufacturing industry. Thus, insurance demand may be affected by past disaster experience because Japan has suffered from incessant natural disasters. Therefore, we attempt to control for the effect of past disaster experience on property liability insurance demand. However, the results in Table 3 indicate that *Disaster* is not significantly associated with property liability insurance demand.

Doherty (2000) and other researches note that insurance could alleviate the problems that arise from asymmetric information between banks and shareholders. Thus, it is expected that SMEs that face agency problems and that are requested to purchase insurance tend to demand more insurance to show that they will not undertake riskier projects. Table 3 shows that the variable *Requests from Bank* is significantly and positively related to property liability insurance demand in Model 1 but is not significant in Model 2. Therefore, the results in Table 3 indicate that *Requests from Bank* is not significantly and positively related to insurance demand.

5.2 Ownership Structure and Insurance Demand

5.2.1 Insurance Demand by Owner Firms and Other Firms

Main (1982) notes that ownership structure can also affect corporate insurance demand. The separation of ownership and management is widespread and common among listed firms. That is, the ownership structure of listed firms is characterized by the separation between ownership and management. Previous empirical studies on insurance demand, such as Yamori (1999), Hoyt and Khang (2000), Zou, Adams and Buckle (2003) and Regan and Hur (2007), attempt to measure the impact of a concentrated ownership structure on insurance demand by using data from listed firms.

By contrast, the most distinctive characteristic of the SME ownership structure is a lack of separation between ownership and management. Thus, often the largest shareholder in an SME is also the president or chairman of the firm. The fact that the largest shareholder is the president or chairman of the firm can affect SME insurance demand and so that it differs from the insurance demand of SMEs where the largest shareholder is not the president or chairman of the firm.

In this section, we examine the impacts of ownership structure on insurance demand among SMEs. Thus, we divide the sample into *Owner Firms* and *Other Firms* to provide evidence regarding distinctive aspects of SME insurance demand. We define the SMEs in which a president or chairman is the largest shareholder and is unaffiliated with a firm group as *Owner Firms*. That is, these firms are not characterized by a separation between ownership and management. We define the remaining firms as *Other Firms*. These are firms in which a president or chairman is not the largest shareholder and/or where the firm is affiliated with

a firm group, which implies a separation between ownership and management.

Table 4 Independent *t*-test on Insurance Demand

	Sample	Average	Difference	t-value
Owner Firms	317	5.410	-1.184	-0.850
Other Firms	450	6.593		

To analyze property liability insurance demand among owner firms (317 firms; 41.3%) and other firms (450 firms; 58.7%), we obtained information on the names of the top five largest shareholders and the names of the president and chairman of the SMEs by using financial statements. Thus, we can identify the SMEs in which a president or chairman is also the largest shareholder. Owner firms are expected to have stronger incentives to purchase insurance because they have larger stakes in their firms.

Table 4 presents the results of an independent *t*-test of insurance demand among owner firms and other firms, where insurance demand is defined as the value of insurance premiums divided by insurable assets. We assumed that insurance demand is greater among owner firms than among other firms because of a lack of separation between ownership and management at owner firms. Therefore, owner firms were expected to purchase more property liability insurance. However, Table 4 indicates that the insurance demand among owner firms is 5.410, while the insurance demand among other firms is 6.953. Contrary to our intuition, owner firms demand less insurance than other firms, although the difference of -1.183 is not statistically significant. Although we expected that owner firms would tend to demand more insurance, the results can be interpreted to suggest that managers at owner firms are more risk neutral. Given that managers such as presidents and chairmen at owner firms are often the founders of the firms, it is natural that they would be less risk averse.

5.2.2 Determinants of Insurance Demand by Owner Firms and Other Firms

Next, we turn to the determinants of the insurance demand of owner firms and other firms. Table 5 focuses on owner firms¹². As we discuss in detail below, the results presented in Tables 5 and 6 on *Banks* and *Tax Incentive* contrast on some points.

Table 5 presents the estimation results for the insurance demand among owner firms. *Bank* is found to be significantly associated with insurance demand, a result that is consistent with the full sample analysis in Table 3 and that is interpreted to suggest that owner firms with weaker relationships with their main banks tend to buy more insurance. Because owner firms do not have parent firms from which they can borrow, they must prepare for accidents and natural disasters through ample property liability insurance if they do not have strong relationships with banks.

¹² The numbers of *Owner Firms* and *Other Firms* in Tables 3, 5, and 6 do not match because the firms that did not answer the questions in the questionnaire cannot be used in the analysis.

Table 5 Factors Affecting Insurance Demand (Owner Firms)

Variables	Coefficient	Standard	t-value		Coefficient	Standard	t-value	
	<i>Insurance Demand</i>				<i>Log Insurance Demand</i>			
Constant	45.595	9.363	4.870	***	5.539	0.552	10.036	***
Banks	0.548	0.258	2.125	**	0.060	0.015	3.934	***
Tax	7.771	1.659	4.685	***	0.317	0.098	3.243	***
Credit Score	0.297	0.084	3.524	***	0.012	0.005	2.461	**
Log Assets	-9.754	1.357	-7.189	***	-1.012	0.080	-12.633	***
Growth	-0.448	1.078	-0.416		-0.037	0.064	-0.585	
Disaster	-0.046	1.198	-0.039		0.020	0.071	0.276	
Requests from Bank	0.608	1.557	0.391		-0.069	0.092	-0.749	
Number of Sample	316				316			
Adjusted R^2	0.203				0.365			

***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Additionally, Table 5 indicates that owner firms with tax incentives tend to demand more insurance. It is possible that the firms that are not characterized by a separation between ownership and management tend to demand more insurance because owners feel that their firms are independent and because agency problems are relatively small. Additionally, if firms can rationally reduce their taxes, then the president or chairman, as the largest future shareholder, can obtain tax reductions through dividends. Therefore, it is natural that firms with tax incentives should tend to demand more insurance, particularly owner firms, because the presidents or chairmen have larger stakes in their firms.

