Predicting External Management Risks in China-Based Family Businesses: An Exploratory Analysis Using the SVM Technique

Monika Hudson
University of San Francisco

Hailan Helen Yang
Shandong Jainzhu University

Family-owned companies face a challenge: once they evolve to a particular size, they frequently need to incorporate external management. This transition is tricky for all firms but particularly for family-owned businesses in China. In this paper, we identify adverse selection and moral hazard factors that may contribute to difficulties China-based family companies have in scaling, as part of an exploratory project to determine if the support vector machine (SVM) technique can aid in predicting successful external management integration. Preliminary results indicate SVM may be highly accurate in estimating how successful external management involvement will be in the Chinese setting.

INTRODUCTION

Despite the impression that they are mostly tiny establishments, family-owned businesses are actually the foundation of the world's economy. Thirty-five percent of Fortune 500 companies are family-controlled, and family-owned firms represent the full spectrum of U.S. companies from husband–wife partnerships to major multinational corporations such as Bechtel (Conway Center for Family Business, 2012). In addition, family businesses generate 62% of regular U.S. employment, and ownership of these companies has been an essential element of intergenerational wealth creation (Astrachan & Shanker, 2003; Faccio, Lang, & Young, 2001).

In today's China, most for-profit corporate structures are also family-based. Family businesses make up more than 80% of China's 3,000,000 privately-owned firms (National Bureau of Statistics of China, 1996–2003 as cited in Ralston, Terpstra-Tong, Terpstra, Wang, and Egri, 2006). However, their economic success tends to be fairly short-lived (Whyte, 1996). Data released by the Ministry of Commerce in China in 2013 reveals some troubling trends: while 150,000 new family firms are created in China each year, this number is offset by the more than 100,000 family-owned businesses that annually fail. The statistics are even worse relative to intergenerational succession: 60% of China-based, family-owned firms declare bankruptcy within five years of being established and over 85% declare bankruptcy within ten years of creation (Wang, 2009). Most China-based family businesses are considered fortunate if they function for even 2.9 years (Wang, 2009).

So, Chinese family firms appear to be limited in scale. These facts naturally lead to some general questions. What are some of the factors that make it difficult for China's family businesses to survive and flourish? Are there tools that can assist these business owners in identifying some of the continuity risks

they face? Addressing these contextual questions extends knowledge about family businesses in settings qualitatively different from modal patterns in the West.

The foundations of systems theory indicate that family businesses are comprised of three overlapping and interdependent subsystems: the family system, the ownership system, and the business system, which interact to create particular firm dynamics (Poza, 2009). All three of these major subsystems of family businesses transition through well-documented life-cycles (Gersick, 1997). Each evolutionary stage of development comes with its own set of challenges, but a key stumbling block appears to be what has been referenced as the "professionalization" phase (Katz & Green, 2009) of the family firm. The issue of management professionalization may be a particular hindrance to the growth of family businesses in China as in other transitional economies (Herrero, 2011). For example, China-based family businesses do not appear to appoint, reward, discipline, or fire family members employed in the firm according to these individuals' qualifications or performance; rather, individual treatment appears to be consistently skewed by the obligations attached to being a member of the "family" (Dyer, 1989). Such practices conflict with those employed by professional managers and the resulting dissonance may deepen pre-existing distrust of non-family members. Networking influenced by the traditional Chinese cultural practice of familism may further contribute to this phenomenon (Fukuyama, 1995; Redding, 1990; Weidenbaum & Hughes, 1996).

Familism in China, as in other collective societies (Hofstede, 1984), may be one of the impediments to the further growth or even survival of these firms (Gersick, 1997; Hoy & Pu, 2012; Poza, 2009). Chinese family business patterns, with their personalized style of management, are categorized as passive economic organizational forms that are under-capitalized in a world under increased pressure from intensive market competition, institutional change, and cultural evolution (Lan & Zhangliu, 2012; Marion & Uhl-Bien, 2002). These factors appear to be pushing China-based family firms toward increased external management (M.-J. Chen, 2001; Williamson & Zeng, 2007). As has been found worldwide, Chinese businesses will, out of necessity, be the subject of forces that may compel them to transition from a traditional, family-related governance structure to one that involves professional, non-family member managers to further develop and continue the firm.

Trials and failures related to non-family management abound in the Chinese family business community; this makes the transition toward the inclusion of external managers both painful and problematic (Lan & Zhangliu, 2012; J. J. Zhang, 2005). The challenges related to changing family firm governance can frequently be traced to differences between the interests and values of the family and those of non-family professional managers. External managers pose more risks to the firm and the owner-employers if these managers are seen as promoting their personal interests at the expense of the family owners (Shleifer & Vishny, 1997). Concurrently, many family firm leaders underestimate how complex the transition may be between having a totally family-based form of governance to one that combines family and non-family members (Marion & Uhl-Bien, 2002).

Thus, family businesses in China face a dilemma: on the one hand, these types of firms may realize that they need to replace their relation-oriented traditions with formalized, standardized, and scientific management (Ahlstrom, Young, Chan, & Bruton, 2004; Low, 2002; Tsui-Auch, 2004; Yeung, 2006; Yeung & Olds, 1999; Young, Ahlstrom, & Bruton, 2004; J. J. Zhang, 2005) and thereby enhance the knowledge capital of the company (Poza, 2009). On the other hand, the absence of kinship ties through blood, marriage, or adoption between professional managers and family owners are grounds for an inherent distrust of the external manager and conscious or unconscious sabotage of a necessary relationship (Chu, 2000). Given these two extremes, Chinese family businesses have tended to avoid bringing in external managers.

Predicting the risks associated with changing Chinese family firm governance patterns would assist these owners in deciding how to leverage external management to enhance company performance. Proper, efficient, and effective risk evaluation tools are necessary if China-based family businesses are to navigate these changes successfully. Prediction of professional management risk has received considerable interest from researchers in the fields of finance, business, and engineering. However, most

of the existing studies in this arena have been challenged as subjective and lacking statistical evidence and empirical proof (Beer et al., 2004; Dorfman, 2007; J. Q. Zhang, 2002).

Accurate risk prediction is often hindered by the complex relationships between predictor and target variables and the absence of theory to guide model identification. Various mathematical methods, such as fuzzy analytical hierarchy process, artificial neural networks (ANN), fuzzy comprehensive evaluation methods, and expert evaluation methods have gained attention from various researchers working in the human resource risk management domain (Danenas & Garsva, 2010; Kim & Ahn, 2012; Yu, Yao, Wang, & Lai, 2011; Y. L. Zhang & Yang, 2002b). Researchers are finding that these techniques are well suited for developing accurate risk scoring systems, and they perform competitively when compared to other classification techniques such as logistic regression, multiple discriminate analysis (MDA), and decision trees. Over the last 15 years, the support vector machine (SVM) technique has emerged as one of the most widely researched and applied approaches in this field.

