出口导向的国际化和创新何时能降低企业-政府风险?

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WHEN DO EXPORT-LED INTERNATIONALIZATION AND INNOVATION REDUCE

FIRM-IDIOSYNCRATIC RISK? EVIDNECE FROM HIGH-TECH FIRMS

Jun Li

Postdoctoral student Shanghai University of Finance and Economics & PICC Asset Management Company Limited Shanghai, China Email: lijun@163.sufe.edu.cn

Jingwen Li* Research assistant Shanghai University of Finance and Economics Shanghai, China Email: li.jingwen@shufe.edu.cn

*Corresponding Author

Abstract: Although prior research has largely focused on the relationship between a firm's degree of internationalization and systematic risk, little is known of its direct impact and interaction effects with innovation on firm-idiosyncratic risk. In response, the authors use a set of panel data collected from high tech firms in China to demonstrate that while export-led internationalization directly suppresses firm-idiosyncratic risk, increased innovation makes such risk reduction effect weaker. Furthermore, while firms facing a more turbulent market environment see export-led internationalization alone a potent tool to alleviate firm-idiosyncratic risk, concurrently increasing export-led internationalization and innovation leads to higher idiosyncratic risk. Results remain robust after controlling for endogeneity and after considering several nuance factors such as firm ownership types and timing. Post-hoc analysis, using systematic risk and performance indicators, provides further evidence showing the criticality of concerning idiosyncratic risk.

Key words: Export-led Internationalization; Innovation; R&D Intensity; Idiosyncratic Risk; Market Turbulence; Panel Data

INTRODUCTION

Internationalization is a form of diversification that has been shown to increase firms' streams of revenues (Chabowski et al., 2018). The literature shows that as a firm's degree of internationalization, measured commonly by its sales located outside of its home country relative to its total sales, increases, so does its performance such as Tobin's q (Gande, Schenzler, & Senbet, 2009) and return on assets (ROA) (Su & Tsang, 2015; Wu & Salomon, 2016). This specific measure of internationalization portraits a firm's extent of exporting along with sales from its foreign subsidiaries (Aabo, Pantzalis, Sørensen, & Toustrup, 2016; Krapl, 2015). A strategic focus on exporting benefits a firm from exploiting its existing offerings for business growth outside its home market. Similarly, innovation is undeniably another important strategic focus that helps firms sustain their growth and competitive advantages through developing new products and business models, improving processes, or generating novelty by creating ''new combinations'' from existing components (Schumpeter, 1934).

However, despite their direct and indirect contributions to a firm's bottom line, innovation and internationalization are inherently risky (Mazzucato & Tancioni, 2012). In today's turbulent global marketplace and rising protectionism in some countries, increases in internationalization and innovation raise an important question to researchers and practitioners on whether they promote or suppress a firm's idiosyncratic risk. *Firm-idiosyncratic risk* is referred to as an unsystematic risk or irregularities specific to a firm that result from stock price volatility (Luo & Bhattacharya, 2009). It is different from systematic risk (Martin, Josephson, Vadakkepatt, & Johnson, 2018). A firm's strategic decisions such as on resource deployment, operations, strategy, and policy can affect its exposure to idiosyncratic risk but not necessarily systematic risk (Gaspar & Massa, 2006).

Furthermore, both innovation and internationalization focus on aggressive business growth (Ansoff, 1965; Prashantham, 2008). Some firms may achieve their growth goals by launching novel products and/or developing new markets. Unfortunately, extant research primarily investigates their impacts on firm performance with a few exceptions (Hejazi & Santor, 2010). We maintain that simply focusing on firm performance (e.g., Tobin's q and ROA) may mislead managers to believe that business growth via overseas market expansion and innovation does not come with a price. Reportedly, each of these strategic choices can influence a firm's future cash flows and subsequently greater volatility in its stock price (Fama & French, 1992). Moreover, some researchers suggest that innovation and internationalization are interrelated (Filipescu, Prashantham, Rialp, & Rialp, 2013); however, anecdotal notes maintain that implementing these mixed strategies is never easy (Lecerf, 2012). Thus, whether simultaneously pursuing these two strategies help reduce idiosyncratic risk remains to be seen. Against this backdrop, the main purpose of this study is to close these research gaps by examining when and how innovation and internationalization individually and collectively lead to firm-idiosyncratic risk such that firms could learn to avoid exposing themselves too much into it, eventually causing their stock prices to fall. We focus on export-led internationalization, captured by the extent to which a firm's sales are generated through exporting relative to its total sales (aka exporting intensity), as this form of internationalization strategy is more common among firms from emerging economies during their early stage of global market expansion.

Using longitudinal data collected from 323 high-tech firms publicly traded in China between 2009 and 2015, our results show that export-led internationalization reduces firmidiosyncratic risk and such effect is even stronger in time of high market turbulence. Nonetheless, although innovation by itself does not incur idiosyncratic risk, it weakens the risk

reduction effect of export-led internationalization; such weakening effect further increases as market turbulence increases. Our findings contribute to practice by cautioning managers to be mindful when coupling innovation with export-led internationalization as far as idiosyncratic risk is concerned. Moreover, different from most traditional performance measures such as ROA widely studied in the literature (Hejazi & Santor, 2010), the direct and indirect impacts of exportled internationalization and innovation on idiosyncratic risk are often overlooked. We contribute to the literature by addressing this void through providing an alternative perspective to evaluate the role of export-led internationalization and innovation in the context of market turbulence.

