Graduate School of
Business Administration

KOBE UNIVERSITY

ROKKO KOBE JAPAN

2017-17

The Effect of Corporate International Diversification on Firm Risk

Charee Kwak

Discussion Paper Series

The Effect of Corporate International Diversification on Firm Risk

Charee Kwak
Graduate School of Business Administration, Kobe University

Abstract

This study investigates the relation between corporate international diversification and firm risk using a sample of listed Japanese firms. Diversification benefits obtained by operating in multiple markets which are not perfectly correlated can decrease risk, according to portfolio theory. However, additional risk factors of foreign expansion including currency risk, political risk, and greater agency costs may increase risks of multinational firms. Previous studies also report conflicting results, risk-increasing and risk-decreasing. The results of this study present that corporate international diversification increases systematic, idiosyncratic, and total risk. This indicates that shareholders consider overseas expansion of Japanese firms as risk-increasing and the cost of capital of Japanese multinationals becomes higher because of the increase in risk.

1. Introduction

Firm risk is an important factor in investment decision making process, because it implies the uncertainty regarding the expected returns on the investment. It is also a determinant of the firm's cost of capital, which indicates required return of investors. Higher risk causes an increase in required returns due to risk premium for higher risk, resulting in increasing of cost of capital. Therefore, knowledge of the level of risk would be crucial for firms that invest overseas. However, the relation between corporate international diversification and firm risk has not been completely clarified. The expected effect of overseas operations on risk is conflicting based on theoretical background. The empirical results of previous studies are also inconsistent.

In the portfolio theory, corporate international diversification can reduce firm risk. Because multinational firms are highly diversified compared to domestic firms, they would get risk-reducing effect comparable with diversification benefits which are obtained by holding an efficiently diversified portfolio. Rugman(1976) and Shapiro(1978) argue that cash flows from various markets correlated imperfectly generate the advantage of risk reduction. The results of some empirical studies are consistent with their argument and present that overseas activities is associated with lower firm risk (e.g., Agmon and Lessard, 1977; Fatemi, 1984).

However, multinational firms may experience a greater firm risk owing to additional risk factors accompanied by foreign expansion. Their operations in foreign markets are exposed to various risks such as exchange risk, political risk, an increase in agency costs, and information asymmetry between parent and foreign subsidiaries. As a result, these risks cause an increase in firm risk. Some previous studies support this view and suggest that international operations are positively related to risk (e.g., Reeb et al., 1998; Olibe et al., 2008).

As discussed above, there are inconsistent results on corporate international diversification may have conflicting effects on firm risk, risk-increasing and risk-decreasing. Thus, the effect of corporate international diversification on risk depends on the net of two sides of effect. Moreover, most of previous studies use samples of American or European firms, thus, it is hard to find the research on case of Japanese firms. Despite to their active foreign expansions, there is little empirical evidence of international diversification of Japanese firms as compared to that of American or European firms. Therefore, this study explores the relation between corporate international diversification and firm risk with a sample of listed Japanese firms. This aims to obtain the empirical implication of the impacts of foreign expansion on risk for

managers and investors of Japanese firms. Moreover, the result of this study would have importance in terms of cost of capital. In recent, the importance of cost of capital has received considerable attention in Japan. The Ito Review (2014)[1] suggests that firms should pursue sufficient earnings that dominate their cost of capital for sustainable growth. Firms need to perceive their cost of capital exactly when they establish their earnings goal. This study aims to investigate the relation between corporate international diversification and the level of cost of capital by examining how foreign expansion of Japanese firms influences their risk.

In empirical analyses, this study considers three types of risk, which are systematic risk, idiosyncratic risk, and total risk. Most previous studies on the relation between international diversification and risk have focused on systematic risk, because idiosyncratic risk is expected to be eliminated through diversification under the Capital Asset Pricing Model (hereafter, CAPM). However, some research suggests that idiosyncratic risk is not fully diversified owing to market imperfections and, thus, influences stock returns significantly (e.g., Merton, 1987; Malkiel and Xu, 2002; Ang et al., 2009). If idiosyncratic risk is not eliminated by international diversification, it would affect total risk and the cost of capital as well. Thus, this study investigates the effect overseas business activities on each risk measure, considering idiosyncratic risk with other two risks. The ratio of foreign sales and assets are used as proxies for the degree of international diversification. .

Regression results of this study show that corporate international diversification increases firm risk. International diversification measures are positively associated with systematic risk, idiosyncratic risk, and total risk, after controlling for other determinants of firm risk. These results also indicate that shareholders of Japanese firms assume that foreign expansion increases risk of the firm. In addition, the cost of capital becomes higher as firm risk increases. Therefore, firms diversified internationally should fully understand the increased risk involved in their foreign expansion.