SVM is a relatively new and promising classification and regression technique; it offers several advantages including the absence of local minima and relatively simple architecture (Danenas & Garsva, 2010; Kim & Ahn, 2012; Yu et al., 2011). SVM requires few prior assumptions about the data; it classifies arbitrarily complex case ensembles by identifying special data points (the support vectors) from the set of input data describing the boundaries between the cases. In the case of unknown nonlinear data dependencies, powerful decision rules can be obtained by numerical optimization procedures. An optimized SVM issues a decision rule that can be used to forecast (classify) new incoming data. Given the emerging use of SVM for prediction and classification in other settings, we felt this technique might offer an effective tool for predicting the risks associated with introducing professionalized management into Chinese family businesses.

This paper is organized as follows. First, from a theoretical perspective, we identify two major risks associated with integrating external managers in China-based family firms. Second, from an application perspective, we create a risk prediction model, using SVM, that can assist family business owners in identifying specific obstacles associated with changing governance and thus pave the way for enhanced firm professionalization. Finally, we conclude by elaborating on the primary theoretical and practical implications of our model and identifying potential directions for future research.

EXTERNAL MANAGEMENT AND CHINESE FAMILY BUSINESSES

Family businesses are traditionally defined as firms that are majority owned and controlled by members of the same family. Family members hold most of the top management positions, make operational decisions, and bear major firm risks (Chua, Chrisman, & Sharma, 1999; Poza, 2009).

The literature tends to define "outside or external professional managers" and "non-family professional managers" interchangeably. von Schultzendorff (1984) identified non-family business managers as having the following characteristics: they are not related to the family owners by blood, marriage, or adoption; they occupy positions of authority as it relates to firm governance, and they may or may not share in firm ownership. Pieper and Klein (2007) describe non-family managers from the behavioral aspect. They argue that, in contrast to family members and other stakeholders, non-family professionals have the flexibility in their actions to run these businesses according to their personal desires, motivations, skills, and vision, rather than merely being puppets of interests of the firm's owners.

We argue that "non-family professional managers" should meet both von Schultzendorff's (1984) individual characteristics standards and Pieper and Klein's (2007) behavioral condition requirements. Given this set of combined definitions, in the remainder of this paper, we refer to "non-family professional managers" as "external managers."

Leveraging Intellectual and Social Capital within Chinese Family-Owned Businesses

The resource-based view of family firms suggests that their competitive advantage is created by the unique and often idiosyncratic characteristics of family enterprises including such traits as rapid speed to market, focus on market niches, concentrated ownership structures, a desire to protect the family's

reputation, patient capital, knowledge transfer between generations, and responsiveness to rapidly changing external environments (Poza, 2009). During the initial and formative years of their development, most new Chinese family businesses tend to rely upon their own financial, human, patient, and knowledge resources (Luo & Park, 2001). Given their initial relatively small scale and scope, most of these firms are inclined towards only employing members with direct family ties. This practice is both pragmatic and consistent with their ownership structure and size. Internal family trust mechanisms, loyalty, and ethical constraints simplify supervision and incentive mechanisms within the firm, improve cohesion and solidarity, and serve as efficient mechanisms for management cost savings (Kramer & Tyler, 1995; Poza, 2009).

However, when family firms reach critical scale, they may be forced to enhance their human, patient and knowledge capacity by bringing in external managers. Moreover, as the transition toward a market-oriented economy continues and competition becomes more intense, China's business environment inherently mandates that family firm's scale, if they want to survive. The continued development of the family business then may exceed the entrepreneurial capacity of the single proprietor. From a resource theory perspective, the limited human, patient and knowledge talents of the family cannot fully adapt to the changing environment; rather, increasing market pressures and institutional changes push these firms toward some combination of internal and external management (Chu, 2000).

In support of these arguments, Zahra (2005) points out that a continued conservatism attitude can undermine a family firm's long-term financial performance and erode its early competitive advantage, factors which may underlie the relatively short lifespan of these companies in China. Firms that acknowledge they are at this crossroad may then consider ways to modify their business management because they realize external managers can bring skills, competence and other value-added benefits to family enterprise. The company may begin to search for personnel with talents that do not pre-exist within the current family structure. Family owners may then revamp their firm's governance and begin the process of incorporating external management innovations into their organizational systems.

Principal Versus Agent Risk and Chinese Family Businesses

The expansion and professionalization of China-based family businesses have increased the pressure to incorporate non-family members as managers. However, the entry of external managers is usually accompanied by a separation between family ownership and firm decision making and governance. This raises questions regarding the differing interests of owners versus managers.

Clearly, family owners, as company principals, face different risks than do external managers, who are acting as company agents. Agency theory (Madison, Holt, Kellermanns, & Ranft, 2016; Poza, 2009) views the overlap in ownership and management as having the potential to reduce or increase the costs of operating the family enterprise. In line with this theory, Chinese family business owners face unavoidable operational risks in bringing in external management due to currently weak property rights protections in an underdeveloped legal infrastructure. They also face routine family firm governance integration risks including financial undercapitalization, rapidly evolving product lifecycles, determinations as to when and how to grow, and the coordination of overall strategic planning in a rapidly changing global environment.

External managers' risks, in contrast, focus on job and income uncertainty, factors that can be anticipated and therefore intentionally reduced. External managers can choose to exit the company when problems occur, while the family owners usually must remain and bear responsibility for losses that result from poor external management. Risk aversion and prediction are much more crucial when information asymmetry increases between principals and agents, as well as when successive delegation increases external managerial discretion (Fama & Jensen, 1983; Madison et al., 2016). Although these risks exist in family businesses generally, we suggest that the challenges presented by separating ownership and governance in Chinese family firms differ from those elsewhere along three major dimensions.

First, the transition process in China is characterized by insufficient market economy controls as they relate to external institutions (Hoskisson, Eden, Lau, & Wright, 2000; Luo, 2006). The underdeveloped external governance mechanisms including capital, product, labor, and corporate markets, offer weaker

control constraints on external managerial discretion (Jensen, 1993). For example, external managers in Chinese family firms currently face relatively few pressures or threats of capital market takeovers. In addition, other external governance mechanisms including a functioning legal infrastructure and public media monitoring are relatively lacking in today's China.

As a result, Chinese family firms face external manager pre- and post-hire challenges due to the underdevelopment of market-oriented institutions and the inefficiency of the Chinese legal infrastructure that family firms in other parts of the world may not have to confront (Dharwadkar, George, & Brandes, 2000; Mitton, 2002). This increases the potential likelihood of Chinese family enterprises bringing on external managers who may possess inadequate skills or, once hired, behave opportunistically. Decision-making and governance delegation to external managers, in this context, leaves the Chinese family business vulnerable to issues outside of the family's control.

Second, as it relates to internal institutions, private ownership, and family management expose China-based firms to particular agency hazards (Becker, 1981; Schulze, Lubatkin, Dino, & Buchholtz, 2001; Stulz, 1988). Chinese family firms exemplify system theory's complex mixture of family, business, and ownership (Chrisman, Chua, & Litz, 2003; Habbershon, Williams, & MacMillan, 2003; Marion & Uhl-Bien, 2002; Poza, 2009) that presumes strong family orientation and business objectives function side-by-side (Lumpkin, Martin, & Vaughn, 2008). Thus, these companies are more than just economic organizations: they also embody the traditional "family" culture that is deeply rooted in China (Chu, 2004). This family culture frequently leads to relatively noncomplex internal monitoring mechanisms and corporate charters or contracts that lack formally defined rules, standards, and procedures. Should external managers either fail or succeed, there are only limited structures in place to either effectively reward or punish them. Further, the costs of doing so may be too high even when such options are available (J. J. Zhang, 2005). When the external managers do not own or have residual claims on Chinese family businesses, they may take advantage of information asymmetry to maximize their own utility rather than the firm's return on investment. Thus, delegation of power and governance in family firms in China can lead to substantial asset losses.

