Narrow-Framing and Risk Preferences in Family and Non-Family Firms

By: Hanqing "Chevy" Fang, Esra Memili, James J. Chrisman, and Linjia Tang

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Abstract:

Building upon prospect theory's concept of narrow-framing, we explore family firms' risk preferences across multiple decisions in corporate entrepreneurship. We argue that family firms' decisions are less likely to be narrowly framed (more likely to be made as a group rather than in isolation) compared to non-family firms. Examining the interaction between two risky decisions (internationalization and R&D investment) in two samples of publicly traded firms in the USA and China confirms our hypotheses. Family firms appear more likely than non-family firms to diversify risk when making multiple decisions concerning corporate entrepreneurship. However, given inferior performance, risk taking across multiple decisions in family firms is positively related.

Keywords: corporate entrepreneurship | family business | narrow-framing | risk management

Article:

INTRODUCTION

Often studied at the firm level, scholars claim that risk is an inherent part of corporate entrepreneurship (Lumpkin and Dess, 1996; Zahra, 1991; Zahra and Covin, 1995), through which firms might implement strategic renewal and performance turnaround (Wiseman and Bromiley, 1996) or, alternatively, face substantial monetary losses (Sitkin and Pable, 1992). In

recent years, there has been increased scholarly attention to the risk preferences in family owned and -managed firms within the domain of corporate entrepreneurship (Chrisman and Patel, 2012; Gómez-Mejía et al., 2007, 2014). Indeed, the literature recognizes that family business represents a unique type of organization in engaging in and managing corporate entrepreneurship (Brumana et al., 2017; Minola et al., 2016). In particular, research shows that family firms tend to be loss and usually, risk averse, as reflected in lower R&D intensity (Chrisman and Patel, 2012; Gomez-Mejia et al., 2014), diversification (Gómez-Mejía et al., 2010), and internationalization than non-family firms (Alessandri et al., 2018a; Fang et al., 2018). Nonetheless, family business scholars also note that risk preferences in family firms might also be subject to preference reversals (e.g., De Massis et al., 2020; Strike et al., 2015). Moreover, studies generally show that inferior past performance may prompt firms to take greater risk (e.g., Park, 2002). In this case, family firms might turn from risk aversion to risk taking, potentially even more so than non-family competitors in order to enhance firm performance and preserve the owning family's socioemotional wealth (SEW), which represents their non-economic endowment in the business (Chrisman and Patel, 2012; Gomez-Mejia et al., 2007; Kotlar et al., 2014).

While the prominent stream of research on family firm risk preference has yielded fruitful insights, researchers often treat risky decisions individually. Nonetheless, as Miller and Bromiley (1990) and others (Bromiley et al., 2015, 2017; Palmer and Wiseman, 1999; Ruefli et al., 1999) highlight, strategic decisions embedded in corporate entrepreneurship might have different types and levels of risks. Thus, conceptualizing risk preference based on a single type of decision might fall short in reflecting the complexity of corporate entrepreneurship in organizations and neglect the fact that organizations can manage their aggregate level of risk by combining high and low risk activities (Amit and Livnat, 1988), or by designing integrative systems that coordinate multiple risk-taking activities (Lawrence and Lorsch, 1969).

Building upon the narrow-framing perspective discussed in prospect theory (Kahneman and Lovallo, 1993; Kahneman, 2003), we argue that compared to family firms, risky decisions in non-family firms are more likely to be narrowly framed, meaning that risk decisions in non-family firms are more likely to be made in isolation rather than as a group because decision-makers are apt to be evaluated on the short-term results of each decision and have limited discretion to deviate from short-term profit maximization objectives. By contrast, decision-makers in family firms should have greater discretion to consider decisions in combination and from a long-term perspective. By drawing upon existing risk preference and corporate entrepreneurship studies in the family business literature, we further argue that given the tendencies for risk aversion and preference reversal observed in family firms, the consideration of decisions as a group are likely to be influenced by these tendencies.

We test these premises by exploring the interactions among two risky dimensions – R&D investment and internationalization – that are widely studied in the corporate entrepreneurship and family business literatures (see De Massis et al., 2013; Pukall and Calabró, 2014). Using two samples of publicly traded firms (US sample, *S&P 1500* manufacturing firms from 1996 to 2013; China sample, *Second-board Market* from 2012 to 2017), we find a negative relationship between internationalization and R&D investments in family firms. Nonetheless, when facing inferior performance, the relationship between internationalization and R&D investments is positive in family firms. In comparison, in non-family firms, the two risky decisions seem to be

made in isolation. We conclude that risky decisions in family firms are more likely to be broadly framed than they are in non-family firms where decisions are more likely to be narrowly framed.

This study contributes to the management field, particularly the family business and the corporate entrepreneurship literatures, in several ways. First, this study builds on prior work to explore how family firms manage multiple risky decisions rather than a single risky decision. By combining the concept of 'narrow-framing' and the family business risk preference and corporate entrepreneurship literatures, this study adds to the understanding of risk preferences in family firms and suggests new ways of exploring the topic. Second, this study adds to knowledge on strategic decision-making in family firms (Chrisman et al., 2016). Our findings suggest that, unlike non-family firms, strategic decisions in family firms are more likely to be broadly framed. Hence, our findings suggest that family firms' corporate entrepreneurship in general and risky decisions in particular cannot be fully understood without considering the portfolio of risk decisions being made. This study also has important implications for corporate entrepreneurship in family firms. If indeed family firms are less vulnerable to the problem of narrow-framing, then family firm decision-makers might be more discriminating in their management of new venture portfolios than non-family firms and pursue a more balanced approach to risk-taking when performance meets (or exceeds) expectations and a more extreme approach in risk seeking when performance falls below aspirations. Thus, future work in family business should consider how corporate entrepreneurship fits into a portfolio of risky decisions, since focusing on a single set of preferences and a single risk dimension (e.g., R&D investment) might hide important nuances in entrepreneurial behaviour.

THEORETICAL FRAMEWORK

Multiple Risk Decisions in Corporate Entrepreneurship

The investigation of the role of risk in corporate entrepreneurship has been gaining impetus (Bromiley, 1991; Bromiley et al., 2017; Miller and Bromiley, 1990) and the literature has been drawing attention to the various types and sources of risk that organizational decision-makers need to face (Palmer and Wiseman, 1999; Ruefli et al., 1999). For instance, Bromiley et al. (2015, p. 269) note that, 'executives face diverse risks including market risk, competitive risk, supply chain risk, political risk, and exchange rate risk' and 'a single strategic decision may involve multiple types of risk that occur at different times during execution'.

In this article, we define risk as the probability of adverse outcomes in strategic choices involving the allocation of resources. This definition is aligned with Palmer and Wiseman (1999)'s definition of managerial risk, as we focus on risks that organizations might be exposed to stemming from what they choose to do. By contrast, we are not focusing on risks that arise from externalities that are beyond the control of organization's decision-makers such as risks associated with recession, currency fluctuations, so forth.

Studies in corporate entrepreneurship and family business tend to focus on a single risky decision such as R&D investments (e.g., Chrisman and Patel, 2012; Gómez-Mejía et al., 2014) or international diversification (Alessandri et al., 2018a; Lin, 2012). While this has added to the knowledge of family firm decision making under risk, it does not fully reflect the complexity of

risk taking within the domain of corporate entrepreneurship. Indeed, firms can make multiple risky decisions over time or at a point in time in entrepreneurial endeavours. Thus, conceptualizing risk-taking along a single decision dimension may not fully reflect risk preferences and lead to inaccurate assumptions about the nature of risk taking in corporate entrepreneurship.

Narrow-Framing

One possible reason behind the neglect of multiple risky decisions in the literature is that decision-makers might not always evaluate risks in a holistic manner: instead of merging one risk with other risks, they often evaluate risks in isolation. This tendency to evaluate a risky prospect in isolation rather than mixing it with other risks is known as 'narrow-framing', (Kahneman, 2003; Kahneman and Lovallo, 1993). Kahneman and Tversky (1979) and Tversky and Kahneman (1981) first introduce the concept of narrow framing by noting that people tend to simplify complicated phenomena by segmenting them into easily understandable components (also see mental accounting: Benartzi and Thaler, 1995; Thaler, 1985). In their seminal work on prospect theory, Kahneman and Lovallo (1993) define narrow-framing as a behavioural tendency such that 'people tend to consider decision problems one at a time, often isolating the current problem from other choices that may be pending, as well as from future opportunities to make similar decisions' (p. 19).[1] As Kahneman (2003) observes, narrowly framed decisions depart far more from risk neutrality than decisions that are broadly framed in a more inclusive context, i.e., as a group. Hence, narrow framing makes it hard to take advantage of diversification in managing multiple decisions concerning corporate entrepreneurship, which by definition requires joint evaluation.