The remainder of this study is organized as follows. Chapter 2 introduces theoretical backgrounds for this research. Then, Chapter 3 reviews the literature and establishes

[1] It indicates the final report that summarizes the results of the discussion of the "Competitiveness and Incentives for Sustainable Growth: Building Favorable Relationships between Companies and Investors" project by the Ministry of Economy, Trade and Industry (METI) in Japan. The report contains recommendations with respect to the issues companies face in seeking to increase corporate value and generate on-going growth via investor dialogue and capital procurement. As the project was chaired by Professor Kunio Ito, Graduate School of Commerce and Management, Hitotsubashi University, the final report is known as the Ito Review.

hypothesis. Chapter 4 describes the sample, variables and the method for empirical analysis and Chapter 5 presents the results of regression. Finally, Chapter 6 draws conclusions.

2. Theoretical Background

2.1. Corporate international diversification and risk

Corporate international diversification has conflicting effects on firm risk. Previous literature suggests that firms can obtain several benefits from multinational operations that contribute a reduction in their risk. However, foreign expansion requires additional costs which may increase firm risk. Hereafter, I introduce the benefits and costs related to the effect of overseas activities on firm risk.

Some advantages of international diversification would decrease risk of firms with foreign expansion. First, according to the argument of portfolio theory, multinational operations can generate diversification benefit. The theory suggests that one can reduce risk of portfolio by combining assets, returns of which are not perfectly correlated. Due to this effect, internationally diversified firms are able to get such diversification benefits. Indeed, operations in multiple markets, where are imperfectly correlated increase earnings stability (Rugman, 1976). The correlation between earnings of multinational firms and domestic markets decreases as the firms become more diversified internationally, owing to cash flows generated by those multiple markets, (Shapiro, 1978). Especially, under the circumstance where the barriers of international capital flow exist, investors can indirectly diversify their portfolios by investing multinational firms (Agmon and Lessard, 1977). In addition, business activities performed in multiple markets may increase the firm's operational flexibility and decrease the probability of bankruptcy, thereby reducing its riskiness (Michel and Shaked, 1986; Bodnar et al., 2003).

On the contrary, firms expanding their operations internationally confront with various costs that may increase their risk. Multinational firms are exposed to currency risk, because their cash flows are influenced by changes in exchange rates (Reeb et al., 1998). Differences between home and host countries in political regulations and cultural practices can be also significant determinants of increased risk by foreign expansion. If multinational firms are not informed enough about their host countries compared to local firms, riskiness of foreign expansion becomes larger. In addition, geographical

distance and difference in languages would make it difficult to monitor managers in foreign subsidiaries. Thus, information asymmetry between parent and foreign subsidiaries may increase as firms become more diversified internationally (Lee and Kwok, 1988). Moreover, greater complexity in operations of multinational firms is likely to exacerbate agency problem.

To summarize the discussion, the effects of corporate international diversification on firm risk are inconsistent. Business activities in multiple markets enable firms to take diversification benefits that decrease their riskiness. However, foreign expansion requires additional costs such as currency risk, political risk, increased agency costs and information asymmetry between parent and foreign subsidiaries. Thus, whether corporate international diversification is risk-decreasing or risk-increasing is determined by the net of those two effects.

2.2. Various types of risk

Modern finance theory on asset pricing evaluates the risk of certain asset by dividing it into two parts, systematic and idiosyncratic risk. They have different characteristics and implication.

Systematic risk refers to market risk inherent in the economy and is not diversified with market portfolio. In the CAPM, the systematic risk is represented as beta (β) that means the sensitivity of the expected returns of individual asset to that of the market portfolio. The definition of beta is as follows:

$$\beta_i = (\rho_{im} \cdot \sigma_i)/\sigma_m$$

where ρ_{im} is the correlation coefficient between security i and the market portfolio; σ_i is the standard deviation of returns of security i; σ_m is the standard deviation of the market returns. As seen in the equation, beta is determined by ρ_{jm} and σ_i. Therefore, systematic risk of an asset is positively related with the risk of the asset and the correlation between the asset and the market.

Contrary to the systematic risk, idiosyncratic risk is defined as the risk which can be mitigated by diversifying investment portfolio. It is also called firm-specific risk, because it influences the firm at the microeconomic level and has less or no correlation with market risk. Whether idiosyncratic risk should be priced is ambiguous. The traditional CAPM approach, based on the assumption that all investors hold the market portfolio in equilibrium, argues that idiosyncratic risk should not be incorporated into

asset prices because it can be eliminated through diversification. However, in the real world, it is difficult for investors to fully diversify their portfolios because of various reasons such as transaction costs, incomplete information, taxes, and institutional restrictions including limitations on short sales. Under this circumstance, idiosyncratic risk would not be fully diversified, thus, some research argues that idiosyncratic risk would be priced in market (e. g., Merton, 1987; Malkiel and Xu, 2002).

