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Why Do Small and Medium-sized Enterprises Use Derivatives?

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Abstract

The use of derivatives is widespread and common among firms. While studies have focused on their use, few articles have distinguished between *risk management* and *speculation* due to data constraints. In this paper, I use a survey method whose data enable me to determine whether risk management or speculation is behind the use of derivatives. Thus, I analyze the determinants of derivative use through a sample of 909 small and medium enterprises (SMEs) in the Japanese manufacturing industry. To the best of my knowledge, this is one of the first studies to focus on why SMEs use derivatives.

I find that the following factors are associated with derivative use. First, SMEs that have weaker relationships with their main banks use derivatives for both risk management and speculation. Second, independent firms are less likely to use derivatives for speculation. Third, import, export, and foreign activities are positively associated with derivative use for risk management. Fourth, SMEs located in Tokyo use derivatives for risk management. This empirical evidence shows that the use of derivatives plays an important role in SME financing.

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1. Introduction

The use of derivatives for risk management remains one of the central issues in the corporate finance field. According to the classic Modigliani and Miller framework, risk management is irrelevant to firm values because shareholders can do it on their own, for example, by holding well-diversified portfolios. However, Macminn (1987) indicates that corporate risk management can be justified to eliminate or reduce bankruptcy and agency costs. Also, Froot, Scharfstein and Stein (1993) show that risk management can reduce the volatility in cash flows so that firms can have access to internally generated funds in bad situations and then use derivatives to decrease their dependence on external funds for investment. That is, firms that conduct appropriate risk management can avoid forgoing positive NPV projects that are associated with firm value. Furthermore, it is difficult for shareholders of small and medium-sized enterprises (SMEs) to hold well-diversified portfolios that makes ownership structure relevant to risk management.

According to Harrington and Niehause (2003), risk management consists of loss financing and loss control. Risk management by derivatives is a form of loss financing, and hedging is also. However, there is a significant difference between derivatives and hedging because derivatives can be used not only to manage pure risks but also to speculate. However, hedging is used purely for managing risk.

Few studies have focused on this point because it is difficult to distinguish between hedging and the speculation of derivatives from the disclosed information[1]. As a matter of fact, the existing empirical evidence provides mixed results for derivative use. That is, the results of studies might regard the derivatives that are purchased for speculation in the same light as hedging. Therefore, the purpose of this article is provide empirical evidence on the reasons for using derivatives. To

[1] The only exception is Bodnar, Hayt and Marston (1998). They show that the corporate use of derivatives for speculation is as likely as hedging by using a survey of firms in the US in 1998. But they use data from listed firms and do not indicate what factors are related to purchases.

achieve this aim, I depart from conventional approaches and directly analyze why firms purchase derivatives. That is, I use a survey method that enables me to access information on why firms purchase derivatives. The survey combines data from the questionnaire with the data from financial statements.

Another unique contribution of this article is that it provides empirical evidence that is based on data from SMEs. To the best of my knowledge, Little evidence exists on this use in SMEs because of unavailable data[2]. However, the survey method has been popular in recent corporate finance studies (e.g., Graham and Harvey (2001)) and is particularly effective in analyzing SME financing (e.g., Asai (2019), 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 of 2014, allows me 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 relationships alleviate the financial constraints of SMEs. Accordingly, if SMEs cannot build strong relationships with banks, they will be financially constrained. In this situation, hedging can be an important financial resource for SMEs that face financial constraints. That is, studies have predicted that SMEs with stronger financial constraints will purchase derivatives for the purpose of hedging. Thus, this article seeks to contribute to the literature on both relationship banking and derivative purchases among SMEs by using a unique firm-level dataset of SMEs in Japan.

The ownership structure can be an important factor in purchasing derivatives. Harrington and

[2] Vickery (2008) focuses on similar topics of SMEs' financing but not on derivative use.

Niehause (2003) point out that the owners of closely held firms typically have a significant proportion of their wealth invested in the firm and thus are undiversified compared to shareholders of listed firms with widely traded stock. Therefore, closely held firms have an incentive to retain less risk than listed firms. SMEs are typical closely held relative to listed and large firms and are expected to have stronger incentives to manage risk. Also, Doukas (2011) finds that family firms invest less than non-family firms with low risk. Thus, family firms should be less likely to purchase derivatives for speculation.