In the sections that follow, we begin with a review of the literature on firm-idiosyncratic risk. We then develop a conceptual framework, which connects internationalization, innovation, and firm-idiosyncratic risk, with market turbulence serving as an environmental contingency factor.

LITERATURE REVIEW

Risk is the possibility that future events will produce negative consequences for a firm, because it lacks not only a control over the course of events but also knowledge about what events and resolution will occur (MacCrimmon & Wehrung, 1986). Therefore, risk is an inherent characteristic and outcome of strategic decision-making. The financial economics literature suggests that firm stock price volatility is an important metric to measure risk and it can be divided into two types, systematic and idiosyncratic (Martin, Josephson, Vadakkepatt, & Johnson, 2018). Systematic risk reflects how sensitive a firm is to changes in market conditions or to news of its economy (e.g., unemployment rate, interest rate). It is measured by investors' expectations about the future volatility of a firm's total return relative to that of the market as a whole (i.e., β value). This measure of risk has been used quite extensively in earlier studies (Aabo, Pantzalis, Sørensen, & Toustrup, 2016; Sharma & Blomstermo, 2003; Yi, Wang, & Kafouros, 2013). However, systematic risk does not capture risk that results from firm-level factors, and it is not diversifiable by corporate strategies.

More recent research suggests that idiosyncratic risk is a more appropriate metric, which reflects the extent of risk undertaken by a firm for its strategic decision (Shane, 2000). As an echo, (Gaspar & Massa, 2006) show that a firm's stock price volatility comes mostly from idiosyncratic risk, which is 81% as opposed to 19% from systematic risk. Thus, gauging on a firm's idiosyncratic risk rather than systematic risk reflects more accurately its strategic choices and associated outcomes.

Surprisingly, our review of literature reveals that prior research that examines the impact of internationalization or innovation on risk primarily focuses on systematic risk instead of idiosyncratic risk. For example, (Michel & Shaked, 1986), who compared a sample of multinational corporations (MNCs) with a control group of domestic corporations, found a lower systematic risk among MNCs than their counterparts. In contrast, (Reeb, Kwok, & Baek, 1998), using a portfolio approach in an empirical analysis of MNCs headquartered in the United States, showed that internationalization increased systematic risk. Although it is important to understand how internationalization affects systematic risk, managers remain in the dark because systematic risk does not completely explain stock market volatility movements specific to their strategic decisions. Thus, there is an increasing call for examining firm-idiosyncratic risk in order to provide more insights to practice (Gaspar & Massa, 2006; Martin, Josephson, Vadakkepatt, & Johnson, 2018).

Similar to internationalization, innovation has long been recognized as an alternative growth strategy (Schumpeter, 1934), and existing empirical studies consistently find a positive relationship between innovation and firm performance (Van Essen, van Oosterhout, & Carney, 2012). However, this line of argument only tells one side of the story since it ignores the fact that innovation is subject to a long horizon for returns with more volatile and less certain payoffs, which increase firm risk (Ho, Xu, & Yap, 2004). Consequently, using R&D intensity as a proxy of innovation, some researchers such as (Lantz & Sahut, 2005) who explored and found that R&D intensity led to higher systematic risk. (McAlister, Srinivasan, & Kim, 2007) also investigated the same topic but revealed a significant systematic risk reduction effect of R&D intensity. Their findings were echoed by (Saad & Zantout, 2009) and (Pandit, Wasley, & Zach, 2011). Despite the contributions made by this set of literature, whether R&D intensity reduces systematic risk remains unclear. We believe that it is largely due to the fact that systematic risk is influenced heavily by macro environments such as fiscal policy and economic turmoil and when samples are collected from different countries or at different points in time, results could be different.

Some recent research in the field of strategy management (Luo & Bhattacharya, 2009; Martin, Josephson, Vadakkepatt, & Johnson, 2018) has emerged to focus on idiosyncratic risk because it is what firms and their managers could manage through their strategic actions. Unfortunately, empirical evidence remains behind as to how R&D intensity or innovation being a strategic choice affects firm-idiosyncratic risk. Table 1 summarizes our review of the literature.

[Insert Table 1 about here]

One can see that previous studies that examine the impacts of either internationalization or innovation not only draw mixed conclusions on systematic risk but also pay little attention to idiosyncratic risk.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

Given export-led internationalization and innovation are two critical growth strategies pursued by many organizations, how they individually and collectively affect firm-idiosyncratic risk remains an important research question to be answered. Furthermore, because the efficacy of these growth focused strategies is likely to be affected by external environments, we further investigate to what extent market turbulence influences the individual and collective impacts of export-led internationalization and innovation on idiosyncratic risk. Figure 1 illustrates our conceptual model.