This study considers both systematic risk and idiosyncratic risk, because some empirical studies suggest that idiosyncratic risk has significant effects on stock returns or portfolio returns (Goyal and Santa-Clara, 2003; Ang, Hodrick, Xing and Zhang, 2009; Angelidis, 2010; Fu, 2010). If idiosyncratic risk influences stock returns, investors would be concerned about it as well as systematic risk. Further, this study also examines total risk indicating the sum of systematic and idiosyncratic risk and measured by the firm's stock return volatility.

3. Literature Review and Hypotheses Development

3.1. The effect of corporate international diversification on systematic risk

As discussed above, overseas business activities may have conflicting effects on firm risk, risk-decreasing and risk-increasing. The relation between corporate international diversification and systematic risk is expected to depend on the net effect of these two effects. Regarding the relation, previous studies provide inconsistent results.

Some studies find that internationally diversified firms have lower systematic risk. Agmon and Lessard (1977) find that the foreign sales ratio of American multinational firms is related to lower systematic risk estimated based on domestic market. The result of research conducted by Fatemi (1984) also presents the risk-decreasing effect of international diversification. It shows that a portfolio of multinational firms has lower systematic risk compared to that of domestic firms. Michel and Shaked (1986) point out that the average domestic systematic risk of multinational firms is significantly lower than that of domestic firms. These results imply that multinational operations can contribute to reduce systematic risk of the firm by exploiting diversification benefits.

On the other hand, some studies indicate that the systematic risk of a firm becomes larger, as the firm diversifies its operations internationally. Reeb et al. (1998) find that foreign sales ratio and foreign assets ratio are positively associated with CAPM beta. They argue that multinational operations increase systematic risk if an increase in the

standard deviation of cash flows resulting from various costs of international diversification is greater than a decrease in the correlation between the firm and domestic market by operations in foreign multiple markets. Olibe et al. (2008) also suggest positive relations between international diversification proxies and systematic risk, by including geographical segment data adding to foreign sales and assets. The increase in systematic risk implies that the effects of the costs of international diversification exceed the diversification benefits.

As mentioned above, the results of previous studies on the relation between corporate international diversification and systematic risk are conflicting. As Reeb et al. (1998) argue, overseas activities can reduce systematic risk, because operations in multiple foreign markets decrease the correlation between the firm and domestic market. However, multinational firms is exposed various risks that increase the standard deviation of their stock returns. It is would be concluded that the relation between international activities and systematic risk is determined by the net of these adverse effects. Based on the discussion above, this study examines the relation using the sample of listed Japanese firms. If the benefits of foreign expansion of Japanese firms dominate the costs, their systematic risk would decrease as they increase international operations, and vise versa.

So, I formulate the conflicting hypotheses as follows:

H1.a. Corporate international diversification is associated with greater systematic risk.
H1.b. Corporate international diversification is associated with lower systematic risk.

3.2. The effect of corporate international diversification on idiosyncratic risk

Literature on the relation between corporate international diversification and firm risk mainly focuses on systematic risk. Idiosyncratic risk has been hardly spotlighted, since it is regarded to be mitigated by diversification. However, some recent studies argue that idiosyncratic risk may not be fully diversified and form a significant part of firm risk (e.g., Goyal and Santa-Clara, 2003; Ang, Hodrick, Xing and Zhang, 2009; Angelidis, 2010; Fu, 2010). Some previous literature not only suggests that the risks of foreign expansion contain idiosyncratic factors (e.g., Goldberg and Heflin, 1995; Krapl, 2015), but also provide evidence of the significant relation between international diversification and idiosyncratic risk, despite its limited number.

Hughes et al. (1975) find that a portfolio of multinational firms has lower idiosyncratic risk compared to that of domestically oriented firms. They refer that

investors consider that multinational firms provide substantial diversification benefits. But, Krapl (2015) suggest that corporate international diversification increases idiosyncratic risk, and discusses that additional risk factors of international diversification include idiosyncratic components as well as systematic components. In terms of the components, it refers that currency risk would be systematic while other risks associated with international diversification may mostly be idiosyncratic.

Although corporate international diversification has significant effects on idiosyncratic risk, previous studies show conflicting results. Internationally diversified firms may have lower idiosyncratic risk than domestic firms, because the risk can be dispersed through operations in multiple markets. However, if additional risks of international diversification include idiosyncratic components and they are not perfectly diversified, idiosyncratic risk may increase, as a firm expands its operations to foreign markets. Some previous studies suggest that risks of foreign expansion include idiosyncratic factors, although systematic and idiosyncratic natures of the risks have not been identified definitely. Thus, how corporate international diversification influences idiosyncratic risk depends on which of these two effects is dominant. When the former effect predominates over the latter effect, idiosyncratic risk decreases with international diversification, and vise versa.