Lim and Wang (2001) and Kim, Mathur and Nam (2006) point out that transactions with foreign countries can be associated with hedging. SMEs with factories and offices in foreign countries may have to assume risks. For example, they may assume risks such as currency risks and violations of law and tax procedures. Therefore, SMEs that operate abroad can have an increased risk exposure. This exposure means they are more likely to manage risks through the use of derivatives.

To examine the purchases of derivatives, I use data from the SMEs in the Japanese manufacturing industry. Japan is a desirable market to investigate the risk management of SMEs for the following reasons. First, Japan is generally considered to have a bank-based financial system (Rajan and Zingales (2003)). While Vickery (2008) fails to find a significant relationship between banks and the use of derivatives, the evidence from a country with a bank-based financial system may help to improve this understanding of the roles of their relationship and usage in SME financing. Second, Japan is the one of the largest derivatives markets in the world. According to the Bank for International Settlements' OTC derivatives statistical release at the end of June 2015, financial institutions in Japan have OTC derivatives worth 53 trillion yen, while financial institutions around the world have 483 trillion yen's worth. Third, while Yamori (1999), Yamori and Kobayashi (2002), and Asai (2017) provide empirical results on the hedging demand, few

studies exist on the use of derivatives by Japanese firms. Additionally, because I focus on the manufacturing industry in Japan, I do not need to control for industry-specific factors.

This article is structured as follows: In Section 2, I develop the empirical hypotheses that are based on the theoretical models and empirical research. Section 3 has descriptions of the data and variables that are used in this article and presents this empirical model. Section 4 presents the results of this empirical analysis, and section 5 concludes.

2. Empirical Hypothesis

2.1 Bank Relationship

The research has shown that SMEs face stronger financial constraints than listed firms because they cannot issue stocks and bonds to raise funds. This research finds that close relationships can 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 represented 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 indicates stronger financial constraints.

Therefore, SMEs that transact with more banks tend to purchase derivatives for risk management and speculation. Derivatives for risk management are purchased to prepare for financial constraints that arise from disasters, and derivatives for speculation are purchased to ease financial constraints.

Thus, my first hypothesis is:

Hypothesis 1 (H1). Derivative use is more frequent among SMEs that face greater financial

constraints. In particular, SMEs that borrow from many banks are likely to use derivatives.

2.2 Independent Firms

According to Harrington and Niehause (2003), the owners of closely held firms typically have a significant proportion of their wealth invested in the firm and thus are undiversified compared to shareholders of listed firms with widely traded stock. We call the SMEs that do not have parent firms *Independent Firms*. The shareholders of *Independent Firms* own a larger amount of stock and therefore are undiversified. Therefore, among SMEs, *Independent Firms* have a stronger incentive to reduce risks through derivative use.

Thus, this second hypothesis is:

Hypothesis 2 (H2). Derivative use is greater among *Independent Firms*. That is, SMEs that do not have parents firms are likely to use derivatives to reduce risks.

2.3. Exports, imports, and foreign activities

If firms engage in activities such as exports and imports or firms operate factories in foreign counties, then they may face larger risks like currency and country risks. Therefore, firms that export and import goods and materials are more likely to use derivatives because their trading partners might require it. In fact, Regan and Hur (2007) indicate that exports are positively associated with the demand for property liability insurance.

Therefore, I propose the third empirical hypothesis:

Hypothesis 3 (H3). Risk management through derivatives is associated with exports and imports. Thus, I expect a positive relation between derivatives and import and export activities in foreign

countries.

2.4 Region

While few empirical studies exist on risk management and regional economics, the SME's location might be associated with the use of derivatives. For example, according to National Survey regarding Securities Investment in 2015 by the Japan Securities Dealers Association, 90.9% of the people in the Tohoku area had never invested in stocks and 76.4% of the people in Tokai and Kanto areas had never invested in stocks. It is possible that derivative use is more popular in urban areas, such as Tokyo, than rural areas because SMEs have more opportunities to access information about the use of derivatives for risk management and speculation. Therefore, I expect that SMEs that operate in Tokyo are familiar with derivatives and use them for risk management and speculation.