[Insert Figure 1 about here]

Effects of Export-Led Internationalization on Firm-Idiosyncratic Risk

Export-Led internationalization, captured by exporting intensity, reflects a firm's strategic focus on expanding its market overseas (Fletcher, 2001). A high degree of export-led internationalization suggests its strong levels of market diversification that could potentially bring in revenue streams from selling to foreign markets (Chabowski et al., 2018), yet incur less costs associated with liabilities of foreignness (Hymer, 1976). We believe that export-led internationalization has distinctive options that help firms reduce idiosyncratic risk in at least multiple ways. First, expanding overseas gives firms opportunities to increase their revenue streams outside of their home country (Filipescu, Prashantham, Rialp, & Rialp, 2013). Selling increasingly to global markets reduces demand fluctuations and reliance on a firm's domestic market, thus smooths the volatility of the firm's cash flows and earnings. Second, increased demands from international markets stipulate productions, making economies of scales possible, ultimately making a firm's product more price competitive. Different from other foreign market entry modes, export-led internationalization emphasizes local production and therefore the firm has more controls over the quality of its inputs and outputs (Lipsey & Weiss, 1984). Along with economies of scales, better control over product quality is likely to reduce idiosyncratic risk. Third, although transactions could be more complex in foreign markets, increased export-led internationalization facilitates the firm to gain knowledge of overseas markets. Having more exposure to global markets enables it to close its knowledge gaps. A stronger understanding of foreign markets provides assurance to investors that the firm will continue having the ability to meet customer needs worldwide (Ray, Ray, & Kumar, 2017; Tsao & Chen, 2012). Finally, export-led internationalization is typically in the form of arm's length transactions. Such contractual agreements and transactions are likely to be viewed as safer exchanges by investors, reducing a firm's idiosyncratic risk. Taken together, despite the liability of foreignness, as firms increase their exporting intensity, learning and economies of scales are likely to take place, we posit:

H1: As export-led internationalization increases (decreases), firm-idiosyncratic risk decreases (increases).

Nonetheless, when taking contingency factors into consideration, such effect is far from straightforward. Market turbulence reflects the rate of change in customer preferences and demands associated with a firm's primary market (Saboo & Grewal, 2013). Prior research shows that some firms that expand aboard are driven by their desire to escape from erratic and

unfavorable local conditions (Ray, Ray, & Kumar, 2017; Zhu, Wittmann, & Peng, 2012). This is particularly true for firms from emerging countries where market liberalization prevails, making domestic firms more vulnerable to competition as foreign multinational firms continue to enter. Intense competition provokes market instability. Thus, we argue that when market turbulence is high, export-led internationalization, which reduces a firm's reliance on demands from its local or single market, should aid in lowering its idiosyncratic risk. Additionally, internationalization brings firms contacting with new knowledge or information about global market trends and competitive environments not easily obtainable in their home market (Ray, Ray, & Kumar, 2017). When market conditions are highly unstable, those knowledge aids firms to learn and keep track of market dynamics (Tsao & Chen, 2012). Increases in internationalization also foster firms to adapt more rapidly to prevailing circumstances. During the process of expanding overseas, firms accumulate new resources and capabilities (Hsu, Lien, & Chen, 2015; Yildiz & Fey, 2012), enabling them to mitigate intense competition and shifting demands, reducing their exposure to idiosyncratic risk. We posit:

H2: In the presence of high (low) market turbulence, more export-led internationalization decreases (increases) firm-idiosyncratic risk.

Effects of Innovation on Idiosyncratic Risk

Innovation, often connected to R&D intensity, reflects a firm's strategic focus on experimenting and creating new ideas, technology, and alike (Ansoff, 1965). Because R&D investments support a firm's absorptive capacity (Cohen & Levinthal, 1990), innovation ability (Martin, Josephson, Vadakkepatt, & Johnson, 2018), and product adaptation (Gassmann & Han, 2004), it comes with no surprise that the literature constantly shows that innovation not only induces direct effects but also complements other firm strategies or capabilities to influence long term performance (Azar & Ciabuschi, 2017; Silva, Styles, & Lages, 2017). However, innovation is not without costs and more R&D investments could drain a firm's resources substantially in the short-run (Mazzucato & Tancioni, 2012). Due to the uncertainty surrounding innovation, the question bears asking is whether it entails any risk.

In our review of extant literature shown in Table 1, we find little empirical work that studies the impact of R&D intensity or innovation on idiosyncratic risk. In contrast, more studies have attempted to explore the impact of R&D intensity on systematic risk although their findings are inconclusive, with some showing positive (Lantz & Sahut, 2005) and others, negative (McAlister, Srinivasan, & Kim, 2007; Pandit, Wasley, & Zach, 2011; Saad & Zantout, 2009). These mixed results seem unsurprising given the fact that systematic risks are in general affected by monetary policy, macroeconomic factors, and alike, making the estimation of systematic risks not only less stable but also more disconnected to firm strategy.

Among the limited evidence on the influence of R&D intensity on idiosyncratic risk, the study by (Mazzucato & Tancioni, 2012) shows that due to higher uncertainty in the outcomes of their R&D efforts, R&D intensive firms such as those in the biotechnology industry may experience more volatility in firm-specific returns relative to average market returns. Their assertion echoes (Schumpeter, 1934), who maintains that innovation is a costly process. Because outcomes from R&D investment are difficult to predict and investors are unlikely to have enough information to weigh in, leading to more volatility in stock price specific to the firm rather than the market as a whole. In contrast, when R&D intensity is low, reduced changes in product designs and increased predictable product rollout timing reduce uncertainty associated with the firm (Özsomer & Gençtürk, 2003), thereby reducing idiosyncratic risk. We posit:

H3: As innovation increases (decreases), firm-idiosyncratic risk increases (decreases).

Furthermore, we argue that in the presence of high market turbulence, increases in innovation or R&D intensity likely result in more idiosyncratic risk. In highly turbulent markets, firms relying on making a full use of their current marketing knowledge and skills may find it difficult to appeal to evolving customer needs. Continuous changing product preferences require firms to combine and reconfigure their intangible and tangible resources in new ways. Unfortunately, the outcomes of these novel efforts are difficult to assess particularly when volatility is high on the demand side.