Therefore, I hypothesize on the relation between corporate international diversification and idiosyncratic risk as follows:

H2.a. Corporate international diversification is associated with greater idiosyncratic risk.
H2.b. Corporate international diversification is associated with lower idiosyncratic risk.

3.3. The effect of corporate international diversification on total risk

In this section, I investigate the effects of corporate international diversification on total risk. The change in systematic risk and idiosyncratic risk causes a change in total risk, because total risk indicates the sum of two risks. If foreign expansion has significant effects on systematic and idiosyncratic risk in the same direction, it also would influence total risk in the same way. For example, Krapl (2015) finds that international diversification increases systematic risk, idiosyncratic risk, and total risk. However, the effects on systematic and idiosyncratic risk may be offset against each other. Goldberg and Heflin (1995) find that firms with greater international involvement have higher total risk, while they have lower systematic risk. It is due to

larger portion of idiosyncratic risk which is diversified away. Thus, the relation between corporate international diversification and total risk would be determined by how foreign expansion affects systematic and idiosyncratic risk.

So, the hypotheses are established as follows:

H3.a. Corporate international diversification is associated with greater total risk.
H3.b. Corporate international diversification is associated with lower total risk.

4. Data and Methodology

4.1. Sample selection

The sample consists of all firms listed on the Tokyo Stock Exchange (TSE) excluding financial companies. Financial information and international diversification information of sample firms are extracted Nikkei NEEDS-FinancialQUEST. Weekly stock returns data and Kubota & Takehara's Fama-French data which includes data for estimating risk proxies are acquired from NPM data service. Since information of foreign assets has been disclosed from 1999, I collect the data from 1999 to 2012. Observations without positive foreign sales ratio or foreign assets ratio are excluded. Observations with missing value of variables are also excluded. To minimize the effects of outliers, I winsorize all of the variables at the 1% level. The final dataset consists of 1,670 firms and 12,171 firm-year observations of foreign sales ratio, 987 firms and 6,585 firm-year observations of foreign assets ratio.

4.2. Risk measures

This study uses three types of risk parameters, which are systematic risk, idiosyncratic risk, and total risk. To estimate the risk measures, I employ Fama-French three-factor model (Fama and French, 1993) composed of the CAPM and two additional factors.[2] The equation of the model is as follows:

[2] The estimated systematic risk in this study may be imperfect, as it just considers the coefficient of market excess returns (β_i) excluding the coefficients of the size effect (s_i) and the value effect (h_i). For that reason, I also estimate the risk measures relying on the original version of CAPM. The risk measures provide results that are consistent with the results of this study.

$$R_{it} - R_{ft} = \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_{it}$$

where R_{it} is the stock return of firm i in week t, R_{ft} is the weekly risk-free rate of return which is calculated from the rates of 10-year Japanese government bonds, R_{mt} is the weekly return of value-weighted market portfolio which consists of all listed firms on the TSE, β_i is the beta which is the measure of systematic risk, SMB_t is the size premium computed as the average return for the smallest 50% of stocks minus the average return for the largest 50% stocks in week t, HML_t is the value premium computed as the average return for the 30% of stocks with the highest book-to-market ratio minus the average return for the 30% of stocks with the lowest book-to-market ratio in week t, and ε_{it} is the weekly idiosyncratic stock returns of firm i. I estimate total risk (σ_R) using the standard deviation of weekly excess stock returns ($R_{it} - R_{ft}$). I also estimate idiosyncratic risk (σ_{RES}) using the standard deviation of idiosyncratic stock returns ε_{it}, obtained by residuals form the equation. All the risk measures are based on 1-year (52 weeks) rolling period windows.[3]

4.3. Corporate international diversification measures

This study uses the ratio of Foreign Sales to Total Sales (*FSTS*) and the ratio of Foreign Assets to Total Assets (*FATA*) as the measure of international diversification. These two measures are frequently used in previous studies (Reeb et al., 1998; Olibe et al., 2008). Each of these two measures reflects different facets of international diversification. The ratio of foreign sales to total sales provides a measure of a firm's dependence on its foreign markets for sales revenues, while the ratio of foreign assets to total assets can be regarded as a proxy for a firm's dependence on foreign production. In addition, while the ratio of foreign sales cannot fully capture geographical economic activities of firms, the ratio of foreign assets mitigating the problem of mixed export and foreign subsidiary sales captures geographic structural information.