Third, from the perspective of governance, in contrast to Western and other newly industrialized countries, external managers are a relatively new phenomenon in China. In some cases, the external manager may not have the same business ethics as the family owners. External managers may lack awareness of agency contracts or may not consider that contract compliance is a basic and critical element of their job (Li, 2003). Without the pressure of external legal or social enforcement, external managers may be motivated to keep all of their personal options open and enhance their self-interests at the expense of business owners.

Given the numerous market opportunities in China, alongside lower entry and exit market barriers, one might argue that the impetus to self-enhance is not only rational but should be expected. As such, research indicates that many Chinese external managers choose to enter a family firm to acquire knowledge and resources for their own future businesses (J. J. Zhang, 2005; J. Q. Zhang, 2002). They then leave their employing family firms as soon as other opportunities beckon, and they may leverage their new intellectual and relational capital in competition with the firms they just left (Chu & Li, 2003). These same external managers may go to companies run by competitors of their former employers (Chu, 2002). Further, with neither external nor internal institutions providing effective corporate monitoring and discipline for ethics violations, the morale of external managers in Chinese family businesses is often decreased, enhancing the motivation to exit their employing firms (Whyte, 1996; J. J. Zhang, 2005).

The Governance Challenge

In China, the truth of the Nash equilibrium (Nash, 1950) is proven every day: whether family business owners trust external managers and whether these same managers keep faith with the family business owners is based on repeated experiences between the two. Both sides have a long-term interest in mutual enhancement. However, due to the lack of long-term contracts between the family owners and external managers, there is not a formal mechanism that either side can rely upon when it comes to establishing mutual owner/external manager trust in Chinese family businesses. Thus, over the long run,

the prisoner's dilemma related to the longer-term benefits associated with repeated interactions may not have an opportunity to become established (Axelrod, 1987; Kreps & Wilson, 1982; Lambert, 1983).

Underdeveloped market institutions, the lack of internal monitoring mechanisms and newly emerging professional management skills lead to two challenges that often reduce China-based family firms' effective use of their assets and cooperative efficiencies (Hughes & Hughes, 2004). The first is adverse selection and the second is moral hazard. Adverse selection and moral hazard are more likely to prevail under conditions of information asymmetry, which, in turn, increase the likelihood of Chinese external managers enhancing their personal self-interest at the expense of the family firm. The favoring of personal over collective interests can potentially lead to decreased family business financial performance (J. Q. Zhang, 2002; Y. L. Zhang & Yang, 2002a).

Ex-Ante Contract Challenges

Adverse selection risks arise in the case of principal and agent problems ex-ante contract. Adverse selection refers to situations where negative or erroneous information about a candidate is hidden to the detriment of the employer, who consequently lacks complete data to make an effective hiring decision. Had the employer had this information prior to making a job offer, it is likely that such an offer might not have been extended.

Adverse selection results from information asymmetry where the employing firm cannot fully evaluate an applicant's quality and worth, their match to the job specifications or their potential job satisfaction due to internal or external capacity factors (Fama, 1980; Hansmann, 1996). Information distortion effects may include a Chinese agent's misrepresenting his or her skill capabilities. However, it can also occur where regulations or social norms prevent the hiring agent, in this case, the Chinese family firm, from using certain categories of known information (Molho, 1997). Without the extensive use of personality or related evaluation, the match between a job candidate and the employing job may not be adequately assessed. These adverse selection individual characteristic concerns directly link to our reference to von Schultzendorff's (1984) definition of what constitutes external management.

Post-Contract Challenges

In contrast with ex-ante contract challenges, moral hazard refers to the risk of having hired an external manager, who subsequently does not comply with the terms of the employment contract. The agent—in this case, the external manager—may have an incentive to deliberately act inappropriately once they are in their position (from the viewpoint of the principal), because there has not been a clear and continuing effort to match the conscious or unconscious needs of the agent to those of the Chinese family business owners (Gomez-Mejia, Nunez-Nickel, & Gutierrez, 2001; Jensen & Meckling, 1992; McCollom, 1990).

Thus, in China, a moral hazard risk typically arises when the interests of the family business principals and the external managers turn out not to be aligned; when both parties fail to establish a basis for interest exchange as a part of establishing a contractual relationship; and, when it is difficult, if not impossible, to determine if the articles of the contract can or will be carried out. From an agency theory perspective (Poza, 2009), the Chinese family business owners may decide that it is too costly or impractical to closely monitor the external manager. External managers may feel no compunction about revealing firms' confidential information to competitor companies because there are no consequences associated with doing so. These employees may also deliberately pursue diversification or expansion strategies that actually benefit their current employer's rivals, especially if they believe they are enhancing their own future employment opportunities (Hu, Wang, & Zhong, 2002). Finally, the issue of job fulfillment may not be adequately explored by either party on a sufficiently regular basis to provide an early warning assessment regarding an external manager's job satisfaction. These behavioral factors led to our reference to Pieper and Klein's (2007) definition of what constitutes external management.

The Present Study

Given the negative impacts that adverse selection and moral hazard have on the ability of China-based family firms to scale and survive, we decided to limit ourselves to an examination of these two constructs. Our hope was that the machine learning technique we chose might concretely demonstrate its ability to determine the risks associated with both of these factors within the China-based family businesses population.

METHODS

Sample and Data Sources

We selected a convenience sample of 19 Chinese family businesses, where at least 50% of the ownership was in the hands of related family members; family members maintained control of institutional decision-making and governance, and a majority of management positions were occupied by family members. In each case, a family member served as the chairman or CEO of the Chinese firm and two or more family members were on the company's board of directors. In several the organizations, family members also served as legal representatives and general managers. Finally, in all 19 cases, family members were, directly or indirectly, the largest company shareholders (Hughes, 2004).

Ten of the 19 firms were associated with either the construction or building industries, while five were technology firms and four were family-owned training institutions. All 19 companies employed fewer than 50 individuals.

The 19 family firms were surveyed in 2011, 2012 and 2013. Since reliable public information about Chinese family businesses is extremely difficult to obtain (Wortman, 1994), 30-minute interviews were conducted with the chief executive or business owners of the 19 firms to collect responses to our eight questions.

For seven of the eight questions, the interviewed individual was asked to provide a written response, using a scale of 0% (no match) to 100% (complete match). For the one question related to the degree that the evaluator felt the external manager's competencies were adequate to those required, respondents provided a ranked answer, using a scale of 1 (no match) to 5 (complete match).