The concept of narrow framing has been adopted in the economics, finance, and marketing literatures. Scholars have used narrow-framing to explain decision-making biases associated with equity premiums (Benartzi and Thaler, 1995), stocks and options markets (Barberis and Huang, 2001; Kumar and Lim, 2008, Liu et al., 2010), investment portfolios (Barberis et al., 2006) and consumer choices (Thaler, 1980; Read and Loewenstein, 1995). The shared wisdom is that narrow-framing represents a type of cognitive bias that makes it difficult to reduce risk by combining high and low risk opportunities (Amit and Livnat, 1988), or designing an integrative system that can facilitate coordination among a firm's functions (Lawrence and Lorsch, 1969).

Narrow-Framing in Organizations

According to Kahneman and Lovallo (1993), the extent to which narrow-framing exists in organizational settings depends upon whether problems are easily grouped together and how outcomes based on risky choices are evaluated. In the first instance, whether problems are

[1] Read and Loewenstein (1995) discuss two factors causing narrow-framing: *time contraction* which is the tendency to compress time intervals and treat long intervals as if they were short, and *choice bracketing*, which is the tendency to treat choices that are framed together differently from those that are framed apart. Note that *choice bracketing* is simply another name for whether decisions are broadly or narrowly framed. We follow the terminology used in Kahneman and Lovello (1993) Kahneman (2003) rather than that of Read and Loewenstein (1993) and Read et al. (1999). We further discuss *time contraction* below.

grouped together is influenced by their common dimensions and the extent to which these can be described in similar terms. Problem grouping is often applied when decisions are made locally (Hill et al., 1992), involve coordination of multiple strategic functions (Barki and Pinsonneault, 2005), require intuitive thinking and accessibility to a broad range of information (Kahneman, 2003; Stanovich and West, 2000), and are based on frames of reference heavily orientated toward a specific decision scenario (Barki and Pinsonneault, 2005).

In the second instance, narrow framing is influenced by how a manager's performance is evaluated and how often it is evaluated (Kahneman and Lovallo, 1993). If tolerance for failure is low, the tendency of managers to treat decisions in isolation should increase. Likewise, as the frequency of performance evaluation increases, so will narrow-framing because the likelihood that managers will be evaluated on a single or small number of strategic decisions is increased. Conversely, if failure is tolerated and decisions are evaluated less frequently and in bundles, narrow framing is less likely to occur.

Narrow-Framing and Risky Decisions in Family Business

The research on corporate entrepreneurship in family business recognizes that family firms represent a unique type of organization in managing risk-decisions. A central theme here is that there exists a 'mixed gamble' such that risky decisions in family firms are driven by the interaction between economic and non-economic endowments (Alessandri et al., 2018a; Gómez-Mejía et al., 2014; Martin et al., 2013). Other studies highlight certain contingencies such as growth opportunities and business group membership (Choi et al., 2015), managerial incentives (Alessandri et al., 2018b), and the behaviours of competitors, buyers and suppliers (Kotlar et al., 2014) that affect risk preferences in family firms. Kotlar and others (2018) found that mixed gambles might manifest in attempts to balance current and the future wealth endowments.[2] Despite notable advancements, previous studies often focus on a single risky decision, neglecting the fact that family and non-family firms need to make multiple risk decisions in corporate entrepreneurship simultaneously.

As discussed below, we argue that family firms are less vulnerable to the problem of narrowing-framing, and therefore risky decisions in corporate entrepreneurship are more likely to be made as a group in family firms for two reasons. First, decision-making in family firms often follows a long-term, continuity-focused orientation (Lumpkin and Brigham, 2011), defined by 'the tendency to prioritize the long-range implications and impact of decisions and actions that come to fruition after an extended time period' (Lumpkin et al., 2010, p. 241). As a type of dominant logic, long-term orientation is 'stored as a shared cognitive map (or set of schemas) among the dominant coalition' of an owning family and its family members (Prahalad and Bettis, 1986, p. 491), and may shape strategic decisions such as how slack resources will be managed (Gentry et al., 2016). Here, long-term orientation is developed, magnified, transferred, solidified, and eventually shared among family members, largely through family members' early childhood

[2] Similar to the focus in Kotlar et al. (2018), one extension in the narrow-framing literature is *time contraction* (Read and Loewenstein, 1995), which suggests that risk preferences will differ depending upon if decisions are made together at one point in time or sequentially over time. Although we do not attempt to directly investigate the nuances of time contraction in the article, we do compare the decision framing of family and non-family firms when decisions are made simultaneously or sequentially.

participation and long-term involvement in the family firm (Le Breton-Miller and Miller, 2006). Long-term orientation might help shape the goal setting of each family member, as the motives behind decisions are more aligned with the long-term prosperity of the family (Diaz-Moriana et al., 2020; Lumpkin and Brigham, 2011). Research illustrates that even CEOs approaching retirement in family firms exhibit long-term orientation with future generations in mind and thereby pursue risky strategic activities, such as international acquisitions, in line with this tendency (Strike et al., 2015). Thus, a long-term orientation should reduce the probability that narrow framing will occur.

Second, unified ownership and control provide family firm decision-makers with the authority and discretion needed to bypass normal constraints on decision making found in non-family firms (Carney, 2005; De Massis et al., 2014). Indeed, family firms are often able to behave idiosyncratically because of the power derived from family's ownership and involvement in top management/director positions, as well as the legitimacy stemming from long-term family presence and influence in business (Mitchell et al., 2011). Strong family control allows family firm decision-makers to ensure that their family centred agendas are implemented throughout the whole organization with minimal political resistance (Carney, 2005; De Massis et al., 2020; König et al., 2013). Strong family control also suggests extended time frames of evaluation and higher tolerances for failure in entrepreneurial endeavours which may further reduce the probability of narrow-framing (Gómez-Mejía et al., 2001).

Strong family control may also facilitate the spread of the family centred long-term- cognitions mentioned above to non-family subordinates through socialization and selection processes (Eddleston, 2008; Pearson and Marler, 2010). Such cognitive consensus among family and non-family decision-makers in family firms might help proscribe narrowly framed decisions (Kaplan, 2008). Furthermore, shared mindsets among decision-makers might strengthen the 'informal' management style of family firms, as the adoption of family centred long-term orientation might simplify the complex decision-making process and partially substitute for the bureaucratic budgeting, reporting, and monitoring commonly found in non-family firms (Kets de Vries, 1993). Overall, due to long-term-orientated family centred mindsets as well as the strong decision-making control, risky decisions inherently embedded in a family firm's corporate entrepreneurship initiatives seem less likely to be narrowly framed than in non-family firms.

Managing Multiple Risks in Family Business

A prominent stream of corporate entrepreneurship research explores risk preference in family firms. It is generally agreed that when making risky decisions, family firm decision-makers may follow a subjective preference for SEW as its primary reference point (Berrone et al., 2012; Strike et al., 2015), and it is steeper on the loss side than the gain side (Chua et al., 2015). In addition, the owning family tend be loss averse toward the threats to their SEW, and risk seeking in the realm of losses (Berrone et al., 2012; Gómez-Mejía et al., 2007). The motivation of creating and/or preserving the family's SEW appears to cause family firm decision-makers to be more risk-averse compared to decision-makers in non-family firms (Berrone et al., 2012; Chrisman and Patel, 2012; Cennamo et al., 2012; Gómez-Mejía et al., 2007; Wiseman and Gómez-Mejía, 1998), as risky decisions in corporate entrepreneurship might disrupt the tradition, heritage, and legacy of the family firm (De Massis et al., 2016), as well as reduce family control

(Gómez-Mejía et al., 2007, 2010). On the other hand, in the loss domain, family firms might be more willing to take risk than non-family competitors in order to bring performance to acceptable levels and preserve the owning family's SEW (Chrisman and Patel, 2012; Gomez-Mejia et al., 2010; Kotlar et al., 2014). Finally, the embodiment of authority within the family enhances the freedom to make risk averse or risk seeking choices in its entrepreneurial activities (Brumana et al., 2017; Carney, 2005).

Chua and colleagues (2015, p.178) state that from a prospect theory point of view there could be multiple reference points and multiple approaches to framing decisions that influence SEW, each of which could lead to different decisions. This prompts attention to how family firms group together multiple decisions in corporate entrepreneurship, rather than making individual decisions. Indeed, given a lower probability of narrow-framing as discussed above, we expect that when examining risky decisions as a group, family firm decision-makers will generally favour a risk-diversifying strategy. In other words, in family firms, we expect that decision-makers will consider decisions as a group to ensure that overall risks are manageable rather than too high or too low. Such a risk diversifying strategy in corporate entrepreneurship is comparable to the rationale behind a diversified investment portfolio that aims to mitigate overall risk by combining high-risk investments with low-risk ones (Amit and Livnat, 1988). Risk diversifying is, therefore, driven by 'loss aversion'. That is, although risk diversification does not necessarily lead to profit maximization, at least it helps ensure acceptable profits at an acceptable level of risk while developing entrepreneurial initiatives at the firm level.