Although market uncertainty may make firms to invest in innovation, not all innovations are fruitful, and some even fail (Yen & Wei, 2009). In turbulent environments, it becomes even more important for a firm to bring new products to market in a timely manner (Bstieler, 2005), because a contention exists between a longer horizon of paying back and a shorter product life cycle for innovation (Ho, Xu, & Yap, 2004). Specifically, a product may take a long journey from idea to development and from development to commercialization. Nonetheless, buyer preferences are diverse, discrete and uncertain in turbulence environments. By the time when a firm is ready to launch a new product to the market, customer preferences might have changed or competitors might have already launched a product similar to the firm's. Therefore, the downside financial and credibility risks can increase substantially in a relatively short window of opportunity. Aimless investment strategies are prone to resource-misallocation, and large amounts of resources consumed by R&D investment further trigger cashflow issues, leading to firm idiosyncratic risk. Thus, we postulate that:

H4: In the presence of high (low) market turbulence, more innovation further increases (decreases) firm-idiosyncratic risk.

Interactive Effects of Innovation and Export-Led Internationalization on Idiosyncratic Risk

Earlier research suggests that innovation could drive export-led internationalization. In particular, (Vernon, 1966) emphasizes innovation comes first and new products are launched to home markets prior to exporting to the rest of the world. However, late research suggests otherwise. For example, (Cassiman & Martinez-Ros, 2007) show that product innovation drives firm-level internationalization, whereas (Filipescu, Prashantham, Rialp, & Rialp, 2013) do not establish a positive relationship between product innovation and internationalization. Late research postulates that innovation and internationalization indeed are two growth strategies that possibly interact with each other to affect performance outcomes (Lecerf, 2012).

Some scholars argue that innovation and internationalization could complement each other because new knowledge arises from these two venues can serve as inputs for each other, leading to better performance outcomes (Kotabe, Jiang, & Murray, 2017). Despite the upside profit potentials brought by the combining these two efforts, from a risk management perspective, we postulate that as a firm's innovation or R&D intensifies, the idiosyncratic risk reduction effect of export-led internationalization is likely jeopardize for the following reasons.

First and foremost, when a firm focuses more on innovation and thus raises its R&D investment, it may signal to investors an added cost to internationalization, which may affect the firm's expected cash flow, inducing volatility to the firm's stock price (Brown & Petersen, 2011). Second, when the firm strengthens its R&D spending, innovation could become more frequent (Van Essen, van Oosterhout, & Carney, 2012), possibly making its product life cycle shorter and less stable worldwide. This in turn creates volatility in the firm's stock price as uncertainty associated with R&D investment together with internationalization looms large. In contrast, when R&D intensity is low, the idiosyncratic risk reduction effect of internationalization increases. Reduced changes in product designs and increased predictable product rollout timing reduce uncertainty associated with the firm (Özsomer & Gençtürk, 2003), enabling export-led internationalization to reap the benefits of cost savings (i.e., economies of scale) and thereby reducing idiosyncratic risk. Third, the effort to innovate and to internationalize could also come from the same pool of resources, leading to a tension between these two strategic focuses. Because innovation takes a longer horizon to see its outcomes and if a firm tries to maximize investment in all domains, resource misallocation may occur (He & Tian, 2013), which could be alarming to investors, leading to more undesirable firmidiosyncratic risk. Taken together, we posit:

H5: As innovation increases (decreases), the idiosyncratic risk reduction effect of export-led internationalization decreases (increases).

Furthermore, increased market turbulence could make firms difficult to formulate future strategic plans because of uncertainties in demand and supply sides (Bstieler, 2005; Lee, 2010), thus escalating the downside uncertainty of innovation, putting export-led internationalization at further risk. However, when the market condition is more stable, customer preferences are more predictable, hence more innovation, driven by higher R&D intensity, would be helpful to quickly capture and satisfy the needs of customers from various international markets. Prior research shows that firms, as information processors, learn and absorb new knowledge better in a relatively calm market environment (Ray, Ray, & Kumar, 2017). Continuous learning through

innovation and internationalization in a more predicable market environment gives the firms opportunities to develop expand their offerings more suitable to foreign markets, resulting in better cash flow and thus lower idiosyncratic risk.

H6: In the presence of low (high) market turbulence, more innovation strengthens (weakens) the idiosyncratic risk reduction effect of export-led internationalization.

METHODS

Research Context and Data

This study sets its context in China. As one of the fastest growing economies in the world, China's global trade has been growing rapidly in the last thirty decades or so (Tsao & Chen, 2012). Its total trade in goods increased from USD280.9 billion in 1995 to USD4.1 trillion or a 12.4% of total world trade in 2017.¹ Echoing this fact, previous research (Chabowski et al., 2018) shows that a firm's internationalization typically begins with exporting and many firms from developing and emerging countries have been counting mostly on exporting to sustain their growth and competitive advantages. As evidence, in 2017 alone, members of the World Trade Organization exported almost 17.5 trillion US dollars of goods; of which 44% came from developing economies including China.² Additionally, the Chinese central and regional governments have been promoting R&D activities as part of their central planning for many years (Tsao & Chen, 2012). All of these suggest that China provides an appropriate setting to study the theoretical relationships among export-led internationalization, R&D intensity, and firm-idiosyncratic risk.