4.4. Control variables

Based on previous studies, this study includes some control variables in empirical analysis to control the other determinants of firm risk. Return on assets (*ROA*) is

[3] The estimation period is matched to fiscal year end of given observation. For example, the observation with fiscal year end of March 2012 is estimated with the data from April 2011 to March 2012.

expected to be negatively associated with firm risk, because greater profitability can increase expected stock returns by investors. Firms with greater liquidity may have lower risk, because they are likely to be less sensitive to fluctuations in the economy. In this study, the Quick ratio defined as the ratio of quick assets to current liabilities is used as the measure of corporate liquidity (*LIQ*). The quick assets include cash and current assets which can be quickly converted to cash such as account payable and marketable securities. Dividend payout (*DIVPO*) defined as the ratio of the firm's dividends to net income also is expected to reduce firm risk due to positive perception by investors. In addition, operating efficiency (*EFF*) and firm size (*SIZE*) may contribute to decrease in risk, because they are related to greater revenue and lower possibility of bankruptcy, respectively. This study uses the ratio of total revenues to total assets as the measure of the firm's operating efficiency and the natural logarithm of total assets as the proxy for firm size. In contrast, previous studies find that firms with higher growth opportunities and leverage have greater risk. I define growth opportunity as the market-to-book ratio (*MTB*) and firm leverage (*LEV*) as the ratio of total debt to total assets.

4.5. Method

To investigate the effect of corporate international diversification on firm risk, this study uses panel data composed of various cross-sectional units. I rely on fixed effects model to control for unobserved firm-specific characteristics. Estimated regression model is as follows:

$$RISK_{it} = \beta_0 + \beta_1 ID_{it} + \beta_2 ROA_{it} + \beta_3 LIQ_{it} + \beta_4 DIVPO_{it} + \beta_5 MTB_{it} + \beta_6 LEV_{it} + \beta_7 EFF_{it} + \beta_8 SIZE_{it} + \sum \delta_y YEAR_y + u_i + \varepsilon_{it}$$

where $RISK_{it}$ is the risk measures of firm i in year t, ID_{it} is the measures of international diversification, ROA_{it} is return on assets, LIQ_{it} is corporate liquidity, $DIVPO_{it}$ is the dividend payout ratio, MTB_{it} is market-to-book ratio, LEV_{it} is corporate leverage, EFF_{it} is operational efficiency, $SIZE_{it}$ is firm size measured by the natural logarithm of total assets. The set of year dummy variables are included to control time-variant effects, as well as control variables mentioned above.

4.6. Descriptive statistics

Panel A of Table 1 presents summary statistics of the sample: number of observations, mean, median, and standard deviation of each variables. The average foreign sales ratio (*FSTS*) is 0.296 and the average foreign assets ratio (*FATA*) is 0.228. Sample firms have average systematic risk (β) of 0.846, average idiosyncratic risk (σ_{RES}) of 4.531, and average total risk (σ_R) of 5.355.

Correlation matrix between the variables is displayed in Panel B of Table 1. The correlation coefficients among the risk measures are positive. Especially, idiosyncratic risk (σ_{RES}) and total risk (σ_R) show considerably strong correlation of 0.966. The correlation between foreign sales ratio (*FSTS*) and foreign assets ratio (*FATA*) is 0.616. FSTS is positively correlated with all risk measures and statistically significant at the 1% level, implying that firms with greater foreign sales ratio have lower systematic, idiosyncratic, and total risk. On the other hand, *FATA* and systematic risk have a positive correlation which is statistically significant at the 5% level, while the correlation coefficients between *FATA* and other risk measures have no statistical significance. It is possible that the effects of other determinants of firm risk distort the relation between foreign assets ratio and idiosyncratic risk or total risk.

5. Results

5.1. The effect of corporate international diversification on systematic risk

At first, this study investigates the effect of corporate international diversification on systematic risk. Table 2 shows the results of fixed effect regression. Model 1and 2 represent the results using *FSTS* as a proxy for corporate international diversification, while model 3 and 4 represent the results using *FATA*. For all models, the estimated beta is used as the measure of systematic risk. The table shows the results of the basic model not including control variables except for year dummies, and the results of the advanced model with all other control variables.

Both international diversification measures (*FSTS* and *FATA*) are positively associated with systematic risk. In model 1, which is the basic version of regression, the estimated coefficient on *FSTS* is 0.216 and statistically significant at the 1% level. This indicates that the level of foreign sales ratio is positively correlated with beta. Even after controlling for other determinants of systematic risk, the result remains

unchanged. In model 2, including the complete set of control variables, the estimate coefficient on *FSTS* is 0.153 and statistically significant at the 5% level. The coefficient on *FSTS* of model 2 is lower than that of model 1 and it may result from the effects of control variables. The results of regression using *FATA* report are consistent with those using *FSTS*. In model 3 and 4, the coefficient estimates on *FATA* are positive (0.32 and 0.223) and statistically significant at or less than the 5% level.

