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Integrated risk management and product innovation in China: The moderating role of board of directors

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ABSTRACT

This study explored the role of the board of directors in the relationship between integrated risk management and product innovation. We focused on a board's direct involvement in risk oversight and its use of external audit in risk oversight, and examined their moderating effects on the relationship between integrated risk management and product innovation. Panel data from a survey of 1178 Chinese firms was analyzed to test the hypotheses. A board's direct involvement in risk oversight was found to negatively moderate the positive relationship between integrated risk management and product innovation success. The use of external audit in risk oversight similarly weakens the relationship. These results show how an effective board contributes to the innovation benefits associated with risk management in product innovation. They also have important implications for emerging economy firms pursuing an integrated approach to risk management in product innovation.

1. Introduction

Risk management is a process of fundamental interest to finance and innovation scholars. Historically, their debate has been shaped by two extreme perspectives. One is that different sorts of risks can be managed very independently by separate units within a firm (Kobrin, 1982; Simon, 1984). The other perspective views each risk class as part of the firm's overall risk portfolio and suggests managing them in aggregate (Mehr and Hedges, 1963; Miller, 1992; Meulbroek, 2002; Abrams et al., 2007). More recently, this debate has shifted from whether risks are correlated to how to manage risks holistically to maximize a firm's productive efficiency and value (Andersen, 2008; Wu et al., 2010; Kaplan and Mikes, 2012). In financial risk management the use of forward purchases, futures, swaps, and options has emerged as the dominant technique for managing portfolios of different financial risks (Smithson and Simkins, 2005; Andersen, 2008). As others have observed, a similar aggregated approach to risk management can be extended to project management (Coccia and Rolfo, 2009; Söderlund, 2004; Martinsuo and Lehtonen, 2007; Floricel and Ibanescu, 2008; Teller et al., 2012), to financial organizations (Wu and Olson, 2010b; Wu and Birge, 2012), to public research institutions (Coccia, 2008, 2011, 2012; Coccia and Rolfo, 2013) and even to supply chain management (Wu and Olson, 2008, 2010a).

Product innovation is a primary competitive activity for most businesses. Often it is "a highly uncertain path through foggy and shifting markets and technologies" (Eisenhardt and Tabrizi, 1995: 91). All sorts of risks surround a product development project from pre-development (or planning) through the conceptual design stage, product design, testing, process development and production start-up (Cooper, 1981; Wu et al., 2010). By integrating all the risks distributed across the different stages of product innovation, firms can achieve many benefits that are not available with a disaggregated approach. Firms that adopt an integrated approach to risk management can, among other benefits, avoid duplication of risk management expenditures by exploiting natural hedges (Liebenberg and Hoyt, 2003). Because an integrated approach to risk enables firms to better understand and to integrate different risks across the stages of product innovation, this provides a firm with a more objective basis for allocating its resources, thus improving its capital efficiency and perhaps the return on its R&D investments (Keizer et al., 2005).

Integrated risk management (IRM) in this study refers to a systematic, integrated approach to managing all the risks involved in product innovation. IRM typically involves identifying particular events or circumstances relevant to product innovation's risks and opportunities, assessing and measuring them, integrating the risks and formulating plans to limit them. The process also includes executing those plans and monitoring progress. An integrated approach to risk management has thus become an important

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component of product innovation in the face of the various risks throughout the innovation process. However, IRM differs from the related but essentially different concept of enterprise risk management (ERM). The risks covered by the former are operational, whereas the risks covered by the latter are more strategic (Anderson, 2008). Operational risks arise from the people, processes (cost controls, quality control, marketing) and physical assets (property, plant, equipment) that can impact the performance of new products or the efficiency of day-to-day operations (Meulbroek, 2002; Koletar, 2010; Sweeting, 2007). In many new product development situations serious operational risks arise from a failure to keep within cost estimates, failure to maintain the schedule, and/or failure to achieve the required quality and operating efficiency (Merna and Al-Thani, 2005). In contrast, strategic risks usually make a material difference to an organization's ability to achieve its main objectives or even to survive (Sweeting, 2007). Strategic risks arise from governance problems, market uncertainty, meeting external regulatory requirements and other such factors (Marchetti, 2011). Many strategic risks are related to forces which are dynamic, uncertain and interconnected and therefore such risks often need to be managed as complex processes. Strategic risks often require active oversight from the board of directors, whereas operational risks are controlled by project managers (Beasley et al., 2010).