¹ https://chinapower.csis.org/trade-partner/

² https://www.wto.org/english/res_e/statis_e/wts2018_e/wts2018_e.pdf

We focus on high-tech industries, defined by OECD classification standards, which include aviation and aircraft, biological medicine, communications, computer-related, electronics, medical equipment, and instrument manufacturing. One major reason for us to study high-tech industries because technological turbulence is found shaping firm strategic choices and we want to control for such possible impacts (Lee & Tang, 2018). A total of 469 high-tech firms were listed on the stock exchanges in China. Since the global financial crisis in 2008 was a huge exogenous shock for many firms, we set our observation period from 2009 to 2015. Because we needed data for firm-level foreign sales, stock price, and financial data, we turned to several Chinese databases such as WIND, iFinD and GTA CSMAR. After removing firms of excessive missing data, our final sample includes 1,783 firm-year observations, involving 323 firms.

Model Setting

Based on the conceptual model and its hypotheses discussed above, this study sets the model in Equation (1):

$$iRisk_{i,t+1} = \beta_0 + \beta_1 DOI_{it} + \beta_2 R \& D_{it} + \beta_3 M tur_{it} + \beta_4 DOI * R \& D_{it} + \beta_5 DOI * M tur_{it} + \beta_6 R \& D * M tur_{it} + \beta_7 DOI * R \& D * M tur_{it} + \sum \beta_k Z_{it} + \delta_t + \varepsilon_{it}$$
(1)

where *iRisk* is firm-idiosyncratic risk, *DOI* is the level of export-led internationalization; *R&D* indicates R&D intensity, and *Mtur* represents the degree of market turbulence; *Z*, a vector of controls, is included for each observation; β is a coefficient, indicating the effect of each individual factor on export-led internationalization; δ and ε represent respectively the time-fixed effect and the error term; and the subscripts of *i* and *t* indicate respectively firm and year. All but the dependent variable are lagged by one year.

<u>Measures</u>

Dependent Variable: *firm-idiosyncratic risk* is derived from excess returns, which capture the extent to which stock prices react to company specific behaviors above and beyond the way the market evolves, including a slow moving. Prior studies have used idiosyncratic risk as an outcome variable of corporate strategies, for example, internationalization (Krapl, 2015), innovation (Saad & Zantout, 2009) and corporate social responsibility (Luo & Bhattacharya, 2009). Furthermore, China's stock market starts late, but well developed. The individual daily data is available in all major databases, which is similar to the French website or CRSP, and it has been widely used in the finance literature (Pan, Wang, & Weisbach, 2015), Therefore, it is an appropriate strategy for Chinese firms to use the Fama-French factors on stock market data.

Thus, following the literature (Luo & Bhattacharya, 2009; Martin, Josephson, Vadakkepatt, & Johnson, 2018), *firm-idiosyncratic risk* is calculated as follows:

$$v_{it} = \ln\left(\frac{1 - R_{it}^2}{R_{it}^2}\right)$$
(2)

where R_{it}^2 is the coefficient of determination derived from Equation (3) stated below.

$$(r_{i,d} - r_{rf}) = \alpha_i + \beta_1 (r_{MKT} - r_{rf}) + \beta_2 r_{SMB} + \beta_3 r_{HML} + u_{i,d}$$
(3)

where $(r_{i,d})$, the stock return on a given day minus the risk-free rate of return (r_{rf}) , is determined by the daily factors of (1) difference between the market index return rate and the market risk-free rate (r_{MKT}) , (2) difference of returns between large and small stocks (r_{SMB}) , and (3) difference of returns between book-to-market stocks that are considered high or low (r_{HML}) , plus its error term $(u_{i,d})$. Independent and Moderating Variables: Consistent with previous literature (Ray, Ray, & Kumar, 2017), *export-led internationalization* is measured by the ratio of foreign sales to total sales. *R&D intensity* reflects a firm's efforts to build its innovation strategy and associated outcomes. In general, the stronger a firm's commitment to innovation, the more financial resources the firm would put into R&D (Özsomer & Gençtürk, 2003). Accordingly, we measure a firm's innovation strategy based on its R&D expenses in proportion to its total sales (Tsao & Chen, 2012). Similar to (Segarra & Callejón, 2002) and (Saboo & Grewal, 2013), we measure *local market turbulence* using the selling, general, and administrative expenses divided by the sales of all firms classified in the same industrial category as a sampled firm. As the focal firm's industry is increasingly unstable, it is expected to increase its marketing expenses in proportion to its local industrial norm.

Control Variables: Consistent with the literature, the following variables are controlled. Larger firms tend to have more resources and therefore are more likely to take risk (Audia & Greve, 2006). We thus control for *firm size*, measured by the number of employees and it is log-transformed to reduce skewness. We also control for *firm age* since younger firms tend to take more risk and internationalize more aggressively than older firms (Van Essen, van Oosterhout, & Carney, 2012). Firm age is calculated by the number of years between the founding year and 2015. *Return on assets (ROA)* is measured by net incomes to total assets and since net incomes are easily accessible, more profitable firms tend to take on more risks (Hejazi & Santor, 2010). We further control for *leverage*, which is the ratio of total debts to total assets and is found associated positively with risk (Audia & Greve, 2006). We control for a firm's *business growth*, measured by the change in its main business income over last year. Firms that experience stronger growth rates are prone to risk-taking (Eshima & Anderson, 2017). The literature on