Hypothesis 4 (H4). Derivative use is greater in *urban areas*. Thus, I expect a significant relation between derivative use and SMEs' locations.

3. Data

This study utilizes *The Management Survey of Corporate Insurance Issues* in Japan that was conducted in January and February of 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) that is a business credit bureau like Dun and Bradstreet in the US.

A total of 6,535 manufacturing firms matched this criteria, and I randomly chose firms by considering the population size of the prefectural product and the number of enterprises. I chose

manufacturing firms to control for industry effects. Thus, the questionnaires were mailed to 3,500 manufacturing firms, which were chosen from TDB's database, across Japan.

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 only uses firms with 21 to 300 employees. By focusing on firms of a certain size and unlisted, I can examine the determinants of derivative use. TDB received 909 responses (by postal mail), which yielded a response rate of 26.0%[3]. I obtained SMEs' financial statements from TDB. In this article, I utilize the financial statements that pertain to one year before the questionnaire in January and February of 2014: that is 2013[4].

My dataset has three main advantages. First, the survey asked for the main reason why SMEs purchased derivatives. Information on the reasons why SMEs purchased derivatives is not usually disclosed, while the number of derivatives purchased are disclosed. The number of derivatives include information on both risk management and speculation regarding derivative use.

Second, the survey method allows me to investigate in depth why and how SMEs purchase derivatives. Third, by matching the survey results with the financial statements that were obtained from TDB, I can control for SME characteristics in examining the determinants of purchasing derivatives.

Although this dataset is the most detailed that is available on purchases of derivatives in Japan, caveats must be mentioned. As is often the case with surveys, its data relate only to surviving firms. Additionally, although I effectively clarify the boundary between firms and households by focusing on relatively large SMEs, I am unable to focus on the derivative use among smaller firms

[3] Of the 909 firms, 870 answered the question "Who answered the survey?" The answers were 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.

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

such as firms with 20 or fewer employees.

4. Variables and Empirical Model

The following is the empirical model:

Pr(Y=1) = f (Bank Relationship, Independent, Import-Export and activities abroad, Region, Firm's Assets, Credit Score, Growth)

where Y is the purchase of derivatives.

4.1 The dependent Variables

The first dependent variable is *Risk Management* because firms use derivatives to manage risk by, for example, hedging. If the firm's manager answered, "I purchase derivatives to prepare for risks such as natural disasters", then the dependent variable equals one, and zero otherwise. my second dependent variable is *Speculation* because firms purchase derivatives as a part of investments. If the firm's manager answered, "I purchase derivatives as a part of asset management", then the dependent variable equals one, and zero otherwise. Multiple answers are not allowed in these questions. Then, I use the sum of *Risk Management* and *Speculation* as the total SME managers who purchased derivatives.

Harrington and Niehause (2004) show that few small businesses manage relatively little risk with derivatives. I do have evidence that SMEs manage risk with derivatives because Table 2 indicates that 12.8% of SMEs purchase derivatives to manage risk out of a total of 23.1%.

4.2 Independent Variables

4.2.1 Key Variables

Bank Relationship

To examine Hypothesis 1, I use the number of banks that SMEs transact with (*Banks*), which is a common metric of the relationships between banks and firms in the relationship banking literature. According to this literature (Petersen and Rajan (1994) and Blackwell and Winters (1997)), the greater the number of banks a firm borrows from, the weaker its relationship is with each bank. I obtain the number of banks that a firm transacts with from financial data in TDB. Thus, I predict that the more banks that SMEs borrow from, the more SMEs use derivatives to manage risk and to speculate.

Ownership Structure

To examine Hypothesis 2, I use a dependent variable that is the measure of the effect of the ownership structure on derivative variables. In the survey, if the firm answered, "I am an independent firm that does not belong to a corporate group", then the dependent variable equals one, and zero otherwise.

As discussed earlier, risk management is less frequent in listed SMEs because shareholders can eliminate risks by holding portfolios of securities. On the other hand, owners of closely held SMEs may purchase derivatives to protect against the risk of losses. Independent SMEs are usually closely held because they do not have parent firms. Also, they have a stronger incentive to reduce risks because managers are the largest shareholders of the firms. In other words, ownership and management are not separate in SMEs. Thus, I predict that derivative purchases will be greater if the SME is closely held.