Thus, corporate international diversification increases the firm's systematic risk, even when controlling for other control variables. The regression results of Table 2 represent the positive relation between the international diversification measures and beta, as supporting the hypothesis 1a that corporate international diversification is associated with greater systematic risk. It is interpreted that the effects of additional risk of foreign expansion predominate over the reduction in the correlation between multinational firms and domestic market (Reeb et al, 1998; Olibe et al., 2008). Therefore, firms with more international activities may confront with greater systematic risk in Japan.

Control variables have significant effects on systematic risk. *MTB* and *LEV* are positively associated with beta, implying that the firms with greater growth opportunities and leverage have higher systematic risk. However, *LIQ*, *DIVPO*, and *EFF* are negative related with beta. Increase in liquidity, dividend payout, and operational efficiency contribute to reduction in systematic risk. Opposite to the expectation, *SIZE* is positively associated with systematic risk. In Japan, larger firms have greater systematic risk and this is contrary to the conventional arguments and existing evidences.

5.2. The effect of corporate international diversification on idiosyncratic risk

This study investigates the effect of corporate international diversification on idiosyncratic risk, as well as systematic risk, because the risk may be the significant part of firm risk. Table 3 reports the regression results considering idiosyncratic risk. The standard variations of idiosyncratic stock returns are used as dependent variables, instead of betas. Other components of each model are consistent with those of Table 2.

The results in Table 3 show that corporate international diversification is positive related with idiosyncratic risk based on the regression results. In model 1 and 2, the estimated coefficients on *FSTS* are positive (0.587 and 0.663) and statistically significant at the 10% level. The estimated coefficients on *FATA*, in model 3 and 4, are also positive (1.042 and 1.179) and statistically significant at the 5% level.

Corporate international diversification is positively associated with idiosyncratic risk, after controlling for other determinants of idiosyncratic risk. This result supports the hypothesis 2a that corporate international diversification is associated with greater idiosyncratic risk. The result indicates that the risks of foreign expansion include idiosyncratic factors that become larger with the firm's increased overseas activities (Krapl, 2015). Unlike the argument of portfolio theory, this finding suggests that idiosyncratic risk is not fully dispersed by multinational operations, but rather becomes greater with internationalization.

From the results of the control variables, other determinants also have significant effects on idiosyncratic risk. Greater growth opportunities and leverage are associated with higher idiosyncratic risk. Conversely, liquidity, dividend payout, and operational efficiency are likely to decrease idiosyncratic risk. Larger firms have lower idiosyncratic risk, but they have higher systematic risk. Finally, contrary to the expectation, profitability is positively related to idiosyncratic risk.

5.3. The effect of corporate international diversification on total risk

In this section, I examine how corporate international diversification influences total risk. Table 4 presents the estimates of the regression models. The standard variations of weakly stock returns are used as dependent variables. Other components are consistent with those of Table 2 and 3.

Consistent with the results of regressions regarding systematic and idiosyncratic risk results, corporate international diversification is positively associated with total risk. In model 1 and 2, the estimated coefficients on *FSTS* are positive (0.953 and 0.902) and statistically significant at the 5% level. Similarly, the estimated coefficients on *FATA*, in model 3 and 4, are positive (1.511 and 1.452) and statistically significant at the 1% level. Even when controlling for other determinants of total risk, the positive relation between corporate international diversification and total risk remains unchanged. The result also suggest that when firms expand operations internationally, they become to be exposed to greater costs exceeding benefits, based on the estimates of systematic and idiosyncratic risk.

6. Conclusion

This study examines how corporate international diversification affects firm risk.

Given the portfolio theory, international diversification is considered to contribute to reducing risk resulting diversification benefits, while multinational firms face additional costs that increase the firms' risk. Thus, the relation between corporate international diversification depends on the net of the adverse effects. The relation is still unanswered due to the lack of consensus among the results of previous studies.

The regression results using a sample of listed Japanese firms suggest that corporate international diversification increases systematic risk, idiosyncratic risk, and total risk. The international diversification measures, represented by the ratio of foreign sales and assets, are positively associated with all risk proxies, after controlling other determinants of risk. This result is consistent with previous studies suggesting that the additional costs of multinational operations such as currency risk, political risk, and greater agency costs result in greater firm risk s (e.g., Lee and Kwok, 1988; Reeb et al., 1998). Therefore, the result of empirical analysis can be explained that the costs of foreign expansion by Japanese firms may dominate benefits, thereby increasing their corporate risk.

Given the finding of this study, as firms increase overseas activities, their firm risks become greater. Even idiosyncratic risk, which is expected to be mitigated by diversification, also increases with overseas expansion. This result provides implications for investors that investing in internationally diversified firms leads to greater risk. If investors hold stocks of multinational firms, they will be exposed to increased idiosyncratic risk as well as systematic risk. In addition, the increase in firm risk is likely to result in the greater cost of capital, because investors require the higher returns for the higher risk. It may also influence the firm's ability to take on capital investment. Therefore, it is recommended for managers of multinational firms to take an efficient risk management of their foreign operations.