On the other hand, in the face of a 'loss domain', family firm decision-makers should be willing to bear risk even across multiple strategic decisions with the hope that the loss of family–centred economic and non-economic utilities can be neutralized. Again, because of the owning family's strong control of the business, narrow framing is likely to be avoided and a riskier set of entrepreneurial initiatives might be acceptable (Kahneman and Lovallo, 1993).

HYPOTHESES DEVELOPMENT

To test our theory, we choose to explore how the level of internationalization would influence investments in R&D activities. R&D investment and internationalization are among the two most-widely studied types of risky decisions in the family business literature (Chrisman and Patel, 2012; Fang et al., 2018; Gómez-Mejía et al., 2010, 2014). We focus on internationalization and R&D investments because, consistent with the narrow-framing literature, we wanted to study decisions that involve similar types of risk but that are different enough to be potentially isolated in the minds of decision makers (Kahneman and Lovallo, 1993).

Risk-taking is a defining feature of corporate entrepreneurship (Dess and Lumpkin, 2005; Zahra, 2018), and both R&D investment and internationalization involve risk-taking that firms often need to leverage in order to build a balanced portfolio of risky investments. In addition, both R&D and internationalization rely upon new combinations involving new markets, new products, and new sources of supply (Schumpeter, 1934). Finally, the interactivity between R&D and internationalization is also entrepreneurial. Indeed, firms often rely upon R&D activities to develop new products for foreign countries and internationalization might help the firm obtain

and/or accumulate physical, human, and knowledge resources, which can be leveraged to further support R&D activities.

Yet, although each represents a component of a firm's portfolio of risky decisions in corporate entrepreneurship, an investment in one does not require an investment in the other. Nonetheless, the two decisions often should be made as a group rather than in isolation to increase returns and/or reduce risk.

Risk Management in Family Firms

Since they are generally loss-averse with respect to both their economic and non-economic performance, family firm decision-makers are expected to be more likely to favour risk-diversifying strategies than non-family firms to ensure the survival of the business and preserve its SEW (Berrone et al., 2012; Gómez-Mejía et al., 2007; Mishra and McConaughy, 1999). That means high (low) internationalization might be associated with lower (higher) levels of R&D investment in family firms compared to non-family firms (Kotlar et al., 2014). Thus, we expect that risk diversifying would be preferred because it can serve to ensure that moderate rather than excessive or insufficient levels of risks are taken. In comparison, the discretion of decision-makers in non-family firms might be bounded by the organizational bureaucracy (Williamson, 1996). In other words, decision-makers in non-family firms might be less able to unilaterally make risky decisions. Furthermore, their decision-making latitude may be further constrained by short-term profit considerations and by evaluations that focus more on the outcomes of individual decisions rather than the outcomes of a set of decisions (Strike et al., 2015).

Hence, we expect that risk-diversifying would be a favourable risk management strategy for family firms engaging in corporate entrepreneurship. In non-family firms, given the greater limits to decision-making discretion (Carney, 2005), the more frequent and formalized evaluations of managers (Gomez-Mejia et al., 2001; Williamson, 1996), and greater weight placed on short-term performance (Lumpkin and Brigham, 2011; Lumpkin et al., 2010), R&D investments and internationalization decisions are likely to be treated in isolation. In other words, family firms are more likely to *broadly* frame multiple risky decisions than non-family firms, meaning that the relationship between R&D investments and internationalization will be negatively moderated by family involvement in a firm (i.e., the family firm variable in our study).

Hypothesis 1: Family involvement in a firm will negatively moderate the relationship between internationalization and R&D investments.

Performance Aspirations and Risk Management in Family Firms

Previous research suggests that family firms are characterized by preference reversals. In this vein, studies generally show that decision-makers frame strategic decisions and take risk depending on prior performance in comparison to aspirations (e.g., Park, 2002). In line with this, empirical evidence shows that family firms take fewer risks in R&D investments (e.g., Block, 2012; Chrisman and Patel, 2012; Kotlar et al., 2014), but when performance falls below

industry averages, otherwise risk-averse family firms are likely to embrace higher risk in the form of increased R&D investments (Chrisman and Patel, 2012; Patel and Chrisman, 2014), technology acquisitions (Kotlar et al., 2013), and both domestic and international diversification (Gómez-Mejía et al., 2010). This is because performance below aspirations affect both economic and non-economic wealth, exacerbating the loss aversion experienced by family firm decision-makers.

This suggests that family firm decision-makers may become risk-willing in the face of inferior firm performance. Thus, we argue that family firms might exhibit a shift from risk diversifying to risk taking in corporate entrepreneurship when making multiple strategic decisions for at least two reasons. First, in case of deteriorating performance, family firms may engage in strategic changes in order to mitigate the performance discrepancy with market competitors (Chrisman and Patel, 2012; Gómez-Mejía et al., 2007). Because they are generally loss averse, inferior performance shifts the owning family's goals toward eliminating losses in financial performance since this will protect both economic and non-economic wealth (Patel and Chrisman, 2014). In other words, family firm decision-makers are willing to elevate the firm's aggregated level of risk by increasing investments in entrepreneurial opportunities. This follows from prior literature. However, how family firms treat multiple risks in combination has not been investigated.

Second, in contrast to non-family firms where decision-makers might not have sufficient power and authority to make idiosyncratic decisions, the owning family's control grants family decision-makers with that ability (Carney, 2005). As noted earlier, strong family control, along with long term orientation provides a greater degree of protection to decision-makers, if some decisions turn out to be wrong (Gómez-Mejía et al., 2001). For these reasons, family owners are more willing and able to take higher risks across multiple dimensions (De Massis et al., 2014).

Thus, when performance is below aspirations, the relationship between R&D investments and internationalization is expected to be positively related for family firms because we expect them to intensify their overall level of risk taking. By contrast, in non-family firms, due to the relatively short-term orientation and bureaucratic controls facing decision-makers, narrow-framing even in the face of inferior performance is more likely. In other words, our theorizing leads us to expect that the relationship between R&D investment and internationalization will be positively moderated by family involvement in the firm (i.e., the family firm variable in our study).

Hypothesis 2: When firm performance is below aspirations, family involvement will positively moderate the relationship between internationalization and R&D investments.

METHODOLOGY

We use two samples to test our hypotheses. The first sample includes manufacturing firms listed in the *S&P 1500* index (USA) from 1996 to 2013 with at least five years of continuous information available. Furthermore, we focus on manufacturing firms as these organizations often need to rely on high R&D investments and internationalization to remain competitive, thus they constitute an appropriate sample to test our hypotheses. Utility and service firms are

excluded owing to differences in regulations and strategies which may have unique effects on firms' risk decisions. The temporal span considered in this sample covers the 'Internet Bubble' and 2008 financial crisis both characterized by dramatic macro-economic fluctuations. Thus, observations should have enough variation regarding the dynamic pattern of firm performance as well as industrial settings.

To identify founding families and their role in the firm, we examined *Hoover's, ExecuComp*, *Fundinguniverse.com*, *ancestry.com*, firm websites, and company proxy statements. We use Hoover's, fundinguniverse.com, and firm websites to identify the founders, past owners, managers, and directors of each firm. We use ExecuComp and Hoover's to obtain names of owners, managers, and directors between 1996 and 2013. In order to verify family relations, we use 1) the match of family name, 2) family relationships released in proxy statements as required by law, and 3) ancestry.com. Measures related to family firm governance are obtained from firm proxies and annual reports. Other variables come from the Compustat database.

Owing to some outliers in the US sample, we winsorize the data by limiting extreme values of the internationalization variable by 1 per cent. Therefore, the final sample includes 805 firms with 9,919 firm-year observations. The data structure is unbalanced in nature.

In order to ensure the robustness of our analyses in different contexts, we also use a sample of manufacturing firms from China. We choose to use samples of firms from China and the USA because they are the two largest economies in the world, yet their national cultures are markedly different. Indeed, the USA is a developed economy while China is a transitional economy that is moving toward being a developed economy (Davies and Walters, 2004). China has a culture of high collectivism (Chen et al., 2005), in comparison to the prevalence of individualism in the USA. Hence, decision-making in Chinese family firms might be guided by the collective interest of the whole family rather than interests of individual family members. In addition, Chinese culture features higher power distance compared to the USA (Farh et al., 2007), hence the decision-making authority of the owning family might be further pronounced in China. Furthermore, Chinese culture has a greater degree of long-term orientation compared to the USA (Lui and Ngo, 2012), which directly affects the time horizon which owning family uses in grouping and framing risky decisions in business. Thus, if our theoretical assertions about broad framing in family firms and narrow framing in non-family firms holds in these disparate contexts/cultures, then it is likely that they will hold in other contexts and cultures. Also, finding that our theory holds in these two contexts is significant in itself because of the economic importance of the USA and China.