Measures

Adverse Selection

Pre-contract adverse selection resulting from information asymmetry between the external managers and firm owners arises when candidates are able to hide information about themselves such as their skill quality and worth (Fama, 1980; Hansmann, 1996). Adverse selection can be assessed along three indicators including the distortion rate of the information, lack of job matching and the fulfillment of work ratio.

The information disclosed by the Chinese professional managers in their initiating statement, interview, and written examination about their abilities may not be consistent with either their potential or actual performance. During the recruiting process, only the external managers may have access to private information about their personal business ability, historical work experience, moral quality, and efforts. The individuals may exaggerate their skills and conceal information that conflicts with their capacity statements. Without access to reliable external, objective assessment vehicles, Chinese family business owners must over-rely on candidate-provided information to their detriment as the hiring entity.

Moral Hazard

Pre-contract adverse selection is rooted in hidden information, while the post-contract moral hazard risk is associated with hidden actions. In this case, opportunistic external managers may hide behaviors they engage in that could harm the overall welfare of the family business but are in their own personal best interests (Ones, Viswesvaran, & Schmidt, 1993).

Various reasons may underlie this trend. For example, in China today, there are various internal and external incentives to self-enhance on-the-job performance. External managers know there are currently

no serious penalties associated with failing to follow through on firm-principal contracts. Further, they are aware that, if they are skilled as external managers, they have many other employment opportunities, including self-employment. Finally, these individuals may receive financial incentives from competitor firms to take clients and relationship resources from their current family firm and transfer them to a new employer.

Research indicates that moral hazard is measured using five indicators including: risks associated with deliberate information omissions; violation rates, including embezzlement, kickbacks, transferring property, bribery, falsification of accounts, and excessive administrative expenditure; private family firm information disclosure rates; blind pursuit of diversification and expansion to enhance personal social status; and the likelihood of professional managers leaving the family firm.

Support Vector Machine Technique

As previously discussed, regulation violation by managers can negatively impact Chinese family businesses and their associated financial operations. Risk prediction can assist in preventing, redressing and avoiding the mistakes and fluctuations of family firm human resource management. Accurate prediction can enhance the likelihood that both the function and order of personnel selection and hire are reliable, thereby improving the China-based family firm's resource capacity. Therefore, accurate prediction and risk prevention are more essential to these types of businesses than punishment after regulations have been violated.

Accurate prediction, though essential, is often hindered by the complex relationship between predictor and target variables and the absence of theory to guide model identification. To empirically examine the completeness of our adverse selection and moral hazard model, we decided to use the SVM technique for this exploratory study.

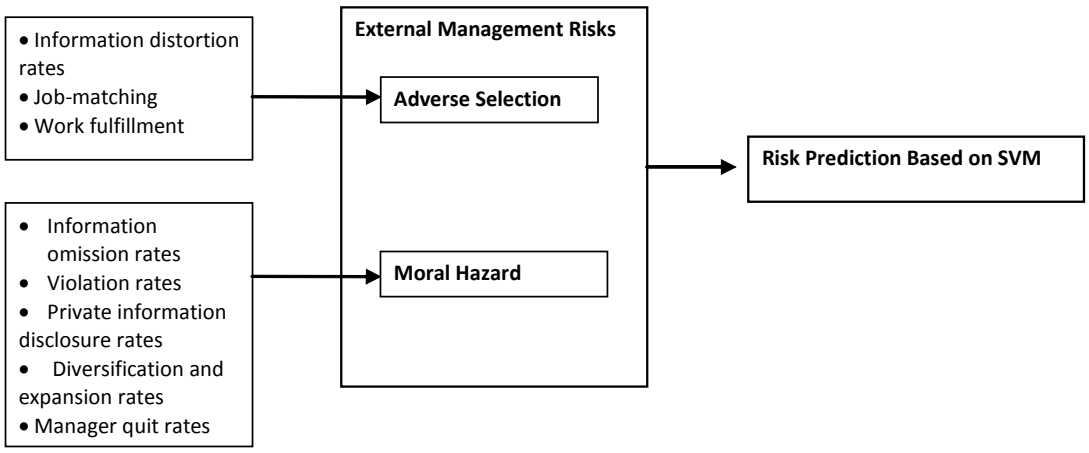
SVM is an efficient and effective pattern recognition technique that is based upon Vapnik–Chervonenkis's structural risk minimization (SRM) theory (Cortes & Vapnik, 1995; Vapnik, 2000). SVM involves supervised learning methods that can be applied to classification or regression. The technique appears to generate more accurate predictive ratios than other statistical and intelligent models in the area of BFP.

SVM can be used for problems of classification and regression and to solve various real-world problems. Two basic principles of SVM are to map raw data into a high dimensional space using kernel functions, and then construct the optimal separation of the hyperplane on the base of support vectors. The technique is helpful in text and hypertext categorization as its application can significantly reduce the need for labeled training instances in both the standard inductive and transductive settings.

Using the SVM technique, we developed a prediction model (see Figure 1) for external management risk in Chinese family businesses.

We used three of the 19 companies (identified by the numbers 6, 17 and 18) as the testing sample for this exploratory effort, while the remaining 16 firms were used as the research or training sample. SVM performs well on predictive tasks where the relationship between predictors and target is complex. Our prediction was that the relative error between the evaluation result and the predictive value would be smaller than 5% for both the test sample and the research/training set. If the predictive results were basically in accordance with the evaluative ones, we would have some evidence that SVM could be successfully used to predict the risks associated with incorporating external management in China-based family businesses.

FIGURE 1
EXTERNAL MANAGEMENT RISK MODEL



Indicator System

The indicator system was comprised of target elements and variables indicator sets (Figure 2). The target set included one indicator: risks associated with introducing external managers into the family firm. The element set was comprised of the two outcome indicators of adverse selection and moral hazard risk. The variable set was comprised of eight indicators including information distortion rates, degree of job-matching, work fulfillment ratios, deliberate information omission rates, contract violation rates, private information disclosure rates, pursuit of diversification and expansion rates, and managers' quit rates. Figure 2 summarizes the indicator system along with the questions used.

FIGURE 2
INDICATOR SYSTEM AND RISK VALUE RANGE –EXTERNAL MANAGER RISKS

First level index (target variable): External Manager Risks		
Second level indicator (element level)	Third level indicator (variable level)	**Value Range**
V1 Adverse selection risks	V11: Information distortion rates	**[0, 100%]**
	V12: Job-matching rates	**[1, 5]**
	V13: Work fulfillment ratios.	**[0, 100%]**
V2 Moral hazard risks	V21: Deliberate omission rates	**[0, 100%]**
	V22: Violation rates	**[0, 100%]**
	V23: Private information disclosure rates	**[0, 100%]**
	V24: Pursuit of diversification and expansion	**[0, 100%]**
	V25: Manager quit rates	**[0, 100%]**
Instructions: Please answer the following questions about your external manager on a scale of 0% to 100%:		
• V11/Distortion rate of the information: Indicate the extent to which information disclosed by your external manager in his initiating statement, interview and written examination about his abilities is consistent with either his capacity or actual performance.		