Unfortunately, previous research on risk management has often confounded these two different types of risk management. Even worse, much of the research has been locked into an unconditional model assuming a universal effect of risk management on product innovation (Cooper, 1981; Keizer et al., 2005; Anderson, 2008). A firm's board of directors plays a critical role in overseeing enterprise-wide risk management, setting the tone and culture for effective risk management through strategy setting, formulating high level objectives, and approving broad resource allocations (Beasley et al., 2010; Merna et al., 2005). As Marchetti (2011: 17) has noted, "Risk management oversight is one of the key responsibilities and functions of the board of directors. The board should be actively involved in an oversight capacity in working with management to define the organization's strategy and objectives as well as ensure risk mitigation occurs". In the United States, the Sarbanes-Oxley Act of 2002 has increased the board's responsibility for risk and forced a top-down approach to managing and monitoring risks. The Turnbull Report encourages similar rigor and transparency in the United Kingdom. The European Commission has also strengthened the role of the board of directors in minimizing the downside risks of strategic changes (Drew et al., 2006).

Surprisingly, little academic work has examined the role of the board of directors in managing the risks associated with product innovation. This study was designed to fill that gap by focusing on the relationship between IRM and product innovation and exploring the moderating role of the board of directors in the relationship. Prior scholarly work has identified the board's direct involvement in risk oversight and its use of external audit as one oversight technique (Beasley et al., 2010). This study focused on those same two elements and specifically addressed two research questions: Is the relationship between IRM and product innovation the same in firms with and without the board's direct involvement in risk oversight?; and is this relationship the same in firms subject and not subject to external audit of their risk management?

The hypotheses were tested using data collected from a sample of 1178 firms operating in various industries in China, a highly complex and dynamic transition economy. Most Chinese markets change rapidly, and new products are introduced frequently (Wu and Wu, in press; Wu, in press). To survive and maintain a competitive advantage, a firm must not only innovate proactively, but also develop an integrated approach to managing the risks involved in product innovation. Meanwhile, more and more Chinese firms are improving the effectiveness of the board's risk oversight and opening themselves up to external audit (Fan and Wong, 2005; Wang and Zhou, 2006). Still, China remains a market where ineffective boards of directors and poorly governed firms are easy to find. Accordingly, a sample of Chinese firms provides a useful empirical setting for testing for any moderating effect of board oversight in the relationship between IRM and product innovation success. The relatively large sample and the systematic research design were conceived to extend the findings of previous work on risk management and product innovation.

2. Theoretical development

2.1. Product innovation and its risks

New product innovation in this context refers to the introduction of goods or services that are new to the market or substantially improve upon existing offerings. It creates opportunities for expansion, growth and profitability and therefore is an important way of achieving superior performance and the long-term growth and prosperity (Zahra et al., 2000). Failure to commit resources and effort to innovation exposes a firm to the risk of being squeezed out of the market by more proactive competitors (Bettis and Hitt, 1995).

However, to develop and commercialize new products involves diverse risks specific to the process (Cooper, 1981; Eisenhardt and Tabrizi, 1995). These can be classified as technological risk, market risk, financial risk, collaborative risk and institutional/regulatory risk. Technological risk is generally associated with 'will it work?' (Eisenhardt and Tabrizi, 1995). Some of the most prevalent technological risks arise from hasty planning, contradictory specifications, unrealistic design, ineffective project leaders, or lack of communication and coordination among the product's developers (Wu and Olson, 2010a). The technology life cycle is another cause of technological risk that has been widely studied (Andersen, 2008; Wu et al., 2010). Market risk can be summed up as 'will it sell?' (Lam, 2008; Olson and Wu, 2008). But there is also input market uncertainty associated with "…the uncertainties surrounding the acquisition of adequate quantities and qualities of inputs into the production process" resulting from either shifts in market supply or fluctuations in the quantity used by other buyers (Miller, 1992: 316). Product market uncertainty arises largely due to changes in consumer tastes, the availability of substitute products, or scarcity of complementary goods (Keizer et al., 2005). Financial risk is associated with whether or not adequate financing will be available for product development and perhaps collectibles problems resulting from working with new clients who may default (Stroh, 2005). Moreover, if a firm collaborates with other firms to develop new products, it probably encounters collaborative risk which arises because of the potential for opportunistic behavior (cheating, distorting information, appropriating resources and so on) (Das and Teng, 2001; Wu, 2012). In addition, introducing a new product or service involves institutional or regulatory risk such as industrial policies related to a specific industry, demands for local sourcing and intellectual property rights protection[2] (Stroh, 2005; Keizer et al., 2005). These risks commonly involved in product innovation are summarized in Table 1. Among them, technological risk, financial risk and collaborative risk are important to a firm's operational objectives, whereas institutional/regulatory risk is more strategic with great potential impact on

[2] We thank an anonymous reviewer for reminding us of this important risk.