corporate governance suggests that top management team's compensation affects firm risk (Miller, Wiseman, & Gomez-Mejia, 2002). We follow the literature and use the average *compensation*, i.e., basic salary, bonus, stipends, and other benefits of the top three executives of each firm to measure the variable (Sun, Zhao, & Yang, 2010). The variable is log-transformed to reduce skewness. Previous studies find that concentrated ownership encourages risk-taking within a firm (Mahmood & Mitchell, 2004). *Ownership concentration* is measured by the percentage of shares the largest shareholders owned (Zhou & Guillén, 2015). Additionally, firms that have received *subsidies* from their local or central governments are more likely to be less risk averse (Kotabe, Jiang, & Murray, 2017). To account for it, we create a dummy variable, coded as "1" if a firm received government subsidies, and "0" otherwise . Finally, we include a series of dummy variables to control for *year fixed effects*.

[Insert Table 2 about here]

RESULTS

Descriptive Statistics and Correlations

Table 3 shows the descriptive statistics of our data. For example, the mean value of firmidiosyncratic risk across all periods is 0.0685, higher than the standard deviation of 0.0501, suggesting that the level of idiosyncratic risk among firms in the sample did not fluctuate significantly. internationalization, measured by the ratio of foreign sales to total sales, is 0.2637, which represents approximately 26% of a firm's total sales come from foreign markets. Furthermore, we also present the correlation matrix of our variables of interest in Table 3. All pairs of correlation coefficients are below 0.4413, suggesting that multicollinearity is unlikely a concern in our data (Leiblein, Reuer, & Dalsace, 2002). Additionally, the correlations between firm-idiosyncratic risk and control variables are negative except for leverage, largely consistent with prior literature.

[Insert Table 3 about here]

Hypothesis Testing Results

Table 4 presents our empirical findings based on fixed effects models. Variables were meancentered whenever appropriate before creating any interaction terms to avoid the concern of multicollinearity. Accordingly, we constructed Model 1, which includes only the control variables. In Model 2, we added to Model 1 the linear term of internationalization, innovation, and market turbulence. We further constructed Model 3 by adding the two-way interaction terms to Model 2. Finally, we added a three-way interaction term of internationalization, innovation and market turbulence to Model 3 to build Model 4.

[Insert Table 4 about here]

Consistent with Hypothesis 1, the results in Model 2 show that the relationship between a firm's internationalization and its idiosyncratic risk is negative and significant (β = -.0197, p < .05), supporting H1. However, the results in Model 2 show that the relationship between a firm's innovation and its idiosyncratic risk is positive but not significant (β = .000155, p >.1), H3 is not supported. Further, our findings in Model 3 support Hypothesis 2, which postulates a negative interaction effect of internationalization and market turbulence on idiosyncratic risk (β = -.0019, p < .01). Figure 2a illustrates this interaction effect – as local market turbulence increases (decreases), internationalization results in lower (higher) idiosyncratic risk. With respect to Hypothesis 4, our results in Model 3 show a positive and significant effect (β

= .000207, p < .01), confirming the risk increasing role of innovation in the presence of market turbulence. Figure 2b provides further evidence – as market turbulence become fierce, innovation tends to increase firm idiosyncratic risk.

[Insert Figure 2a-c about here]

The results in model 4 also show that the interaction of internationalization and innovation has a positive effect on firms' idiosyncratic risk, supporting H5. Figure 2c provides further evidence – as innovation increase, internationalization increases firm idiosyncratic risk. Further, Hypothesis 6 states that market turbulence moderates the coupling effect of internationalization and innovation on firm-idiosyncratic risk, such that the interaction effect becomes stronger as market conditions become more turbulent. Results in Model 4 show that the coefficient of the three-way interaction is statistically significant ($\beta = .000674$, p < .01), supporting H4. Figure 2d illustrates this finding. As market turbulence increases, the combined effect of internationalization and innovation on idiosyncratic risk increases.

Robustness Checks

We examined the robustness of our findings in three ways and results are reported in Table 5. First, the Chinese central government announced "The Belt and Road Initiative" in 2013³. Under this initiative, firms are encouraged to increase their internationalization activities. Accordingly, we used a subsample of firms that were involved in internationalization prior to the year 2013 to test our model. Results are comparable to those using the full sample. Second, state-owned enterprises (SOEs), relative to non-SOEs, are often given priorities to access to needed resources

³ http://www.chinadaily.com.cn/opinion/2017beltandroad/2017-06/05/content_29618551.htm

(Lin & Tan, 1999) and therefore might be more sensitive to changing market conditions. SOE are also expected to support national strategy such as 'Go Global,' which clearly states the importance of firms expanding abroad.⁴ Thus, we tested our model on a subsample of non-SOEs to see if non-SOEs behave differently. The results shown in Models 8-10 are consistent with those reported in Table 4. Third, we ran additional tests to examine whether inverse causality between internationalization and firm-idiosyncratic risk existed. Following prior research (Filatotchev & Piesse, 2009), we structured our models as a causal chain, i.e., internationalization \rightarrow idiosyncratic risk \rightarrow internationalization and tested it on three-stage least square (3sls) regression. As Models 11-13 show, the results remain comparable to those using the full sample. Finally, despite the efforts made through fixed effects and 3SLS, for example, there may still be endogenous problems due to sample selection biases. If the sample selection bias exists, it indicates companies with a low idiosyncratic risk are more motivated to explore new markets, that is, the sample of high-risk firms suffers from relatively weak endogeneity because companies with a high idiosyncratic risk lack the incentive to implement an internationalization strategy. Therefore, we re-run regressions with the group of high-risk firms based on median, and the results shown in Models 14-16 are consistent with those reported in Table 4.