- V13/Fulfillment of the work: Indicate how well you believe your external manager meets your work fulfillment requirements.
- V21/Rate of deliberate information omission: Indicate the extent to which you believe your external manager deliberately omits information.
- V22/Rate of violation: Indicate the extent to which you believe your external manager embezzles, receives kickbacks, transfers company property, accepts bribes, falsifies accounts or incurs excessive administrative expenditures.
- V23/Rate of the disclosure of the private information: Indicate the extent to which you believe your external manager has disclosed private firm information to unauthorized outsiders.
- V24/Diversification and expansion pursuit: Indicate the extent to which you believe your external manager may be engaging in business diversification or expansion pursuits outside of those involving your family business.
- V25/Managers' quit rates: Indicate your estimate as to the likelihood of your external manager leaving your family firm within the next 12 months.

On a scale of 1 (does not match) to 5 (complete match), please tick the box that corresponds to your evaluation of your external manager.

- V12/The skills of my external manager match those required for his job

SVM Risk Prediction Model Building

Even though SVM was first applied to classification problems, SVM can be extended to regression problems by introducing the concept of loss function. The basic principles of loss function are to map the input space data on a higher dimensional feature space, using nonlinear mapping; conduct linear regression analyses in the space; and apply regression estimates, using linear minimization.

According to the characteristics and application areas of each kernel function, we chose radial basis function (RBF) as the method to build an SVM regression model. The RBF formula used is listed below:

$$K(x_i, x_j) = \exp(-\frac{\left|x_i - x_j\right|^2}{2\sigma^2}) \quad (1)$$

Our risk model used adverse selection and moral hazard as the decision attributes and the eight influencing factors as the condition attributes. According to the SVM regression and predictive modeling process, we set up our SVM regression function as follows:

$$y = f(x) = \omega \cdot \phi(x) + b \quad (2)$$

where y is the decision attribute, which is also the professional management risk;

x is the condition attribute, which is also the risk influencing factors;
ω (x) is the non-linear mapping from the input space to the higher dimensional feature space, and ω and b are estimated by using the formula of minimization.

$$R_{SVM}(c) = c\frac{1}{l}\sum_{i=1}^{l} L_{\varepsilon}(y_i, \omega\phi(x_i) + b) + \frac{1}{2}\left\|\omega\right\|^2 \quad (3)$$

$$L_{\varepsilon}(y-f(x))=\begin{cases}0 & |y-f(x)|\le\varepsilon\\ |y-f(x)|-\varepsilon & |y-f(x)|>\varepsilon\end{cases} \quad (4)$$

In order to obtain the coefficients ω and b, the slack variables ξ_i and ξ_i^* were used to minimize the following formula:

$$R_{SVM}(\omega,\xi^{(n)})=c\sum_{i=1}^{l}(\xi_i+\xi_i^*)+\frac{1}{2}\|\omega\|^2 \quad (5)$$

The coefficient b was computed by selecting those Lagrange multipliers a_i and a_i^* that can determine the predictive error $\delta_K=f(x_K)-y_K$. Under the circumstances of Vapnik's insensitive loss function, we obtained the value of a_i and a_i^* by choosing point x_K on the boundary based upon our knowledge of the accurate value of the predictive error $\delta_K=\varepsilon sign(a_K-a_K^*)$.

From the perspective of stability, b was computed by using the average $\overline{a_K}$ of all the points x_K on the boundary, according to the following constraint conditions:

$$s.t.\begin{cases}y_i-\omega\cdot\phi(x_i)-b\le\varepsilon+\xi_i\\ \omega\cdot\phi(x_i)+b-y_i\le\varepsilon+\xi_i^*\\ \xi_i,\xi_i^*\ge 0, i=1,2,\cdots,l\end{cases} \quad (6)$$

We have:

$$b=\overline{a_K}=\delta_K+y_K-\sum\nolimits_i(a_j-a_i^*)K(x_i,x_k) \quad (7)$$

We examined the accuracy of SVM prediction model by using the relative error function, that is,

$$Error(n)=\frac{|x(n,true)-x(n,pred)|}{|x(n,true)|} \quad (8)$$

The relative error function is the error detection function used to examine the accuracy of the prediction model, x (n, true) and x (n, pred) stand for the actual values and the predictive values respectively after testing n samples.

FINDINGS

Business owners and managers from the 19 China-based, family owned firm provided responses for eight indicator factors over a three-year period. The 2011 risk analysis indicators are summarized in Table 1; the 2012 risk analysis indicators are summarized in Table 2, and the 2013 risk analysis indicators are summarized in Table 4.

As can be seen from the tables, company 11 only participated in the 2011 analysis; thus, for the purposes of this exploratory study, the 2012 and 2013 SVM runs were based on new data from the other 18 companies and a repeat insertion of the 2011 information for company 11.

TABLE 1
EXTERNAL MANAGER RISK ANALYSIS – 2011

Companies Training	V11	V12	V13	V21	V22	V23	V24	V25
1	0.45	2.00	0.80	0.60	0.60	0.40	0.50	0.60
2	0.50	4.00	0.85	0.30	0.20	0.10	0.20	0.20
3	0.65	2.00	0.80	0.50	0.50	0.38	0.75	0.70
4	0.42	3.00	0.80	0.40	0.30	0.10	0.10	0.08
5	0.50	3.00	0.78	0.40	0.30	0.10	0.10	0.15
6	0.40	3.00	0.60	0.30	0.20	0.25	0.50	0.20
7	0.30	3.00	0.80	0.20	0.10	0.60	0.40	0.50
8	0.60	2.00	0.50	0.60	0.20	0.80	0.30	0.50
9	0.30	3.00	0.78	0.30	0.30	0.05	0.04	0.27
10	0.65	2.00	0.70	0.30	0.40	0.25	0.30	0.45
11	0.50	3.00	0.80	0.25	0.25	0.40	0.00	0.40
12	0.55	2.00	0.35	0.55	0.20	0.55	0.31	0.42
13	0.50	2.00	0.35	0.55	0.20	0.60	0.31	0.42
14	0.50	3.00	0.37	0.50	0.20	0.45	0.31	0.42
15	0.60	2.00	0.75	0.50	0.50	0.50	0.60	0.60
16	0.60	3.00	0.78	0.20	0.25	0.20	0.25	0.30
17	0.38	3.00	0.80	0.25	0.25	0.23	0.20	0.30
18	0.38	3.00	0.80	0.35	0.30	0.25	0.25	0.25
19	0.60	2.00	0.78	0.40	0.30	0.20	0.30	0.25