References

Agmon, T., & Lessard, D. R. (1977). Investor recognition of corporate international diversification. *The Journal of Finance*, 32(4), 1049-1055.

Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2009). High idiosyncratic volatility and low returns: International and further US evidence. *Journal of Financial Economics*, 91(1), 1-23.

Angelidis, T. (2010). Idiosyncratic risk in emerging markets. *Financial Review*, 45(4), 1053-1078.

Bodnar, G., Tang, C., & Weintrop, J. (2003). The value of corporate international diversification. *NBER Working Paper*.

Brewer, H. L. (1981). Investor benefits from corporate international diversification. *Journal of Financial and Quantitative Analysis*, 16(1), 113-126.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3-56.

Fatemi, A. M. (1984), Shareholders benefits from corporate international diversification. *Journal of Finance*, 39(5), 1325-1344.

Fu, F. (2010). Investor diversification and the pricing of idiosyncratic risk. *Singapore Management University*.

Goldberg, S. R., & Heflin, F. L. (1995). The association between the level of international diversification and risk. *Journal of International Financial Management and Accounting*, 6(1), 1-25.

Goyal, A., & Santa-Clara, P. (2003). Idiosyncratic Risk Matters!. *Journal of Finance*, 58(3), 975-1008.

Hughes, J. S., Logue, D. E., & Sweeney, R. J. (1975) Corporate international diversification and market assigned measures of risk and diversification. *Journal of Financial Quantitative Analysis*, 10(4), 627-637.

Ito, K (2014). Ito Review of Competitiveness and Incentives for Sustainable Growth:Building Favorable Relationships between Companies and Investors. The Ministry of Economy, Trade and Industry, Japan.

Kim, C., W., Hwang, P., & Burgers, W. P. (1989). Global diversification strategy and corporate profit performance. *Strategic management journal*, 10(1), 45-57.

Krapl, A.A. (2015). Corporate international diversification and risk. *International Review of Financial Analysis*, 37, 1-13.

Kwok, C. C., & Reeb, D. M. (2000). Internationalization and firm risk: An upstream-downstream hypothesis. *Journal of International Business Studies*, 31(4),

611-629.

Lee, K. C., & Kwok, C. C. (1988). Multinational corporations vs. domestic corporations: International environmental factors and determinants of capital structure. *Journal of International Business Studies*, 19(2), 195–217.

Malkiel, B. G., & Xu, Y. (2002). Idiosyncratic risk and security returns. *University of Texas at Dallas (November 2002)*.

Merton, R. C. (1987). A simple model of capital market equilibrium with incomplete information. *The journal of finance*, *42*(3), 483-510.

Michel, A., & Shaked, I. (1986). Multinational corporations vs. domestic corporations: Financial performance and characteristics. *Journal of international business studies*, 17(3), 89-100.

Olibe, K.O., Michello, F. A., & Thorne, J. (2008). Systematic risk and international diversification: An empirical perspective. *International Review of Financial Analysis*, 17(4), 681-698.

Reeb, D. M., Kwok, C. C., & Baek, H. Y. (1998). Systematic risk of the multinational corporation. *Journal of International Business Studies*, 29(2), 263–279.

Rugman, A. M. (1976). Risk reduction by international diversification. *Journal of International Business Studies*, 7(2), 75-80.

Shapiro, A. C. (1978). Financial structure and the cost of capital in the multinational corporation. *Journal of Financial and Quantitative Analysis*, 13(2), 211-226.

Singh, M., & Nejadmalayeri, A. (2004). Internationalization, capital structure, and cost of capital: evidence from French corporations. *Journal of Multinational Financial Management*, 14(2), 153-169.

Table 1 Descriptive Statistics

Panel A Summary Statistics

Variables	Observations	Mean	Median	Std Dev
β	11,797	0.846	0.825	0.406
σ_{RES}	12,123	4.531	4.108	1.945
σ_R	12,130	5.355	4.950	2.132
FSTS	12,171	0.296	0.246	0.213
FATA	6,585	0.228	0.199	0.140
ROA	12,472	3.496	2.749	2.994
LIQ	12,472	1.602	1.201	1.331
DIVPO	12,472	0.461	0.257	0.773
MTB	12,472	1.144	1.003	0.593
LEV	12,472	0.492	0.498	0.203
EFF	12,472	1.010	0.912	0.478
SIZE	12,472	11.186	10.990	1.567