[Insert Table 5 about here]

Post-hoc Analysis

Although most literature suggests that risk and returns are correlated positively, i.e., high risk high returns, (Bowman, 1980) argues that it is not always the case and low risk projects could

⁴ http://english.www.gov.cn/news/top_news/2016/04/11/content_281475325205328.htm

yield high returns. To examine "Bowman's paradox," we tested our models using alternative dependent variables, i.e., Tobin's q and ROA, which represent respectively long- and short-term firm performance (Luo & Bhattacharya, 2009). Results are reported in Table 6. In particular, internationalization is found having a positive and marginally significant effect on Tobin's q (Model 18: $\beta = .499$, p < .10) and a negative effect on ROA (Model 22: $\beta = .00748$, p > .1). Conversely, R&D intensity affects Tobin's q and ROA in a positive way (Model 18: $\beta = .171$, p < .01; Model 22: $\beta = .00206$, p < .05). Additionally, the results show that firms that concurrently increase innovation and internationalization boost short-term operating performance, i.e., ROA (Model 23: $\beta = .00892$, p < .05) but doing so does not affect long-term financial performance, i.e., Tobin's q (Model 19: $\beta = .155$, p > .10). This set of findings points to the fact that simply focusing on performance measures might mask our understanding of the role of internationalization and innovation in managing risk idiosyncratic to firms. Finally, we examined whether firm-idiosyncratic risk was related to Tobin's q and ROA. We found that firmidiosyncratic risk is associated negatively and significantly with Tobin's q (b = -4.801; tstatistics = -3.97) but not significantly with ROA (b = -0.00187; t-statistics = -0.04).

We have already investigated the independent and joint impact of the internationalization and innovation strategies on firm-idiosyncratic risk in the previous section. Since most prior studies examine systematic risk, it would be interesting to see how our conceptual model plays out using systematic risk as the dependent variable. Results in Table 6 show that internationalization has a significant and positive effect on systematic risk (Model 28: $\beta = .313$, p < .01), whereas innovation does not (Model 28: $\beta = .0135$, p > .1). Their combined effects are found positively influencing systematic risk as well (Model 28: $\beta = .00156$, p < .01). These results are comparable to our results using idiosyncratic risk as the dependent variable reported in Table 4. However, as

shown in Table 7, when taking market turbulence into account, results based on systematic risk are different from those based on idiosyncratic risk.

[Insert Table 6 and Table 7 about here]

DISCUSSION AND CONCLUSION

We developed a theoretical framework shown in Figure 1 to investigate the independent and joint effects of internationalization and innovation on firm-idiosyncratic risk. Using the framework, we first derived the hypotheses concerning the impact of internationalization and innovation on firm-idiosyncratic risk. In light of our empirical evidence, we concluded that internationalization was able to decrease firm-idiosyncratic risk. We found no evidence that innovation leads to firm-idiosyncratic risk, which is similar to the findings reported by (Luo & Bhattacharya, 2009). In addition, our study examined the interactive effects of internationalization and innovation strategies and found that the combined effects raise firm-idiosyncratic risk. Finally, our findings provide support for the contingency role of market turbulence in changing the direct and indirect influences of internationalization and innovation on idiosyncratic risk. Below we discuss the theoretical and managerial implications of our findings.

Theoretical Implications

This study provides a novel theoretical lens by integrating the financial economics literature on risk to enable our understanding of internationalization in a dynamic setting, offering several important implications to theory. First, although the topic of internationalization has been discussed extensively in recent years (Tsao & Chen, 2012), our study is the first shifting the

predominant focus of internationalization on firm performance to firm-idiosyncratic risk by showing how internationalization influences this particular type of risk. Although some prior studies have investigated the link between internationalization and risk, they focus on systematic risk. A core argument in the literature is that tapping into a more diverse set of foreign markets may yield new opportunities (Sapienza, Autio, George, & Zahra, 2006), but it inevitably involves increased liabilities of foreignness and risks (Zahra, 2005). Internationalization is complex and difficult to manage, as cross-national differences in government regulations, trade policies, and currency fluctuations generate mostly systematic risks, however. As discussed previously, systematic risk and firm-idiosyncratic risk are different and most risk faced by firms comes from idiosyncratic risk (Martin, Josephson, Vadakkepatt, & Johnson, 2018). We explicitly investigate whether or not and under what conditions internationalization helps a firm suppress firm-level idiosyncratic risk, which affects the volatility of stock price and thus, its long-term well-being.

Second, recent cross-national longitudinal study shows that internationalization has neither linear nor non-linear effects on performance, measured by ROA, thus rejecting the Scurve effects (Pisani, Garcia-Bernardo, & Heemskerk, 2020). We add to this debate by showing that rather than a predictor of ROA, internationalization may affect a firm's idiosyncratic risk. In our post-hoc analysis, we found that internationalization does not affect ROA and its effect on Tobin's q is marginally significant at the 10% level. In other words, internationalization could create a long-term positive influence on a firm's financial success perhaps through its impact on reducing firm-idiosyncratic risk.