TABLE 2
EXTERNAL MANAGER RISK ANALYSIS – 2012

Companies Training	V11	V12	V13	V21	V22	V23	V24	V25
1	0.55	2.00	0.80	0.50	0.50	0.30	0.45	0.55
2	0.05	4.00	0.90	0.25	0.20	0.20	0.20	0.20
3	0.60	2.00	0.80	0.80	0.60	0.40	0.50	0.60
4	0.40	3.00	0.85	0.30	0.20	0.20	0.20	0.10
5	0.40	3.00	0.85	0.35	0.20	0.20	0.20	0.20
6	0.35	3.00	0.75	0.30	0.25	0.45	0.40	0.35
7	0.40	3.00	0.80	0.20	0.25	0.50	0.35	0.60
8	0.55	2.00	0.60	0.65	0.20	0.60	0.30	0.54
9	0.25	2.00	0.80	0.25	0.30	0.20	0.15	0.30
10	0.50	2.00	0.70	0.30	0.35	0.30	0.30	0.50
11	0 (no recruitment)	2.00	0.70	0.20	0.20	0.30	0.20	0.20
12	0.55	2.00	0.66	0.45	0.23	0.50	0.37	0.49
13	0.50	2.00	0.62	0.50	0.23	0.55	0.39	0.49
14	0.55	3.00	0.60	0.50	0.20	0.60	0.39	0.49
15	0.50	2.00	0.80	0.30	0.40	0.30	0.50	0.65
16	0.20	3.00	0.80	0.20	0.20	0.20	0.20	0.20
17	0.40	2.00	0.85	0.35	0.30	0.38	0.32	0.30
18	0.40	2.00	0.85	0.30	0.35	0.37	0.35	0.30
19	0.35	2.00	0.80	0.30	0.40	0.35	0.30	0.30

TABLE 3
EXTERNAL MANAGER RISK ANALYSIS – 2013

Companies Training	V11	V12	V13	V21	V22	V23	V24	V25
1	0.75	2.00	0.78	0.70	0.45	0.30	0.65	0.65
2	0.50	4.00	0.95	0.02	0.20	0.15	0.10	0.20
3	0.55	2.00	0.85	0.60	0.60	0.40	0.65	0.60
4	0.45	3.00	0.85	0.20	0.20	0.10	0.15	0.10
5	0.45	2.00	0.80	0.20	0.25	0.20	0.15	0.15
6	0.30	3.00	0.80	0.35	0.35	0.30	0.30	0.35
7	0.40	3.00	0.75	0.15	0.10	0.60	0.35	0.55
8	0.65	2.00	0.60	0.70	0.30	0.70	0.40	0.60
9	0.25	2.00	0.80	0.10	0.30	0.20	0.10	0.28
10	0.64	2.00	0.75	0.28	0.35	0.25	0.25	0.50
11	0 (no recruitment)	2.00	0.70	0.10	0.10	0.30	0.15	0.20
12	0.55	2.00	0.73	0.45	0.26	0.50	0.30	0.41
13	0.60	2.00	0.73	0.50	0.26	0.65	0.38	0.41
14	0.40	3.00	0.75	0.50	0.28	0.58	0.38	0.41
15	0.55	2.00	0.75	0.20	0.20	0.30	0.40	0.70
16	0.20	3.00	0.85	0.20	0.16	0.20	0.15	0.35
17	0.25	3.00	0.85	0.35	0.35	0.35	0.30	0.20
18	0.42	2.00	0.85	0.30	0.40	0.45	0.25	0.30
19	0.35	2.00	0.80	0.30	0.35	0.30	0.20	0.20

As previously indicated, SVM performs well on predictive tasks where the relationship between predictors and target is complex. As shown in Table 4 for the test sample and Table 5 for the training sample, the results of our experiment indicate that the relative error between the predictive and actual values for each of the three years examined in our study is smaller than 5% for both the comparative testing and training companies included in this research effort.

TABLE 4
COMPARISON: EVALUATION RESULT AND PREDICTIVE VALUE - RBF KERNEL FUNCTIONS FROM 2011-2013 - TEST SAMPLE

2011			**2012**			**2013**		
Evaluation Result	Predictive Value	Error (%)	Evaluation Result	Predictive Value	Error (%)	Evaluation Result	Predictive Value	Error (%)
0.6813	0.6640	2.53%	0.7313	0.7190	1.68%	0.7188	0.7211	0.33%
0.6763	0.6560	2.99%	0.6125	0.6060	1.06%	0.7063	0.7120	0.81%
0.6975	0.6700	3.94%	0.6150	0.6110	0.65%	0.6213	0.6380	2.70%

TABLE 5
COMPARISON: EVALUATION RESULT AND PREDICTIVE VALUE - RBF KERNEL FUNCTIONS FROM 2011-2013 – TRAINING SAMPLE

2011			2012			2013		
Evaluation Result	Predictive Value	Error (%)	Evaluation Result	Predictive Value	Error (%)	Evaluation Result	Predictive Value	Error (%)
0.7438	0.7610	2.32%	0.7063	0.7130	0.96%	0.7850	0.7902	0.66%
0.7938	0.7550	4.88%	0.7500	0.7450	0.67%	0.7650	0.7550	1.31%
0.7850	0.7890	0.51%	0.7875	0.7580	3.75%	0.7813	0.7995	2.34%
0.6500	0.6360	2.15%	0.6563	0.6330	3.54%	0.6313	0.6120	3.05%
0.6663	0.6370	4.39%	0.6750	0.6560	2.81%	0.5250	0.5460	4.00%
0.7375	0.7310	0.88%	0.7625	0.7510	1.51%	0.7375	0.7701	4.42%
0.6875	0.6550	4.73%	0.6800	0.6620	2.65%	0.7438	0.7230	2.79%
0.6300	0.6280	0.32%	0.5313	0.5560	4.66%	0.5038	0.5250	4.22%
0.6313	0.6380	1.07%	0.6188	0.6360	2.79%	0.6275	0.6450	2.79%
0.7000	0.7110	1.57%	0.5429	0.5616	3.45%	0.5071	0.5290	4.31%
0.6163	0.6040	1.99%	0.6563	0.6730	2.55%	0.6500	0.6650	2.31%
0.6163	0.6350	3.04%	0.6600	0.6870	4.09%	0.6913	0.7090	2.57%
0.7188	0.7040	2.05%	0.7913	0.7650	3.32%	0.7875	0.7540	4.25%
0.7563	0.7250	4.13%	0.6813	0.6700	1.65%	0.6375	0.6420	0.71%
0.6975	0.7070	1.36%	0.6250	0.6360	1.76%	0.6388	0.6600	3.33%
0.6038	0.6260	3.69%	0.6000	0.6230	3.83%	0.5625	0.5410	3.82%

Our exploratory project indicates that the SVM tool, with its built-in bootstrapping resampling technique, provides a level of robustness and stability that cannot be obtained from merely performing *ad-hoc* searches of possible logit model combinations. Our experiment also reveals that, as S. Chen, Härdle, and Moro (2011) found for default risk prediction, SVM may have some theoretical advantages in estimating adverse selection and moral hazard challenges in contrast to parametric logic models. The consistency of the statistical results over the three years of our study from our 19 training and testing samples indicates that this particular analytical tool may be very useful in this context.

LIMITATIONS

We acknowledge limitations to our study. As has been pointed out by other researchers in the field (S. Chen et al., 2011; Cui & Curry, 2005), there are some inherent weaknesses in the SVM technique that bear consideration if the approach is to gain acceptance as a good human resource management tool.

First of all, SVM still requires additional theoretical development before social science researchers may want to routinely use it in practical situations because the technique does not naturally yield predictive bounds (Cui & Curry, 2005, p. 608). Of greater concern is the fact that there is currently no meta-theory to assist with kernel transformation selection and, therefore, parameter estimation is time-consuming.