The Chinese sample includes firms listed in the *Chinese Second-board Market* from 2012 to 2017 with continuous information available for the whole period. Known as China's NASDAQ, the secondary board holds a higher percentage of family firms compared to the main board which is primarily composed of state-owned firms (Huang et al., 2016). At the end of 2017, there were 700 companies listed on the Second-board Market in China. Again, utility and service firms are excluded owing to the reasons discussed above, reducing the sample size to 350 listed manufactured firms. We focused on the period from 2012 to 2017 because data on annual R&D expenditures were first released in 2012. Corporate governance data (founders, shareholders and family relationships) are from public news reports, firm proxy statements, and corporate

websites. All other data are from the China Stock Market & Accounting Research Database, which is the most comprehensive and reliable database for publicly traded companies in China. The final Chinese sample includes 251 listed firms with 966 firm-year observations. The data structure is also unbalanced in nature. However, in the case of the Chinese sample, there was no need to winsorize the data.

We used identical measurement methods to classify family firms in the USA and Chinese samples. Furthermore, the dependent, independent, and control variables are measured identically in both samples. We used 2-digit industry codes for both samples (SIC2 for US sample and C2 for China sample). As discussed below, the only difference in the two analyses is in the selection of instrumental variables; we used three for the US sample, but only two for the China sample since one of those used for the US sample was not available.

Measurement of Variables

Hypothesis 1 is tested using the entire sample. To ensure the direction of causality, one-year lags between the dependent variable (time t) and other variables (time $t-1$) are used in the main tests of the hypotheses. To ensure that time contraction bias was not driving our results, we also ran regressions without lags to represent decisions made simultaneously rather than sequentially. Furthermore, as explained below, different configurations of the family firm variable are used to test for robustness.

R&D investment

Our dependent variable, R&D investment, is measured as the ratio of R&D expenses to total sales. This variable is industry adjusted.

Family firm

The literature defines family firms by a family's involvement in a business and a vision for how the firm will benefit the family, potentially across generations (e.g., Chua et al., 1999). Consistent with this definition, the family firm variable is a binary measure coded as 1 when the firm has at least 5 per cent family ownership and at least two family members who are or have been owners, top managers, or directors sometime in the firm's history (Miller et al., 2007). Firms that do not meet these conditions are considered non-family firms and are coded as 0. This measure indicates that multiple family members are (or have been) involved in the company, which may signal the existence of intra-family succession intentions.[3] This measure also differentiates family firms from lone-founder firms (Cannella et al., 2015; Miller et al., 2007), which by definition have never had multiple family members involved in the firm, and from non-family blockholder-controlled firms where the significant owners are neither family members nor founders.

[3] However, across firm-year observations, 98 per cent in the US sample and 100 per cent in the Chinese sample classified as family firms have two or more family members currently involved in ownership, management, or the board of directors.

Internationalization

Internationalization is measured as the ratio of a firm's international sales to total sales (Fang et al., 2018; Gómez-Mejía et al., 2010).[4] This variable is also industry adjusted.

Performance aspirations

Assuming firms aspire to exceed competitors' performance, we determined whether firms had *performance below aspirations* (PBA) by calculating the difference between their ROA in time $t-1$ and industry average ROA in time $t-2$ according to 2-digit industry codes (Chrisman and Patel, 2012; Kotlar et al., 2014). We then split the samples according to whether performance was above or below aspirations and tested Hypothesis 2 using only the firm-year observations where performance was below aspirations.[5]

Control variables

The following control variables are included because of their potential influence on firm behaviour. First, because their performance differs markedly from family firms, we use a *lone-founder firm* variable to denote a firm where one founder has at least 5 per cent ownership (Miller et al., 2007), but no other family members are or have been involved in the firm (Cannella et al., 2015; Miller et al., 2007). The lone-founder firm variable is measured as a binary variable. Second, *non-family blockholder ownership,* measured as the ratio of blockholder ownership to total ownership in year $t-1$, is used as a control because non-family blockholders may have concerns that are incompatible with the owning family's interests (Morck and Steier, 2005) since they are typically the representatives of institutional or other non-family investors. Third, we control for *firm age* (the number of years that a company has been operating in the market) and *firm size* (log of sales, in dollars for the US sample and in RMBs for the Chinese sample), as these variables can often affect firm behaviour and performance (Anderson and Reeb, 2003; Miller et al., 2007). Fourth, to exclude the effects of other strategic actions, we use *advertising ratio* (advertising/ sales), *absorbed slack* (SGA expenses/sales), *plant and equipment newness* (net P&E/gross P&E), and *debt financing* (debt/total asset) as controls (Chrisman and Patel, 2012; Zhang, 2006; Zhang and Rajagopalan, 2010). Finally, we use Tobin's Q (Chrisman and Patel, 2012) to control for *past performance*.

Analytical Method

After adjusting for industry effects, the highest variance inflation factor (VIF) is 1.82 for the US sample and 2.66 for the China sample, suggesting that multi-collinearity is not a major concern. In longitudinal data, Ordinary Least Square regression analysis may yield biased estimations. Thus, fixed-effects longitudinal regression is used as the primary analytical technique because Hausman tests suggests it is more appropriate than the random-effects model for both samples. (US sample: Chi Sq = 109.74, p-Value < 0.001; China sample: Chi Sq = 703.91, p-

[4] Debt financing was used in place of replacing internationalization as a risk measure in one of our robustness tests.
[5] We did not use 3-way interactions to test H2. This is because in 3-way interaction performance-below-aspirations would be treated as a continue variable, whereas our theory and the hypothesis treat performance-below-aspirations as a special context. Thus, splitting the sample is a better also more direct approach for testing the hypothesis.

Value < 0.001). In order to control for potential serial correlation and heteroscedasticity, the Huber-White estimator clustered at the firm level is also used (Judson and Owen, 1999). For both samples, a one-year lag between dependent and other variables is used for the main tests; to ensure robustness with regard to whether the strategic decisions are made simultaneously or sequentially (Read and Loewenstein, 1995), we also ran tests with no lag between the dependent variable and the independent and control variables.

Controlling for Endogeneity

To avoid biased regression estimates, we applied two approaches to control for endogeneity. First, endogeneity might stem from reverse causality. To ensure the direction of causality, one-year lags are used between the dependent variable and others. Second, Heckman's (1979) two-stage technique (also see Gómez-Mejía et al., 2007) is used. In the first stage, instrumental variables are selected that are highly related to the family firm variable, but are unrelated to the dependent variable, R&D investment.

We used three instrumental variables in the US sample. The first variable is *family trust-holdings* where a value of 1 indicates that firm owners hold either trusts or foundations for the benefit of family members, and a value of 0 indicates they do not. Family trust-holding can be a signal of the owning family's trans-generational vision, but is unlikely to be related to R&D investments. This variable is obtained from annual proxy statements for the US sample.

The second variable is the ratio of industry sales by family firms in a 2-digit industry to the sales of all firms in that industry (*family firm sales/industry sales*), which is related to the probability that a firm in the industry is a family firm, yet is independent of R&D investments because the latter is industry-adjusted. Similar approaches have been used in previous family business studies to control for endogeneity (Amit et al., 2015; Campa and Kedia, 2002). We used the ratio of advertisement expenditures by family firms in an industry to total advertisement expenditures in the industry, again according to 2-digit industry codes (*family firm advertising expenditures/industry advertising expenditures*) as the third variable.

For the Chinese sample, data for the family trust variable are not available, therefore, we relied on the *family firm sales/industry sales* and *family firm advertising expenditures/industry advertising expenditures* variables. The two *industry-level* instrumental variables should be highly correlated with the family firm variable. Furthermore, because we adjusted the dependent variable by industry effects, its correlation with the instrumental variables should be low (Amit et al., 2015).

Using Heckman's two-stage procedure for both samples, we first estimated a probit model where the 1-0 family firm variable is regressed against instrumental variables and the other control variables mentioned above. Based on the estimation results, the inverse Mills ratio is calculated for each firm-year observation and included as a control in all models.