We found that in isolation, internationalization suppresses firm-idiosyncratic risk, but in conjunction with innovation, its effect on firm-idiosyncratic risk shifts to the opposite direction.

Our study provides empirical evidence to support the premise that while tapping into a more diverse set of foreign markets may yield new opportunities, doing so inevitably involves risks. We further found that the effect of internationalization on idiosyncratic risk varies as local market turbulence changes. Unfavorable domestic market conditions could push firms out looking for opportunities (Ray, Ray, & Kumar, 2017).

Third, our study departs from other research that focuses on internationalizing innovation (Talay, Akdeniz, Obal, & Townsend, 2019). Rather, we view innovation as a strategic choice independent from internationalization although they can be deployed concurrently. We found that innovation mitigates the risk reduction effect of internationalization. This finding is unique as the literature has focused mostly on the role of innovation on firm performance rather than idiosyncratic risk. We add to the literature by showing the challenge of innovation from a risk management perspective.

Fourth, our research provides an alternative explanation as to why firms opt to internationalize even though internationalization alone does not always connect to ROA (Pisani, Garcia-Bernardo, & Heemskerk, 2020). We show that simply considering firm performance as an outcome variable may not help identifying a firm's motivation to go global. Moreover, the decision of managers investing in a foreign country also depends, to some extent, on the likelihood of risk reduction. Our findings are consistent with finance theory (Fatemi, 1984), which suggests that portfolio diversification decreases firm-idiosyncratic risk by avoiding aggressive challenges from its competitors and smoothing the fluctuations of revenue stream, but increase firm systematic risk due to exchange rate fluctuations and political uncertainties (Michel & Shaked, 1986; Reeb, Kwok, & Baek, 1998). The current study indeed broadens our understanding of a firm's motivation to internationalize by taking idiosyncratic risk into account.

Managerial Implications

Our results shed new insights to managers. First, international firms should be mindful of the full extent of the benefits that internationalization offers. It is important to recognize that internationalization not only decreases idiosyncratic risk but also enhances long term performance (Tobin's q). Therefore, this study strongly suggests that a well-devised strategy can simultaneously yield high returns at low idiosyncratic risk.

Second, our study holds important implications for firms that attempt to combine mixed strategies—expanding new markets while developing novel products. The key take-away is that it is not necessary for a firm to be innovative at high levels to strengthen its internationalization efforts. Rather, firms need to adopt strategic postures based on moderate risk-taking, combined with either high or low levels of innovation and internationalization. The findings suggest that the resource demand of pursuing internationalization and innovation strategy simultaneously will exceed firms' resource supply, which will lead firm-idiosyncrasies risk increase. Regardless of which high risk strategy is adopted, however, it is important for managers to avoid becoming over aggressive by increasing resource commitments in too many strategies, that initially benefit firm performance later become hindrances. Internationalization could be regarded as a strategy enabling a firm to exploit new market, whereas innovation reflects its efforts to develop new products. Hence, both internationalization and innovation could be viewed by investors as high risk-taking and resource-consuming activities (Lecerf, 2012). Due to resource constraints and

when a firm's resources cannot cover the risks brought by the simultaneous implementation of innovation and internationalization, firm-idiosyncrasies risk increases.

Finally, our post-hoc analysis and its results show a positive and significant effect of internationalization on Tobin's q but not on ROA, suggesting that senior managers should understand that long-term performance measures are a better fit to estimate the outcomes of internationalization than short-term performance measures. Learning in foreign markets is achieved in the long-term, as previously stated in the organizational learning theory (Ray, Ray, & Kumar, 2017). As long as export-led internationalization can reduce idiosyncratic risk, better long-term financial performance could result.

Limitations and Future Research

This study has some limitations that can be addressed in future research. First, our sample is constrained to the unique context of high-tech in China, which may raise a question about the generalizability of this study's findings to other emerging market contexts. Additionally, exploring industry heterogeneity certainly represents an important question. Therefore, questions such as these present interesting avenues for future research. Second, while internationalization can be outward and/or inward (Tsao & Chen, 2012), this study focuses on the idiosyncratic risk implications of outward internationalization activities. Limited by the availability of data, we were unable to completely reflect a firm's internationalization. Thus, future research investigating the risk implications of inward internationalization, such as international purchasing, may generate new understanding of the risk effects of internationalization. Thirdly, our focus on export-led internationalization and its measure, exporting intensity, does not completely reflect a firm's scope of internationalization and other market entry modes. As the

risk effects of internationalization are likely stronger for firms that are in more advanced stages of the internationalization process (Krapl, 2015), future research could study different entry modes as firms evolve in more advanced stages of internationalization. Lastly, this study only examines the moderating effect of market turbulence. Most recent research (Eduardsen & Marinova, 2020) has called for more attention paid to organizational contingencies to explain why firms differ in their abilities to reduce risk when increasing their involvement in foreign markets. As resource commitment is different for firms that are in earlier stages compared to firms that are in more mature stages, the effect of internationalization on risk may be heterogeneous across various life stages of a firm. Future research could investigate firms' stages of internationalization and other resource factors.

In conclusion, our study deepens academic understanding of the interplay between two key strategic instruments in explaining the variability of firm-idiosyncratic risk among heterogeneous firms. While internationalization and innovation, on the one hand, provides firms with an opportunity to grow, they also expose firms to heightened risks, which may negatively influence their performance. Consequently, the fundamental responsibilities of management in international enterprises is to identify, manage and minimize risk by considering it in the decision-making process.

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