As a part of our experiment, we examined the capacity of SVM to serve as an adverse selection and moral hazard risk reduction tool without completing comparative regression analyses. Thus, while we have some interesting stand-alone findings, it will be crucial to compare the outcomes received from

subsequent human relations-related SVM analyses to those obtained from discriminant analysis, maximum likelihood estimation or logit analysis, using the same data.

CONCLUSIONS AND FUTURE RESEARCH

The transition from family to blended family/non-family governance has concerned family firms throughout China. The absence of effective external corporate monitoring and discipline systems, weak national legal infrastructures, a limited, experienced managerial labor pool, and no real national mechanisms in place to enforce business ethics has heightened the risks associated with integrating external management into Chinese family companies. This makes having accurate prediction and risk avoidance tools in hand even more critical for China-based family businesses than their counterparts in the developed world.

We offer that SVM may be able to assist in predicting some of the risks associated with integrating non-family management into the governance of family businesses. SVM, as a development in statistical machine learning theory, is well founded, and its performance is either similar to or significantly better than that of traditional machine learning approaches, including neural networks. As Cui and Curry (2005) indicate, SVM avoids an overreliance on particular structural assumptions by automating the model identification problem. Thus, the technique allows the researcher to enter the parameter estimation phase with a group of structural possibilities rather than just one. This approach has a stability and robustness that is lacking in the maximum-likelihood procedures typically used under these circumstances.

This paper adds to the family business knowledge base by applying tenants from systems and resource theory in a practical application. Specifically, we demonstrate that SVM, as an emerging machine learning technique, can provide China-based family businesses with an effective tool to more accurately predict the risks associated with a transition to a blended form of family and external management governance. We believe that SVM holds considerable promise as a means of reducing the information asymmetry between external managers and family firm owners in China and subsequently laying the foundation for enhanced integrated governance structures within these companies. A repeat of this experiment with additional Chinese family-owned enterprises and a logic model comparison will be crucial in validating how SVM can be used within this context.

REFERENCES

Ahlstrom, D., Young, M. N., Chan, E. S., & Bruton, G. D. (2004). Facing constraints to growth? Overseas Chinese entrepreneurs and traditional business practices in East Asia. *Asia Pacific Journal of Management, 21*(3), 263-285.

Astrachan, J. H., & Shanker, M. C. (2003). Family businesses' contribution to the US economy: A closer look. *Family Business Review, 16*(3), 211-219.

Axelrod, R. (1987). The evolution of strategies in the iterated prisoner's dilemma. In C. Bicchieri, R. Jeffrey, & B. Skyrm (Eds.), *The dynamics of norms* (pp. 1-16): Cambridge University Press.

Becker, G. (1981). *A treatise on the family*. Cambridge, MA: Harvard University Press.

Beer, M., Cannon, M. D., Baron, J. N., Dailey, P. R., Gerhart, B., Heneman, H. G., . . . Locke, E. A. (2004). Promise and peril in implementing pay-for-performance. *Human Resource Management, 43*(1), 3-48.

Chen, M.-J. (2001). *Inside Chinese business: A guide for managers worldwide*. Boston, MA: Harvard Business Press.

Chen, S., Härdle, W., & Moro, R. (2011). Modeling default risk with support vector machines. *Quantitative Finance, 11*(1), 135-154.

Chrisman, J. J., Chua, J. H., & Litz, R. (2003). A unified systems perspective of family firm performance: An extension and integration. *Journal of Business Venturing, 18*(4), 467-472.

Chu, X. (2000). The study on family business: A topic with modern significance. *Social Science in China, 5*, 51-58.

Chu, X. (2002). Professional managers and the growth of family business. *Management World, 4*, 101-108.
Chu, X. (2004). The definition of Chinese family business. *Economic Theory and Business Management, 1*, 49-53.
Chu, X., & Li, H. (2003). The trust and the growth of the family business in China [in Chinese]. *Management World, 6*, 98-104.
Chua, J. H., Chrisman, J. J., & Sharma, P. (1999). Defining the family business by behavior. *Entrepreneurship: Theory and Practice, 23*(4), 19-19.
Conway Center for Family Business. (2012). Family business facts – 2012. Retrieved from http://www.familybusinesscenter.com/resources/family-business-facts
Cortes, C., & Vapnik, V. (1995). Support-vector networks. *Machine learning, 20*(3), 273-297.
Cui, D., & Curry, D. (2005). Prediction in marketing using the support vector machine. *Marketing Science, 24*(4), 595-615.
Danenas, P., & Garsva, G. (2010). Credit risk evaluation using SVM-based classifier. In W. Abramowicz, R. Tolksdorf, & K. Wecel (Eds.), *Business Information Systems (BIS) 2010 Workshops* (Vol. 57, pp. 7-12). Verlag Berlin Heidelberg: Springer.
Dharwadkar, B., George, G., & Brandes, P. (2000). Privatization in emerging economies: An agency theory perspective. *Academy of Management Review, 25*(3), 650-669.
Dorfman, M. S. (2007). *Introduction to risk management and insurance* (9th ed.). New York, NY: McGraw-Hill.
Dyer, W. G. (1989). Integrating professional management into a family owned business. *Family Business Review, 2*(3), 221-235.
Faccio, M., Lang, L. H., & Young, L. (2001). Dividends and expropriation. *American Economic Review, 91*(1), 54-78.
Fama, E. F. (1980). Agency problems and the theory of the firm. *The Journal of Political Economy, 88*(2), 288-307.
Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *The Journal of Law & Economics, 26*(2), 301-325.
Fukuyama, F. (1995). *Trust: The social virtues and the creation of prosperity*. Middlesex, England: Harmish Hamilton/Penguin.
Gersick, K. E. (1997). *Generation to generation: Life cycles of the family business*. Boston, MA: Harvard Business Press.
Gomez-Mejia, L. R., Nunez-Nickel, M., & Gutierrez, I. (2001). The role of family ties in agency contracts. *Academy of Management Journal, 44*(1), 81-95.
Habbershon, T. G., Williams, M., & MacMillan, I. C. (2003). A unified systems perspective of family firm performance. *Journal of Business Venturing, 18*(4), 451-465.
Hansmann, H. (1996). *The ownership of enterprise*. Cambridge, MA: Harvard University Press.
Herrero, I. (2011). Agency costs, family ties, and firm efficiency. *Journal of Management, 37*(3), 887-904.
Hofstede, G. (1984). *Culture's consequences: International differences in work-related values* (Vol. 5): Sage Publications.
Hoskisson, R. E., Eden, L., Lau, C. M., & Wright, M. (2000). Strategy in emerging economies. *Academy of Management Journal, 43*(3), 249-267.
Hoy, F., & Pu, H. (2012). Reconsidering models for investigating family firms: Variants from China. *Entrepreneurship Research Journal, 2*(4), [Online]. doi:10.1515/2157-5665.1088
Hu, J., Wang, X., & Zhong, Y. P. (2002). The management mode and cultural basis of Chinese business [in Chinese]. *Management World, 12*, 104-113.
Hughes, J. E., Jr. (2004). *Family wealth: Keeping it in the family: How family members and their advisers preserve human, intellectual, and financial assets for generations*. New York, NY: Bloomberg Press.

Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *the Journal of Finance, 48*(3), 831-880.
Jensen, M. C., & Meckling, W. H. (1992). Specific and general knowledge and organizational structure. *Journal of Applied Corporate Finance, 8*(2), 4-18.
Katz, J. A., & Green, R. P. (2009). *Entrepreneurial small business* (Vol. 200). New York, NY: McGraw-Hill/Irwin.
Kim, K.-j., & Ahn, H. (2012). A corporate credit rating model using multi-class support vector machines with an ordinal pairwise partitioning approach. *Computers & Operations Research, 39*(8), 1800-1811.
Kramer, R. M., & Tyler, T. R. (Eds.). (1995). *Trust in organizations: Frontiers of theory and research*: Sage Publications.
Kreps, D. M., & Wilson, R. (1982). Reputation and imperfect information. *Journal of Economic Theory, 27*(2), 253-279.
Lambert, R. A. (1983). Long-term contracts and moral hazard. *The Bell Journal of Economics, 14*(2), 441-452.
Lan, W., & Zhangliu, W. (2012). Three dimensional evolution of governance structure in Chinese family business. In Y. Zhang (Ed.), *Future wireless networks and information systems* (pp. 403-409). Berlin Heidelberg: Springer.
Li, X. C. (2003). The failure of professional managers market and the governance of family business. *Management World, 4*.
Low, C. K. (2002). *Corporate governance: an Asia-Pacific critique*. Hong Kong: Sweet & Maxwell Asia.
Lumpkin, G. T., Martin, W., & Vaughn, M. (2008). Family orientation: individual-level influences on family firm outcomes. *Family Business Review, 21*(2), 127-138.
Luo, Y. (2006). Opportunism in inter-firm exchanges in emerging markets. *Management and Organization Review, 2*(1), 121-147.
Luo, Y., & Park, S. H. (2001). Strategic alignment and performance of market-seeking MNCs in China. *Strategic Management Journal, 22*(2), 141-155.
Madison, K., Holt, D. T., Kellermanns, F. W., & Ranft, A. L. (2016). Viewing family firm behavior and governance through the lens of agency and stewardship theories. *Family Business Review, 29*(1), 65-93.
Marion, R., & Uhl-Bien, M. (2002). Leadership in complex organizations. *The Leadership Quarterly, 12*(4), 389-418.
McCollom, M. E. (1990). Problems and prospects in clinical research on family firms. *Family Business Review, 3*(3), 245-262.
Mitton, T. (2002). A cross-firm analysis of the impact of corporate governance on the East Asian financial crisis. *Journal of Financial Economics, 64*(2), 215-241.
Molho, I. (1997). *The economics of information: Lying and cheating in markets and organizations*. Oxford: Blackwell.
Nash, J. F. (1950). Equilibrium points in n-person games. *Proceedings of the National Academy of Sciences of the United States of America, 36*(1), 48-49.
Ones, D. S., Viswesvaran, C., & Schmidt, F. L. (1993). Comprehensive meta-analysis of integrity test validities: Findings and implications for personnel selection and theories of job performance. *Journal of applied Psychology, 78*(4), 679-703.
Pieper, T. M., & Klein, S. B. (2007). The bulleye: A systems approach to modeling family firms. *Family Business Review, 20*(4), 301-319.
Poza, E. J. (2009). *Family business* (3rd ed.). Mason, OH: South-Western Cengage Learning.
Ralston, D. A., Terpstra-Tong, J., Terpstra, R. H., Wang, X., & Egri, C. (2006). Today's state-owned enterprises of China: Are they dying dinosaurs or dynamic dynamos? *Strategic Management Journal, 27*(9), 825-843.
Redding, S. G. (1990). *The spirit of Chinese capitalism*. Berlin: Walter de Gruyter.

Schulze, W. S., Lubatkin, M. H., Dino, R. N., & Buchholtz, A. K. (2001). Agency relationships in family firms: Theory and evidence. *Organization Science, 12*(2), 99-116.
Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. *The Journal of Finance, 52*(2), 737-783.
Stulz, R. (1988). Managerial control of voting rights: Financing policies and the market for corporate control. *Journal of Financial Economics, 20*(1/2), 25-54.
Tsui-Auch, L. S. (2004). The professionally managed family-ruled enterprise: Ethnic Chinese business in Singapore. *Journal of Management Studies, 41*(4), 693-723.
Vapnik, V. (2000). *The nature of statistical learning theory* (2nd ed.). New York, NY: Springer.
von Schultzendorff, D. (1984). *Fremdmanager in familienunternehmen eine empirische analyse*. Dissertation No. 922, Hochschule St. Gallen, Switzerland.
Wang, J. Q. (2009). The governance of human resource in family business in China [in Chinese]. *Human Resource Management, 24*, 8-11.
Weidenbaum, M. L., & Hughes, S. (1996). *The bamboo network: How expatriate Chinese entrepreneurs are creating a new economic superpower in Asia*. New York, NY: The Free Press.
Whyte, M. K. (1996). The Chinese family and economic development: obstacle or engine? *Economic development and cultural change, 45*(1), 1-30.
Williamson, P. J., & Zeng, M. (2007). The global impact of China's emerging multinationals. In C. A. McNally (Ed.), *China's emergent political economy: Capitalism in the dragon's lair* (pp. 83-101): Routledge.
Wortman, M. S. (1994). Theoretical foundations for family-owned business: A conceptual and research-based paradigm. *Family Business Review, 7*(1), 3-27.
Yeung, H. W.-c. (2006). Change and continuity in Southeast Asian ethnic Chinese business. *Asia Pacific Journal of Management, 23*(3), 229-254.
Yeung, H. W.-c., & Olds, K. (Eds.). (1999). *The globalisation of Chinese business firms*. London: Macmillan.
Young, M. N., Ahlstrom, D., & Bruton, G. D. (2004). The globalization of corporate governance in East Asia: The "transnational" solution. *Management International Review, 44*, 31-50.
Yu, L., Yao, X., Wang, S., & Lai, K. K. (2011). Credit risk evaluation using a weighted least squares SVM classifier with design of experiment for parameter selection. *Expert Systems with Applications, 38*(12), 15392-15399.
Zahra, S. A. (2005). Entrepreneurial risk taking in family firms. *Family Business Review, 18*(1), 23-40.
Zhang, J. J. (2005). *Chinese private entrepreneurs and professional managers [in Chinese]*. Beijing: Finance and Economics.
Zhang, J. Q. (2002). The mechanism of managers' betrayal and the response from family owners. *Management World, 5*.
Zhang, Y. L., & Yang, N. D. (2002a). Expert evaluation method of human resource risks. *Aeronautical Science and Technology, 2*, 38-39.
Zhang, Y. L., & Yang, N. D. (2002b). Study on the fuzzy comprehensive evaluation method of human resource risk [in Chinese]. *Journal of Industrial Engineering and Engineering Management, 6*, 18-20.

ACKNOWLEDGEMENT

This research was underwritten by grants from the Natural Science Funding Program, Shandong Province, China and from the University of San Francisco's China Business Studies Initiative.