Table I. Descriptive statistics and correlations (US sample)

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Family Business (0/1)	0.26	0.44	1.00														
2. R&D Investment	0.04	0.07	−0.15	1.00													
3. Internalization	0.24	1.09	−0.03	0.04	1.00												
4. Lone-Founder Firm (0/1)	0.08	0.28	−0.18	0.16	0.01	1.00											
5. Blockholder Ownership	2.14	7.59	0.00	−0.02	−0.03	0.06	1.00										
6. Firm Age	53.99	65.75	−0.02	−0.16	0.02	−0.14	−0.03	1.00									
7. Firm Size	7.30	1.61	−0.09	−0.25	0.05	−0.14	−0.17	0.18	1.00								
8. Advertisement Ratio	0.01	0.03	0.08	−0.05	−0.01	0.03	0.06	−0.01	0.06	1.00							
9. Absorbed Slack (SGA Expenses/Sales)	0.29	4.26	0.02	0.02	0.00	0.00	0.00	−0.01	−0.07	0.01	1.00						
10. Plant Newness	0.50	0.14	0.08	−0.20	−0.05	0.05	0.07	−0.03	0.07	0.04	0.03	1.00					
11. Debt Financing	0.03	0.06	0.03	−0.11	0.01	−0.07	0.00	0.08	0.17	0.01	−0.01	0.09	1.00				
12. Past Performance (Tobin Q)	2.20	1.99	−0.06	0.19	−0.02	0.16	0.02	−0.08	−0.11	0.12	0.01	0.06	−0.10	1.00			
13. Family Trust-Holdings	0.33	0.47	0.73	−0.06	−0.03	0.25	0.14	−0.09	−0.16	0.12	0.02	0.07	−0.03	0.01	1.00		
14. Family Firm Sales Ratio by Industry	0.17	0.28	0.45	−0.20	−0.04	−0.08	0.00	−0.03	−0.05	0.14	0.02	0.15	0.04	−0.05	0.36	1.00	
15. Family Firm Advertisement Ratio by Industry	0.16	0.33	0.32	−0.18	−0.02	−0.08	−0.02	−0.02	0.02	0.15	0.02	0.07	0.05	−0.04	0.25	0.62	1.00

Descriptive and correlations are based upon 9,919 observations.
All variables are NOT adjusted by industry.
All correlations above |0.02| and |0.03| are significant at 0.05, and 0.01, respectively or better for a two-tailed test

Table II. Descriptive statistics and correlations (China sample)

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Family Business (0/1)	0.27	0.44	1.00													
2. R&D Investment	0.05	0.06	0.00	1.00												
3. Internationalization	0.07	0.17	0.00	0.08	1.00											
4. Lone-Founder Firm (0/1)	0.24	0.42	−0.33	0.00	−0.03	1.00										
5. Blockholder Ownership	31.88	24.91	−0.47	−0.08	0.04	−0.13	1.00									
6. Firm Age	13.52	5.00	−0.02	−0.06	0.04	−0.02	0.04	1.00								
7. Firm Size	20.89	1.12	−0.11	−0.30	0.04	−0.03	0.27	−0.02	1.00							
8. Advertisement Ratio	0.01	0.02	0.03	0.04	−0.04	0.02	0.06	−0.05	−0.01	1.00						
9. Non-Production Overhead	0.89	0.16	−0.06	0.03	0.04	0.01	0.02	−0.02	0.00	−0.11	1.00					
10. Plant Newness	0.29	0.30	0.02	0.02	0.01	0.01	−0.07	−0.02	0.04	−0.02	0.03	1.00				
11. Debt financing	0.66	7.22	0.01	−0.02	−0.03	−0.04	0.02	−0.01	0.07	0.02	−0.09	−0.03	1.00			
12. Past Performance (Tobin Q)	3.33	5.89	−0.09	0.00	0.04	−0.02	−0.03	−0.04	0.01	0.01	−0.01	−0.01	−0.04	1.00		
13. Family Firm Sales Ratio by Industry	0.04	0.03	0.22	−0.07	0.02	0.12	0.03	−0.03	0.09	−0.02	−0.06	−0.01	0.05	−0.03	1.00	
14. Family Firm Advertisement Ratio by Industry	0.06	0.05	0.21	0.02	0.00	−0.08	−0.01	−0.09	−0.10	−0.05	−0.02	−0.01	0.05	−0.01	0.38	1.00

Descriptive and correlations are based upon 966 observations.
All variables are NOT adjusted by industry.
All correlations above |0.04|, |0.07| are significant at 0.05, and 0.01, respectively or better for a two-tailed test

Table III. Fixed-effects longitudinal regression analysis (US sample, R&D as DV, internationalization as IV)

Dependent variable	**Family business**	**R&D investment**	**Internationalization**	**R&D investment**	**R&D investment**	**R&D investment**
	Full sample	**Full Sample**	**Full sample**	**Full sample**	**Below performance aspiration**	**Above performance aspiration**
Sample	**Model 1a**	**Model 2a**	**Model 3a**	**Model 4a**	**Model 5a**	**Model 6a**
Constant	−1.885***	0.016	0.031	0.016	−0.017	0.019
Family Business (Fam)		−0.004†	−0.204**	−0.004†	−0.003	−0.004**
Internationalization				−0.0001	0.0003**	−0.00002
Fam * Internationalization				−0.0001* **(H1)**	0.001* **(H2)**	−0.0001
Lone-Founder Firm		−0.002	−0.028	−0.002	0.001	−0.005†
Blockholder Ownership	−0.027***	0.000	−0.001	0.000	0.000	0.000
Firm Age	0.001***	0.0003†	0.002	0.0003†	0.001**	−0.001***
Firm Size	0.001	−0.005***	0.001	−0.005***	−0.004**	0.005**
Advertisement Ratio	−0.033**	−0.009	0.318	−0.010	0.177	−0.172*
Absorbed Slack (SGA Expenses/Sales)	−1.890**	−0.0001**	−0.004**	−0.0001**	−0.0001*	0.062***
Plant Newness	−0.001	0.012	0.036	0.012	0.015*	−0.011
Debt Financing	−0.108***	−0.003	−0.055	−0.003	−0.008	0.001
Past Performance (Tobin's Q)	0.389**	−0.0001	−0.008	0.000	−0.001	0.000
Inverse Mills Ratio		0.002*	0.055**	0.002*	0.001	0.000
Family Trust-Holdings	2.468***					
Family Sales Ratio by Industry	1.306***					
Family Advertisement Ratio by Industry	0.258***					
Sample Size	9,919	9,919	9,919	9,919	5,507	4,412
Within R^2		0.131	0.033	0.131	0.198	0.107
McFadden R^2	0.576					
F-statistics		50.812***	1.814 ***	50.823***	43.326***	32.566***
Absolute Log Likelihood	2393.835					

[a] Unstandardized estimation coefficients are reported.
[b] Lone-founder firm variable is not included in Model 1 because family business and lone-founder firms are mutually exclusive.
[c] Inverse Mills Ratio calculated by Model 1a, Table III (US sample) and Model 1b, Table IV (China Sample).
[d] The variable of internationalization is industry adjusted.
† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Two-tailed tests.

Table IV. Fixed-effects longitudinal regression analysis (China sample, R&D as DV, internationalization as IV)

Dependent variable	**Family business**	**R&D investment**	**Internationalization**	**R&D investment**	**R&D investment**	**R&D investment**
	Full sample	**Full sample**	**Full sample**	**Full sample**	**Below performance aspiration**	**Above performance aspiration**
Sample	**Model 1b**	**Model 2b**	**Model 3b**	**Model 4b**	**Model 5b**	**Model 6b**
Constant	2.951	0.037***	−0.578*	0.038***	0.036***	0.225***
Family Business (Fam)		−0.0009*	0.0236†	−0.001**	−0.001***	−0.002
Internationalization				0.0004***	−0.0002	0.0001
Fam * Internationalization				−0.0002† **(H1)**	0.001* **(H2)**	−0.007
Lone-Founder Firm		0.0004*	0.001	0.0004*	0.001*	0.033**
Blockholder Ownership	−0.033***	0.0001***	0.004	0.00003***	0.000	−0.0004***
Firm Age	0.023*	0.001**	−0.017	0.001**	0.001*	0.004***
Firm Size	−0.103**	0.0001†	0.035	0.0001	0.0002†	−0.011***
Advertisement Ratio	7.242*	0.007***	−0.840	0.009***	0.010	0.366***
Absorbed Slack (SGA Expenses/Sales)	−0.800**	0.001*	0.068	0.001†	0.001*	−0.045***
Plant Newness	0.156	0.0002†	−0.010	0.0002†	−0.0001†	0.004
Debt Financing	0.659**	0.000	−0.108*	0.000	0.001***	−0.004
Past Performance (Tobin's Q)	−0.018	0.0001**	0.006†	0.0001**	0.0002**	−0.001***
Inverse Mills Ratio		−0.0002*	0.140†	−0.0004***	−0.0002*	−0.008***
Family Sales Ratio by Industry	1.778**					
Family Advertisement Ratio by Industry	0.562**					
Sample Size	966	966	966	966	467	499
Within R^2		0.083	0.327	0.083	0.110	0.076
McFadden R^2	0.219					
F-statistics		4.496***	5.685***	4.460***	2.653***	12.879***
Absolute Log Likelihood	534.784					

[a] Unstandardized estimation coefficients are reported.

[b] Lone-founder firm variable is not included in Model 1 because family business and lone-founder firms are mutually exclusive.

[c] Inverse Mills Ratio calculated by Model 1a, Table III (US sample) and Model 1b, Table IV (China Sample).

[d] The variable of internationalization is industry adjusted

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Two-tailed tests.

RESULTS

Descriptive statistics and correlations are reported in Tables I and II. In the US sample, 26 per cent of the sample are family firms, while 8 per cent are lone-founder firms. These numbers are comparable to other studies exploring publicly traded lone-founder and family firms in the US, (Miller et al., 2007). In the Chinese sample, 27 per cent are family firms, whereas 24 per cent are lone-founder firms. In addition, the mean of blockholder ownership is significantly higher in the Chinese sample compared to the US sample. These results are consistent with the fact that compared to the US, publicly traded firms in China are more likely to have one or more large owners such as founders, founding families, and other private blockholders.