Exports, imports, and foreign activities

To examine Hypothesis 3, I use a dependent variable to measure whether SMEs export, import

or have factories in foreign countries. In the survey, if the firm answered, “I do not have factories abroad but export and/or import materials and products”, or “I have factories abroad”, then the variable equals one, and zero otherwise. If SMEs have factories abroad or export and import, then they will be exposed to risks such as fluctuations in currency rates and political instability. SMEs that do not export and import materials and products and operate only in Japan do not assume these risks. Therefore, I predict that SMEs that export and import or have factories abroad manage risk with derivatives.

Region

To examine Hypothesis 4, I use a dependent variable that equals one if SMEs are located in Tokyo, and zero otherwise. In addition to the survey, I obtain SMEs’ financial statements from TDB that include the address of the firm’s headquarters. Studies have shown that people in urban areas are more familiar with financial products such as derivatives than those in rural areas. Thus, I predict that the SMEs that are located in Tokyo more frequently use derivatives.

4.2.2 Other Variables

The other variables are related to a firm’s characteristics.

Assets

Studies have identified two possible effects of size on the risk management of firms. 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, smaller firms should need more risk management than larger firms.

However, O’Sullivan (1997) shows that large firms have a complex structure that prevents

shareholders from adequately monitoring the management of the firm. Thus, shareholders rely on insurers to monitor the firm. In terms of agency costs, larger firms then need more risk management. Therefore, the size effect can work both ways, and empirical tests are needed. In this article, I use the natural logarithm of assets to measure the effects of size on derivative purchases.

Growth

The research, such as Hoyt and Khang (2001) and Zou and Adams (2006), examines the effects of growth expectations on the demand for risk management. 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 shortfalls in cash flow that follow losses form accidents or disasters. In the same manner, I predict that firms with high growth opportunities are more likely to purchase derivatives than firms with low growth opportunities.

In this study, I can directly access the information on SMEs' estimations of their growth prospects by using my survey. The survey asked SMEs about future management prospects. The answers consisted of the following choices: 1. I expect substantial growth; 2. I expect some growth; 3. I expect the status quo to be maintained; 4. I expect shrinkage; and 5. I do not know. In this article, I introduce a variable that equals one if an SME chooses either 1 or 2. Thus, I predict that firms with high growth opportunities are more likely to purchase derivatives.

Firms' 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 purchase derivatives because they are relatively prone to bankruptcy.

On the contrary, risky firms, particularly SMEs, may not have the capacity to purchase sufficient insurance. 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 purchase derivatives, while SMEs in good financial condition are expected to purchase more derivatives. Because the effects of SMEs' financial condition on purchasing derivatives can be positive or negative, these effects must be empirically analyzed.

Fortunately, I 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 enable me 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 studies have used credit scores to measure firm riskiness, and I follow this 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.

5. Empirical Results

5.1 Full Sample

Table 3 presents the probit estimation and shows the determinants of the total purchases of derivatives by SMEs for both risk management and speculation. Then, I present the results by

dividing the purchases by purpose: risk management or speculation.

Table 3 shows that the coefficient for *Banks* is positive and significant. Thus, Hypothesis 1 that SMEs that borrow from many banks purchase derivatives is accepted. That is, the empirical results indicate that the SMEs that do not have strong relationships with banks purchase more derivatives to cope with the problems that are associated with financial constraints. Table 3 also indicates that the coefficient for *Independent Firms* is not significantly associated with derivative purchases. That is, while I predict that independent firms that do not have parent firms more actively purchase derivatives, the results do not support this prediction. Thus, Hypothesis 2 is not accepted.

Table 3 shows that the coefficient for *Export* (Export, import, and activities abroad) is positive and significant. Hypothesis 3 that states that SMEs that export and import products and goods purchase derivatives is accepted. Table 3 also shows that the coefficient for *Region* is positive and significant. I predicted that SMEs in urban areas are familiar with financial products and tend to purchase more derivatives. The results are consistent with this prediction, and SMEs in the Tokyo area purchase derivatives.

Regarding other variables, Table 3 indicates that *Assets* is not significantly associated with derivative purchases. Table 3 also shows that *Credit Score* is positively and significantly associated with derivative purchases. That is, the more highly evaluated SMEs are, the more derivatives they purchase. Table 3 indicates that *Growth* is not significantly associated with the use of derivatives.