β=systematic risk; σ_{RES}=idiosyncratic risk; σ_R=total risk ; FSTS = foreign sales/total sales; FATA =foreign assets/total assets;; ROA=return on assets; LIQ=quick ratio; DIVPO=dividend payout ratio; MTB=market-to-book ratio; LEV= total debts/total asset; EFF=total revenue/total assets; SIZE=the natural logarithm of total assets

Table 1 Descriptive Statistics

Panel B Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12
1. β	1											
2. σ_{RES}	0.330**	1										
3. σ_{R}	0.497**	0.966**	1									
3. FSTS	0.138**	0.043**	0.076**	1								
4. FATA	0.023*	-0.013	-0.0001	0.616**	1							
5. ROA	-0.012	0.037**	0.022*	0.191**	0.144**	1						
6. LIQ	-0.123**	-0.061**	-0.082**	0.054**	0.004	0.223**						
7. DIVPO	-0.052**	-0.036**	-0.023**	-0.055*	-0.047**	-0.327**	0.045**	1				
8. MTB	0.100**	0.186**	0.181**	0.145**	0.118**	0.551**	0.110**	-0.135**	1			
9. LEV	0.221**	0.162**	0.193**	-0.066**	-0.051**	-0.349**	-0.700**	-0.059**	-0.090**	1		
10. EFF	0.002	-0.003	0.005	-0.036**	0.071**	0.026**	-0.282**	-0.070**	-0.040**	0.307**	1	
11. SIZE	0.089**	-0.240**	-0.180**	0.204**	0.258**	-0.083**	-0.181**	-0.036**	0.094**	0.223**	-0.026**	1

** $p < 0.001$; * $p < 0.05$

Table 2 The effect of corporate international diversification on systematic risk

	β			
	Model 1	Model 2	Model 3	Model 4
Intercept	0.820***	-0.054	0.881***	-0.317
	(31.71)	(-0.17)	(29.56)	(-0.75)
FSTS	0.216***	0.153**		
	(3.05)	(2.16)		
FATA			0.320***	0.223**
			(3.09)	(2.06)
ROA		0.0004		-0.004
		(0.17)		(-1.49)
LIQ		-0.011		-0.021*
		(-1.41)		(-1.95)
DIVPO		-0.008*		-0.0005
		(-1.78)		(-0.07)
MTB		0.078***		0.085***
		(5.46)		(5.31)
LEV		0.156*		0.057
		(1.89)		(0.50)
EFF		-0.058*		-0.006
		(-1.83)		(-0.13)
SIZE		0.082***		0.102***
		(2.95)		(2.77)
Year Dummies	YES	YES	YES	YES
N	11,797	11,797	6,411	6,411
R-sq	0.040	0.053	0.048	0.059

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Table 3 The effect of corporate international diversification on idiosyncratic risk

	σ_{RES}			
	Model 1	Model 2	Model 3	Model 4
Intercept	3.408***	10.61***	5.488***	11.36***
	(26.49)	(7.10)	(37.19)	(5.75)
FSTS	0.587*	0.663*		
	(1.65)	(1.94)		
FATA			1.042**	1.179**
			(2.07)	(2.49)
ROA		0.030***		0.028**
		(2.81)		(2.12)
LIQ		-0.051		-0.025
		(-1.46)		(-0.53)
DIVPO		-0.055**		-0.009
		(-2.46)		(-0.30)
MTB		0.730***		0.573***
		(11.46)		(7.98)
LEV		2.334***		2.276***
		(6.66)		(4.71)
EFF		-0.612***		-0.546***
		(-4.29)		(-3.33)
SIZE		-0.534***		-0.589***
		(-4.01)		(-3.43)
Year Dummies	YES	YES	YES	YES
N	12,123	12,123	6,572	6,572
R-sq	0.293	0.336	0.328	0.356

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Table 4 The effect of corporate international diversification on total risk

	σ			
	Model 1	Model 2	Model 3	Model 4
Intercept	4.170***	9.890***	6.917***	10.70***
	(30.08)	(6.08)	(42.80)	(4.99)
FSTS	0.953**	0.902**		
	(2.48)	(2.45)		
FATA			1.511***	1.452***
			(2.74)	(2.73)
ROA		0.025**		0.017
		(2.20)		(1.17)
LIQ		-0.086**		-0.095
		(-2.08)		(-1.42)
DIVPO		-0.055**		0.001
		(-2.25)		(0.04)
MTB		0.816***		0.698***
		(12.25)		(8.50)
LEV		2.235***		2.013***
		(5.76)		(3.75)
EFF		-0.508***		-0.349*
		(-3.27)		(-1.91)
SIZE		-0.346**		-0.411**
		(-2.39)		(-2.22)
Year Dummies	YES	YES	YES	YES
N	12,130	12,130	6,577	6,577
R-sq	0.308	0.352	0.359	0.387

*** p < 0.01; ** p < 0.05; * p< 0.10

[2017.6.30 1243]