According to the correlation table, all instrumental variables (three for the US sample and two for the China sample) are positively and significantly correlated to the family firm variable. In addition, their correlations with the family firm variable are much higher compared to their correlations with the R&D variable (Tables I and II). These results indicate that the selection of instrumental variables is appropriate.

Preliminary Tests

As noted above, we use Heckman's two-stage approach to partially control for endogeneity. Model 1a and 1b (Tables III and IV, respectively) are the first stage probit treatment models in which the binary family firm variable is regressed against instrumental variables and other controls. Lone-founder firms are not included as a control as this category is mutually exclusive from the family firm variable. Overall, the instrumental variables are all positively and significantly related to the family firm variable, suggesting that the selection of instruments is reasonable.

Before testing our hypotheses, we check to see if we can replicate the findings of previous studies on risk aversion in family business by testing family firms' preferences regarding R&D investments and internationalization for both the US and Chinese sample. As Models 2a and 3a (Table III), and Model 2b and 3b (Table IV) show, family business variables are negatively related to both R&D and internationalization. These results show that our sample is comparable to previous studies exploring risk preference in family firms (e.g., Chrisman and Patel, 2012; Gómez-Mejía et al., 2010, 2014).

Primary Results

Models 4a (Table III) and 4b (Table IV) test H1 for the US and Chinese samples, respectively. Lone-founder control is significant in the Chinese sample, but not significant in the US sample (US sample: $B = -0.002$, $p > 0.10$; China sample: $B = 0.0004$, $p < 0.05$). High power distance in the Chinese culture might make the influence of founder more salient compared to that in the USA.

Supporting H1, the estimated coefficients of the interaction between the internationalization and family business variables are negative and significant in the US sample ($B = -0.0001$, $p < 0.05$) and negative and marginally significant in the Chinese sample ($B = -0.0002$, $p < 0.10$). These

findings indicate that as internationalization increases (decreases), family firms choose to diversify risk by investing less (more) in R&D compared to non-family firms.[6] In other words, decision making in non-family firms is more narrowly framed compared to family firms.

As shown in Models 5a and 5b (Tables III and IV, respectively), Hypothesis 2 is supported. The estimated coefficient of the interactions between the *internationalization* and *family business* variables are positive and significant for firms with performance below aspirations in both samples (US sample: B = 0.001, $p < 0.05$; China sample: B = 0.001, $p < 0.05$).

Moreover, simple slope tests suggest that given the scenario of performance below aspirations, family firms are significantly different from non-family firms in terms of estimated slope (US sample: slope difference = 0.001, *t-statistic* = 1.995, $p < 0.05$; China sample: slope difference = 0.001, *t-statistic* = 2.578, $p < 0.05$). Overall, as Figure 1 (US sample) and 2 (China sample) show, R&D and internationalization are more likely to be connected with each other in family firms compared to the situation in non-family firms.[7]

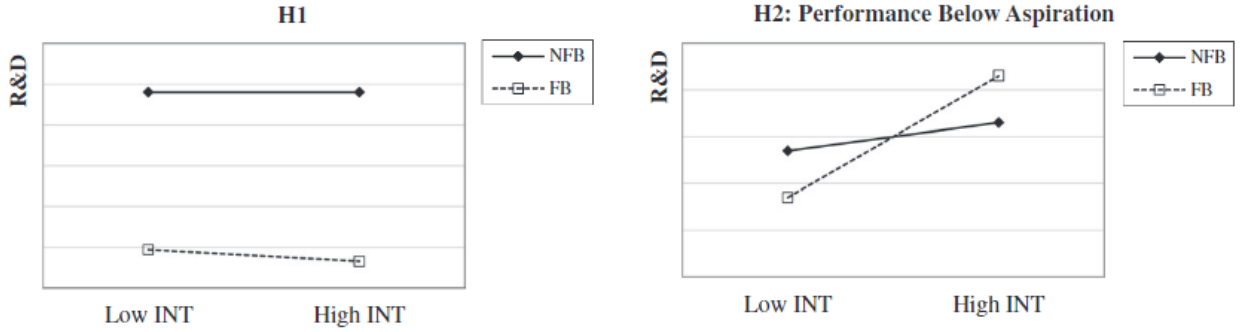

Figure 1. Plotting, US sample

Robustness and Post-Hoc Tests

Several additional tests are conducted to ensure that the results are robust to alternative specifications of the dependent and independent variables. First, as mentioned above, in addition to using a lagged internationalization variable to predict R&D investment we also measured internationalization and R&D in the same year (Table V). The results for both countries are consistent with our primary analysis. Thus, the possibility of time contraction discussed by Read and Loewenstein (1995) does not appear to change the overall conclusion that family firms frame risky decisions more broadly than non-family firms.

Second, we use two alternative criteria in classifying family firms. For both samples (Table VI, US sample; Table VII, China sample), we use 10 per cent and 20 per cent family ownership

[6] Power analysis at the 5 per cent significance level and 95 per cent confidence interval suggest that the minimum sample size to have a 'true' effect is respectively 6,487 (US sample) and 423 (China sample), both lower than the sample size in our analysis. Hence, the risk-diversifying hypothesis (Hypothesis 1) is supported for both samples.
[7] We follow Aiken et al. (1991) and Dawson (2014) in drawing the plotting in Figure 1 and 2. As IVs (internationalization) are industry-adjusted, the mean value is treated as 0. Estimated coefficients with p-value higher than 0.10 are treated as 0. And high and low values of the family business variable are 1 (being a family business) and 0 (being a non-family business).

coupled with at least two family members involved in the firm. All results are comparable to our primary results.

Table V. Fixed-effects longitudinal regression analysis (no time lag)

	R&D investment			
Dependent variable	**US sample**		**China sample**	
Sample	**Full sample**	**Below performance aspiration**	**Full sample**	**Below performance aspiration**
Constant	0.031*	0.027†	0.131*	0.039***
Family Business (Fam)	0.004	0.001	0.018***	0.002**
Internationalization	−0.0001	0.0002*	0.006	−0.0001
Fam * Internationalization	−0.0001* **(H1)**	0.001* **(H2)**	−0.011** **(H1)**	0.001† **(H2)**
Lone-Founder Firm	0.005	0.006	−0.002	0.000
Blockholder Ownership	0.000	0.000	0.000	0.0001*
Firm Age	0.001**	0.001*	0.003***	0.001***
Firm Size	−0.013***	−0.010***	−0.015***	−0.000
Advertisement Ratio	0.118	0.328†	0.238*	−0.022
Absorbed Slack (SGA Expenses/Sales)	−0.0002***	−0.0002***	0.145***	−0.002***
Plant Newness	0.009	0.001	0.000	0.002
Debt Financing	0.009	0.001	−0.015*	−0.002*
Past Performance (Tobin's Q)	−0.002***	−0.003***	0.000	0.000
Inverse Mills Ratio	−0.005***	−0.004***	−0.005	0.001***
Sample Size	9,919	5,507	966	467
Within R^2	0.132	0.198	0.083	0.111
F-statistics	50.345***	43.987 ***	22.365***	2.149***

[a] Unstandardized estimation coefficients are reported.
[b] Lone-founder firm variable is not included in Model 1 because family business and lone-founder firms are mutually exclusive.
[c] Inverse Mills Ratio calculated by Model 1a, Table III (US sample) and Model 1b, Table IV (China Sample).
[d] The variable of internationalization is industry adjusted.
† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Two-tailed tests.

Table VI. Fixed-effects longitudinal regression analysis (alternative family business measures, US sample)

Dependent variable	**R&D investment**			
	Full sample	**Full sample**	**Below performance aspiration**	**Below performance aspiration**
Sample	**10% ownership**	**20% ownership**	**10% ownership**	**20% ownership**
Constant	0.016	0.016	−0.017	−0.015
Family Business (Fam)	−0.004	−0.005*	−0.003	−0.006*
Internationalization	0.000	−0.00002	0.0003**	0.0003**
Fam * Internationalization	−0.0001* **(H1)**	−0.0001† **(H1)**	0.001* **(H2)**	0.002† **(H2)**
Lone-Founder Firm	−0.002	−0.002	0.001	0.001
Blockholder Ownership	0.000	0.000	0.000	0.000
Firm Age	0.0003	0.0003†	0.001**	0.001**
Firm Size	−0.005***	−0.005***	−0.004**	−0.004**
Advertisement Ratio	−0.010	−0.010	0.178	0.180
Absorbed Slack (SGA Expenses/Sales)	−0.0001**	−0.0001**	−0.000*	−0.0004*
Debt Financing	0.012	0.012	0.015*	0.015*

Dependent variable	R&D investment			
	Full sample	Full sample	Below performance aspiration	Below performance aspiration
Sample	10% ownership	20% ownership	10% ownership	20% ownership
Plant Newness	−0.003	−0.003	−0.008	−0.008
Past Performance (Tobin's Q)	0.000	0.000	−0.001	−0.001
Inverse Mills Ratio	0.001†	0.002†	0.001	0.001†
Sample Size	9,919	9,919	5,507	5,507
Within R^2	0.131	0.131	0.197	0.198
F-statistics	50.821***	50.833***	43.329***	43.380***

[a] Unstandardized estimation coefficients are reported.
[b] Lone-founder firm variable is not included in Model 1 because family business and lone-founder firms are mutually exclusive.
[c] Inverse Mills Ratio calculated by Model 1a, Table III (US sample) and Model 1b, Table IV (China Sample).
[d] The variable of internationalization is industry adjusted.
† p < 0.10; * p < 0.05; ** p < 0.01; *** p < 0.001. Two-tailed tests.