Table 5 shows that *Credit Score* is significantly associated with insurance demand and that *Log Assets* is negatively and significantly associated with insurance demand in Models 1 and 2. Table 5 also indicates that *Growth*, *Disaster* and *Requests from Bank* are not significantly associated with insurance demand in Models 1 and 2. The results suggest that smaller firms tend to demand more insurance and that a firm's growth expectations, disaster experience and whether a bank requests that it buy insurance are not important factors in insurance demand.

Table 6 presents the estimation results of insurance demand by using *Other Firms*. Notably, Table 6 contains some interesting results regarding insurance demand. First, Table 6 indicates that *Banks* is not significantly associated with insurance demand in either Model 1 or Model 2. This result is not consistent with the results in Tables 3 and 5. That is, *Other Firms* with weak bank relationships do not tend to demand more insurance. This result can be interpreted to suggest that such firms have other financial resources such as parent firms and that bank relationships are not as important to them as they are to *Owner Firms*.

First, Table 6 shows that *Tax Incentive* is significantly related to insurance demand in Model 1 but not in Model 2. Thus, *Tax Incentive* appears not to be an important factor affecting insurance demand. It is possible that *Other Firms* with tax incentives do not necessarily demand more insurance because managers are not

the largest shareholders in these firms, and the benefits of tax savings for *Other Firms* are not as large as the benefits for *Owner Firms*.

Table 6 Factors Affecting Insurance Demand (Other Firms)

Variables	Coefficient	Standard	t-value		Coefficient	Standard	t-value	
	<i>Insurance Demand</i>				<i>Log Insurance Demand</i>			
Constant	76.285	17.777	4.291	***	4.844	0.410	11.829	***
Banks	0.690	0.470	1.467		0.015	0.011	1.349	
Tax	1.845	3.446	0.535		0.177	0.079	2.236	**
Credit Score	0.418	0.163	2.556	***	0.023	0.004	6.177	***
Log Assets	-16.107	2.640	-6.101	***	-0.952	0.061	-15.685	***
Growth	3.011	2.108	1.429		0.031	0.049	0.638	
Disaster	4.096	2.509	1.633		-0.075	0.058	-1.288	
Requests from Bank	7.551	3.510	2.151	**	0.083	0.081	1.017	
Number of Sample	449				449			
Adjusted R ²	0.096				0.377			

***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Second, Table 6 shows that *Credit Score* is positively and significantly associated with insurance demand. This result is consistent throughout the analyses and the results that are presented in Tables 3, 5 and 6. Thus, the regression results suggest that firm riskiness is an important factor in insurance demand.

Third, Table 6 indicates that *Log Assets* is negatively and significantly associated with insurance demand, and this result is consistent in Tables 3, 5 and 6. That is, smaller firms tend to demand more property liability insurance.

The coefficients for *Growth* and *Disaster* are positive and negative, although they are not statistically significant. *Requests from Bank* is positive and statistically significant in Model 1 but not in Model 2. Therefore, *Requests from Bank* appears not to be associated with insurance demand among *Other Firms*.

Taken together, the results in Tables 5 and 6 suggest that insurance demand among *Owner Firms* is strongly affected by internal factors, that is, “money” issues such as financial constraints and tax savings. This is a persuasive result because such firms have many financial options if they lack strong relationships with banks.

However, the insurance demand among *Other Firms* is more strongly related to superficial factors. In particular, the results suggest that the insurance demand by *Other Firms* is significantly associated with firm riskiness and firm size. These results can be interpreted to suggest that these firms rely on parent firms and that they therefore believe that they will be able to meet their financial needs in cases of natural disaster or serious accidents. Also, they do not have a strong tax-saving incentive. Thus, financial factors are not associated with property liability insurance demand.

5. Conclusion

This paper investigated the role of insurance demand by using a unique dataset of Japanese SMEs in the manufacturing industry. We find that SMEs that borrow from many banks, i.e., the SMEs that have relatively weak banking relationships, tend to demand more insurance. Thus, we find empirical evidence that insurance demand plays an important role in SME financing.

We find that SMEs with tax incentives tend to demand more insurance. Although few previous studies find that tax incentives are significantly associated with insurance demand, our questionnaire approach enables us to examine the effects of tax incentives on insurance demand. In addition, our empirical results indicate that SMEs with a lower probability of bankruptcy tend to demand more insurance, while previous results regarding the impact of bankruptcy probability on insurance demand are mixed. This result can be interpreted to suggest that SMEs in better financial condition demand more insurance because they have more to lose if they go bankrupt.

We also find that the factors that affect property liability insurance demand differ among SMEs. For firms that do not have parent firms and where the largest shareholder is a president or chairman, factors such as financial constraints and tax savings are associated with property liability insurance demand. For firms where the largest shareholder is *not* a president or chairman, these factors are not associated with insurance demand.

This paper emphasizes the need for future research on the insurance demand among smaller firms (less than 20 employees) and for empirical evidence from other industries and countries. Additionally, because this article and previous research do not focus on other risk management tools such as derivatives, it is important to clarify in future studies the role of these tools in SME financing.

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