However, Table 3 uses the full sample that blurs the estimation results because it includes derivatives purchased for both risk management and speculation. Therefore, I divide the sample according to each use.

5.2 Derivatives Purchase for Risk Management

Table 4 shows the probit estimation and the determinants of SMEs' derivative purchases to manage risk. As mentioned earlier, if derivatives are purchased based on risk management, the function of derivatives is loss finance and the role is similar to property liability insurance. Thus, the results obtained by this estimation can be compared to the results obtained by insurance demand studies. Also, by comparing derivative purchases for risk management with purchases for speculation, this estimation can draw an important conclusion.

Table 4 shows that the coefficient for *Banks* is positive and significant. The empirical results indicate that the SMEs that do not have strong relationships with banks purchase derivatives for risk management. This result is consistent with Asai (2017) who examines the relation between a bank relationship and insurance demand. Thus, both estimation results can be interpreted as showing that SMEs with weaker bank relationships prepare for future loss finance by using insurance and derivatives. Table 4 shows that the coefficient for *Independent Firms* is positive but not significantly associated with derivative purchases. Interestingly, while Asai (2017) finds that independent firms demand insurance more, the result of this article indicates that independent firms do not purchase derivatives for risk management.

Table 4 shows that the coefficient for *Export* is positive and significant. Unfortunately, while the survey does not provide information about what kind of derivatives SMEs purchase, the results show that they purchase derivatives such as currency derivatives because they export and import products and materials or operate factories in foreign countries. The result is consistent with Regan and Hur (2007) who examine the relation between exports-imports and the demand for property liability insurance. Table 4 indicates that the coefficient for *Region* is positive and significant because it is an important factor in purchasing derivatives for risk management.

Regarding other control variables, Table 4 indicates that *Assets* is not significantly associated

with derivative purchases for risk management. The results in Table 4 are not consistent with the insurance demand in studies that find smaller firms demand more insurance. It is noteworthy that *Credit Score* is positively and significantly associated with derivative purchases only for risk management. That is, relatively sound SMEs purchase derivatives to manage risk. The result that SMEs purchase derivatives to manage risk is consistent with Asai (2017) who finds relatively sound SMEs demand more property liability insurance. Table 4 indicates that *Growth* is not significantly associated with derivative use for risk management.

5.3 Derivative Purchase for Speculation

Table 5 presents the determinants of derivative purchases for speculation.

The table shows that the coefficient for *Banks* is positive and significant. This is consistent with the result obtained in Table 4. That is, SMEs that do not have a strong relationship with banks purchase derivatives for speculative purposes as well as for risk management. This is the only variable whose result is consistent with that of Table 4.

For example, *Independent Firms* is negatively and significantly associated with derivative purchases. Thus, the result shows that independent SMEs do not engage in speculative activities by using financial products such as derivatives. Doukas (2011) finds that family firms invest less than non-family firms with low risk. The results obtained in this article also indicate that independent firms invest less than non-family firms in speculative activities[5]. That is, these results can be interpreted as showing that family firms take less risks in their activities.

Export is not associated with derivative purchases that is consistent with my reasoning that derivatives are used for managing risks in regard to exports and imports. Furthermore, the results

[5] In this article, the percent represents the independent firms whose largest shareholder is the manager. This definition of independent firms is close to family firms.

in Table 5 show that *Region* is not significantly associated with derivative purchases. While I assume that SMEs located in urban areas such as Tokyo purchase derivatives for speculation, the result is not consistent with this reasoning.

Turning to the other control variables, *Credit Score* is not significantly associated with derivative purchases in Table 5, although it is positively and significantly associated with derivative purchase for risk management in Table 4. This contrasting result highlights the fact that sound SMEs purchase derivatives for risk management and the result is consistent with Asai (2017) who focuses on SMEs' insurance demand. *Assets* is not significantly associated with derivative purchases for speculation. *Growth* is also not associated with derivative purchases for speculation.