Table VII. Fixed-effects longitudinal regression analysis (alternative family business measures, China sample)

Dependent variable	R&D investment			
	Full sample	Full sample	Below performance aspiration	Below performance aspiration
Sample	10% ownership	20% ownership	10% ownership	20% ownership
Constant	0.034***	0.038***	0.036***	0.036***
Family Business (Fam)	−0.001**	−0.0004***	−0.001***	−0.0004***
Internationalization	0.001***	0.001***	0.0002	0.0002†
Fam * Internationalization	−0.0001† **(H1)**	−0.0003† **(H1)**	0.001† **(H2)**	0.0003† **(H2)**
Lone-Founder Firm	0.0003*	0.001*	0.001†	0.001†
Blockholder Ownership	0.0001***	0.0001***	0.000	0.000
Firm Age	0.001**	0.001**	0.001*	0.001
Firm Size	0.000	0.000	0.000	0.0002*
Advertisement Ratio	0.009***	0.009***	0.012†	0.011
Absorbed Slack (SGA Expenses/Sales)	0.001*	0.001†	0.001*	0.001*
Debt Financing	0.000	0.0002†	0.000	0.000
Plant Newness	0.0003†	0.000	0.001***	0.001**
Past Performance (Tobin's Q)	0.0001**	0.0001**	0.0002**	0.0002**
Inverse Mills Ratio	−0.0004***	−0.0004***	−0.0002†	−0.0002†
Sample Size	966	966	467	467
Within R^2	0.083	0.083	0.110	0.110
F-statistics	4.447***	4.424***	2.603***	2.565***

[a] Unstandardized estimation coefficients are reported.
[b] Lone-founder firm variable is not included in Model 1 because family business and lone-founder firms are mutually exclusive.
[c] Inverse Mills Ratio calculated by Model 1a, Table III (US sample) and Model 1b, Table IV (China Sample).
[d] The variable of internationalization is industry adjusted
† p < 0.10; * p < 0.05; ** p < 0.01; *** p < 0.001. Two-tailed tests.

Third, in consideration that that R&D investments in times $t-1$ might impact internationalization in time t, just as internationalization in times t or $t-1$ might impact R&D investments in time t, we ran a regression using internationalization as the dependent variable and a lagged R&D

investment as the independent variable (Table VIII). Although the estimated coefficient of the interaction between family business and internationalization is not significant for the US sample with below-aspiration performance, as a whole, the results here are largely consistent with the primary analysis.

Table VIII. Fixed-effects longitudinal regression analysis (internationalization as DV, R&D as IV)

Dependent variable	**Internationalization**			
	US sample		**China sample**	
	Full sample	**Below performance aspiration**	**Full sample**	**Below performance aspiration**
Constant	0.542	−0.023	−0.601	−2.359**
Family Business (Fam)	−3.053***	−0.068	0.010	−0.052**
R&D Investment	1.645	−0.055	0.392*	−0.104
Fam* R&D Investment	−15.292** **(H1)**	0.043 **(H2)**	−0.469† **(H1)**	0.362† **(H2)**
Lone-Founder Firm	−0.212	0.074	−0.002	−0.0003
Blockholder Ownership	0.000	−0.002	0.004	0.004
Firm Age	0.000	−0.001	−0.017	0.017
Firm Size	0.447†	0.009	0.038†	0.096†
Advertisement Ratio	−0.540	0.748	−0.907	5.742**
Absorbed Slack (SGA Expenses/Sales)	0.005	−0.003*	0.038	0.146*
Plant Newness	−1.744	−0.076	−0.009	−0.002
Debt Financing	0.574	0.182	−0.105†	−0.148
Past Performance (Tobin's Q)	0.118*	−0.010†	0.005†	0.013**
Inverse Mills Ratio	1.461***	−0.039	0.140†	0.132†
Sample Size	9,919	5,507	966	467
Within R^2	0.031	0.030	0.312	0.288
F-statistics	1.822***	1.531***	5.606***	4.624***

[a] Unstandardized estimation coefficients are reported.
[b] Lone-founder firm variable is not included in Model 1 because family business and lone-founder firms are mutually exclusive.
[c] Inverse Mills Ratio calculated by Model 1a, Table III (US sample) and Model 1b, Table IV (China Sample).
[d] The variable of internationalization is industry adjusted
† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Two-tailed tests.

Fourth, to ensure that the relationship found between internationalization and R&D investment was not merely an artifact of our choice of variables, we substituted debt financing for internationalization and ran the analysis again (Table IX). The results are consistent with the primary analysis. However, although the coefficient of H1 for the US sample is in the expected direction, it is not significant.

Fifth, we re-analysed the US sample without winsorizing the data. The results were consistent with the primary results.[8]

Finally, although we hypothesized a linear relationship between risky decisions, the possibility that the relationships are nonlinear cannot be discounted. Therefore, we tested this possibility by including a squared term of internationalization. Our findings show that the squared term of

[8] These results are available upon request from the first author.

internationalization and its interactions with other variables are not significant for both samples, further confirming the linear relationships found in this article.

Table IX. Fixed-effects longitudinal regression analysis (R&D as DV, debt financing as IV)

Dependent variable	**R&D investment**			
	US sample		**China sample**	
	Full sample	**Below performance aspiration**	**Full sample**	**Below performance aspiration**
Constant	0.016	−0.018	0.035***	−0.099
Family Business (Fam)	−0.004†	−0.003	−0.001***	−0.001
Debt Financing	−0.009†	−0.025***	−0.001	−0.045**
Fam* Debt Financing	−0.002 **(H1)**	0.029† **(H2)**	−0.001*** **(H1)**	0.059*** **(H2)**
Lone-Founder Firm	−0.002	0.001	0.0003†	−0.021*
Blockholder Ownership	0.000	0.000	0.0001***	0.0002
Firm Age	0.0003†	0.001**	0.001*	−0.002*
Firm Size	−0.005***	−0.004**	0.0002*	0.005
Advertisement Ratio	−0.010	0.175	0.008***	−0.128
Absorbed Slack (SGA Expenses/Sales)	−0.0001**	−0.0001**	0.001*	0.033
Plant Newness	0.012	0.015*	0.0003†	0.002
Past Performance (Tobin's Q)	0.000	−0.001	0.0002**	−0.001
Inverse Mills Ratio	0.002*	0.001	−0.0003*	0.002†
Sample Size	9,919	5,507	966	467
Within R^2	0.131	0.198	0.086	0.113
F-statistics	50.891***	43.401***	4.513***	8.894***

[a] Unstandardized estimation coefficients are reported.
[b] Lone-founder firm variable is not included in Model 1 because family business and lone-founder firms are mutually exclusive.
[c] Inverse Mills Ratio calculated by Model 1a, Table III (US sample) and Model 1b, Table IV (China Sample).
[d] The variable of internationalization is industry adjusted
† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Two-tailed tests.

DISCUSSION

This paper examines the risk preferences of family firms across multiple risky decisions in corporate entrepreneurship. We hypothesize and find that family firms tend to use risk-diversifying strategies, such that internationalization decisions are influenced by R&D investment decisions in family firms more than in non-family firms. We also find that, when performance is below aspirations, R&D investments become positively related to internationalization. This means that family firms tend to switch from risk-diversifying strategies to more intensive and risk-taking strategies across multiple risk decisions. In comparison, non-family firms appear to be more vulnerable to narrow-framing and relative to family firms, tend to make risky decisions in isolation. We discuss the implications and limitations of our study below.

Theoretical Implications

Prospect theory suggests that organizations might be risk-taking given a 'loss' scenario, while they become risk-averse in a 'gain' domain (Greve, 2008). This theoretical lens has been widely

accepted in the management field for exploring organizational risk preferences in the literature. Nonetheless, most studies analyse risks singly even though organizations need to balance and manage risks across multiple decisions. As we highlight in this manuscript, the application of prospect theory should be coupled with the recognition that firms deal with multiple risky decisions and the way family firms do so is different from the way non-family firms do so. Narrow-framing provides a theoretical lens to help explain this difference.

Narrow-Framing and Family Firm Risk Preference

It is widely recognized that family firms differ from non-family firms in the way they manage risky decisions (Gómez-Mejía et al., 2007). This literature claims that family firms face a 'mixed gamble' as family owners and managers often need to balance the impact of risky decisions on current and future economic and non-economic endowments (Gómez-Mejía et al., 2014; Kotlar et al., 2018; Martin et al., 2013). Nevertheless, previous studies do not fully recognize that family firms, just like non-family firms, often need to manage *multiple* risky decisions in corporate entrepreneurship. The primary implication of our study is that family firms are more likely to use broad framing when considering multiple risky decisions, whereas non-family firms are more likely to treat risky decisions in isolation, i.e., engage in narrow-framing. Narrow-framing in non-family firms may stem from the way decisions are evaluated, the frequency in which decisions are evaluated, a shorter-term focus, and the more limited discretion of decision-makers. By contrast, family owners and managers have greater discretion (Carney, 2005; De Massis et al., 2020), are less likely to be held accountable for individual decisions that go awry, and are likely to be evaluated less frequently, in keeping with the longer-term orientation of family firms (see, Chrisman and Patel, 2012; Strike et al., 2015). These aspects of family firm governance are apt to encourage risky decisions to be made in groups, rather than in isolation.

However, more work is needed before it is possible to state that family firms are less susceptible to the narrow-framing effect than non-family firms. Hence, more attention to groups of risky decisions rather than single risky decisions is required. Such research may yield insights that are not possible to obtain when examining risky decisions in family firms on a piecemeal basis. For example, by considering multiple risky decisions, we are able to conclude that family firms are more likely to exhibit lower R&D investments than non-family firms when risk is high owing to high levels of internationalization, and are likely to have higher R&D investments when risk is low owing to low levels of internationalization. Furthermore, whereas prior work suggests that family firms become risk seeking when performance is below aspirations, our findings suggest that it may be more accurate to assume that when performance is below aspirations, family firms tend to move away from risk-diversifying strategies toward more consistent patterns of risk taking. In general, this should result in higher levels of R&D and internationalization, but since different combinations of goals (economic and non-economic) and contexts are likely to be the determining factors in such decision-making, lower levels of R&D and internationalization are also possible. Future work in this area is in order.

Furthermore, as Read and Loewenstein (1995) and Read et al. (1999) note, risky decisions might be affected by *time contraction*, as decision makers often compress time intervals and treat long intervals as if they were short. Time contraction can be conceptualized as a special form of narrow framing but with more emphasis on the temporal dimension. Although we found no

evidence that time contraction influences the relative level of investments of family firms in comparison to non-family firms, future research is needed to explore whether and when time contraction affects risky decisions in family firms.

Long-Term Orientation as Cognitive Heuristic

While previous studies often focus on the temporal implications of long-term orientation (LTO) in family firms (Diaz-Moriana et al., 2020; Lumpkin and Brigham, 2011; Lumpkin et al., 2010; Strike et al., 2015), this study draws more attention to its properties as a cognitive heuristic. Given that many risky decisions are made locally, having a shared LTO might help family firm decision-makers reach conclusions that are internally consistent even when the decision makers are separated by geographic distance or other factors that make information sharing more difficult. Another possibility worth exploring is that, shared consensus could help family firms reach quicker decisions compared to non-family firms, especially when facing external threats that might otherwise lead to organizational rigidity (Staw et al., 1981).

Family Control and Risky Decisions in Family Business

A defining feature differentiating family from non-family firms is the unification of ownership and management (Chrisman et al., 2015; Chua et al., 1999; De Massis et al., 2014). As Carney (2005) notes, this unification allows family firm decision-makers to operate under fewer internal constraints to their managerial authority than exist in other modes of governance. Interestingly, Strike et al. (2015) and De Massis et al. (2020) demonstrate that the discretion of family CEOs can lead to higher or lower risk taking. Nevertheless, as Gómez-Mejía et al. (2001) show, barring outright failure, how these initiatives turn out might be less important to family managers because the threats to their positions when firm performance declines is somewhat lower than is typically the case in non-family firms. Taken together, although the negative connotations of managerial entrenchment are well-known, the potentially positive aspects such as the freedom to frame risky decisions more broadly has not been fully considered. We build on this idea by arguing that family firms might be more rather than less adept at risk management. A more integrative approach to examining family firm behaviour might identify other areas where family firm management is superior, or inferior, such as in balancing claims across multiple stakeholder groups (Zellweger and Nason, 2008); leveraging resources to build valuable bundles (Carnes and Ireland, 2013; Sirmon and Hitt, 2003); or refining routines that facilitate knowledge combinations and opportunity identification (Cabrera-Suárez et al., 2001; Patel and Fiet, 2011).

Corporate Entrepreneurship in Family Business

Corporate entrepreneurship is ‘the process whereby an individual or a group of individuals, in association with an existing organization, create a new organization or instigate renewal or innovation within that organization’ (Sharma and Chrisman, 1999, p. 18). Corporate entrepreneurship is particularly important to family firms, not only because it can help family owners strengthen the vitality of the business, but also because it can be coupled with inter-generational family business succession when later generation family members who favour new ways of doing business take leadership positions or take the initiative to start their own new

ventures externally (Cruz and Nordqvist, 2012; Duran et al., 2016; Ramirez-Pasillas et al., 2020; Strike et al., 2015; Zahra, 2005; Zellweger et al., 2012).

Almost by definition, risk is a part of corporate entrepreneurship, as creating new businesses and/or renewing existing businesses requires some risk-taking activities (Lumpkin and Dess, 1996). Recognizing the presence of multiple risky decisions or a portfolio of risks in organizations might shed new light on corporate entrepreneurship in family firms. For example, if family firms are indeed less vulnerable to the problem of narrow-framing, then family firm decision-makers might be better able to balance entrepreneurial initiatives to reduce overall risk (Casillas et al., 2010) without foregoing entrepreneurial opportunities. Hence, claiming that family firms take more or fewer risks than non-family firms may mask differences in the way the two types of firms manage risk. In a similar vein, using a single risk dimension (e.g., R&D or internationalization) to capture corporate entrepreneurship might also be problematic. Recognizing the presence of multiple risks, therefore, suggests that a more holistic approach to research that considers the interactions of concurrent and prior entrepreneurial activities might provide a more accurate picture of how corporate entrepreneurship is managed in family and non-family firms. As Thaler and Johnson (1990) suggest, prior outcomes can have a major impact on risky choices. Similarly, our study suggests family firms may be more likely to consider individual initiatives as part of a portfolio of initiatives, which may lead them to make better strategic choices.

Limitations and Future Research

This paper is, of course, not without limitations. To begin, our sample involves publicly traded firms in the United States and in China. We chose to use two samples coming from two different economies to help ensure the robustness of our results. Nonetheless, replication of this study in newly created, small and medium-sized and/or privately owned firms or organizations in other geographical regions are needed. In addition, consistent with past research drawing attention to the link between prior performance and risk taking (e.g., Park, 2002), we demonstrate that family firms tend to exhibit a shift from risk diversifying to risk taking in corporate entrepreneurship while making multiple strategic decisions. Here, we focus on R&D investment and internationalization, because both involve strategic allocations of resources that are important for entrepreneurial growth. Nonetheless, research is needed to explore relationships among other risky decisions.

Furthermore, we rely upon certain constructs (long-term orientation, strong family control, etc.) in hypothesizing that family firms engage in broader framing of risky decisions than non-family firms. While these constructs are commonly used in differentiating family from non-family firms, in the literature (Berrone et al., 2012; Chua et al., 1999), the methods we used do not tease out which one(s) are actually driving the causal relationship. Future research can identify the drivers of the broad framing in family business. Finally, although we consider differences among family firms based on prior performance, we do not fully tap into the rich sources of heterogeneity among family firms (e.g., generation in charge, governance structure involving both ownership and management, degree of professionalization, importance of SEW, etc.) or among family firm decision makers (e.g., career motives, training, experience, personal characteristics, etc.) that might influence problem framing (De Massis et al., 2020; Ramirez-

Pasillas et al., 2020; Strike et al., 2015). Future research is needed to compare different types of family firms and to determine how those differences influence risk management strategies.

Conclusion

In closing, this paper provides a narrow-framing perspective rooted in prospect theory to extend the current knowledge on family firms' risk preferences across multiple decisions (rather than a single decision) in corporate entrepreneurship. We show that family firms' decisions are less likely to be narrowly framed and more likely to be made as a group than the decisions of non-family firms. Specifically, we examine the interaction between two risky decisions (internationalization and R&D investment) and find that family firms are more likely than non-family firms to diversify risk while making multiple decisions within the domain of corporate entrepreneurship. Nevertheless, in case of inferior performance, risk taking across multiple decisions in family firms appears to be positively associated. Hence, our work advances the literature on risk preferences in family and non-family firms by applying an under-utilized perspective (i.e., narrow-framing) and illustrating how multiple risky decisions (internationalization and R&D investment) can be related depending on performance aspirations.

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