Table 1 Definition of Variables

Variable	Definition
Dependent Variable	
Derivative purchase	One if the firm purchased derivatives and zero otherwise
Derivative for risk management	One if the firm purchased derivatives for risk management and zero otherwise
Derivative for speculative	One if the firm purchased derivatives for speculation and zero otherwise
Independent Variables	
Bank Relationship	
Banks	Number of banks the borrower firm has transactions with
Ownership Structure	
Independent	One if the firm answered it was an independent firm and zero otherwise
Firm's Activity	
Exports and Imports	One if the firm answered that it exported and imported materials and goods and 0 otherwise
Tokyo	One if the firm is located in Tokyo and zero otherwise
Firm Characteristics	
Assets	Log of assets
Credit Score	Credit score offered by Teikoku Data Bank
Growth	One if the firm answered that it expected growth and zero otherwise

Table 2 Descriptive Statistics

	Number of Sample	Average	Median	S.D.	Max	Min
Dependent Variables						
All Derivatives	205	0.231	0.000	0.422	1.000	0.000
Derivatives for Risk Management	113	0.128	0.000	0.334	1.000	0.000
Derivatives for Speculation	92	0.104	0.000	0.305	1.000	0.000
Independent Variables						
Banks	886	4.963	5.000	2.214	10.000	1.000
Independent	886	0.582	1.000	0.493	1.000	0.000
Exports and Imports	886	0.335	0.000	0.472	1.000	0.000
Tokyo	886	0.132	0.000	0.339	1.000	0.000
Assets	886	14.147	14.123	0.922	16.740	11.131
Growth	886	0.505	1.000	0.500	1.000	0.000
Credit Score	886	54.212	54.000	6.499	72.000	29.000

Table 3 Overall Derivative Use

Variables	Coefficient	Marginal Effect	Z-score	
	Derivative Use			
Constant	−2.781		−3.258	***
Banks	0.143	0.041	6.391	**
Independent	−0.099	−0.029	−0.982	
Export	0.333	0.100	3.113	***
Tokyo	0.453	0.146	3.418	***
Log Assets	0.010	0.003	0.185	
Credit Score	0.018	0.005	2.308	**
Growth	−0.110	−0.032	−1.126	
Number of Sample	886			
McFadden R-squared	0.099			

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

Table 4 Derivative Use for Risk Management

Variables	Coefficient	Marginal Effect	Z-score	
		Derivative Use for Risk Management		
Constant	−3.933		−3.839	***
Banks	0.158	0.027	6.027	**
Independent	0.069	0.012	0.582	
Export	0.473	0.091	3.735	***
Tokyo	0.436	0.092	2.962	***
Log Assets	0.024	0.004	0.386	
Credit Score	0.023	0.004	2.385	**
Growth	−0.094	−0.016	−0.809	
Number of Sample	886			
McFadden R-squared	0.125			

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

Table 5 Derivative Use for Speculation

Variables	Coefficient	Marginal Effect	Z-score	
	Insurance Demand			
Constant	−1.719		−1.706	*
Banks	0.059	0.010	2.240	**
Independent	−0.229	−0.041	−1.920	*
Export	0.039	0.007	0.305	
Tokyo	0.222	0.043	1.415	
Log Assets	−0.004	−0.001	−0.066	
Credit Score	0.006	0.001	0.594	
Growth	−0.082	−0.014	−0.707	
Number of Sample	886			
McFadden R-squared	0.027			

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

6. Conclusion

In this article, I investigate the role of derivative purchases by using a unique dataset of Japanese SMEs in the manufacturing industry. In particular, this article uses a survey method that separates the derivative into risk management and speculation uses.

I find that SMEs that borrow from many banks have relatively weak banking relationships and purchase derivatives for both uses. I also find that SMEs that export and import products and materials and operate factories abroad purchase derivatives more to manage risk. Further, SMEs that are located in Tokyo purchase derivatives more to manage risk. Moreover, independent SMEs that do not have parent firms are less likely to purchase derivatives for speculation. Thus, while studies have indicated that derivatives were not used in SMEs financing, I find empirical evidence that derivatives play an important role in SME financing.

In this article, I emphasize the need for future research on the use of derivatives by smaller firms (less than 20 employees) and for empirical evidence from other industries and countries. Additionally, because this article and the research do not focus on the relation between derivatives and insurance, it is important to clarify this relation in future studies.

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