INSTITUTO
UNIVERSITÁRIO
DE LISBOA

The Impact of Family Involvement on Enterprise Technological Innovation in China --Evidence from Listed Family Business in Manufacturing Industry

GU Zhengwei

Doctor of Management

Supervisors:
PhD Pedro Fontes Falcão, Assistant Professor,
ISCTE University Institute of Lisbon
PhD LI Ping, Professor,
University of Electronic Science and Technology of China

November, 2023

BUSINESS
SCHOOL

Marketing, Operations and General Management Department

The Impact of Family Involvement on Enterprise Technological Innovation in China --Evidence from Listed Family Business in Manufacturing Industry

GU Zhengwei

Doctor of Management

Supervisors:
PhD Pedro Fontes Falcão, Assistant Professor,
ISCTE University Institute of Lisbon
PhD Li Ping, Professor,
University of Electronic Science and Technology of China

November, 2023

BUSINESS
SCHOOL

Marketing, Operations and General Management Department

The Impact of Family Involvement on Enterprise Technological Innovation in China --Evidence from Listed Family Business in Manufacturing Industry

GU Zhengwei

Doctor of Management

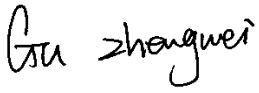
Jury:

PhD João Carlos Rosmaninho de Menezes, Associate Professor with Habilitation,
ISCTE University Institute of Lisbon
PhD António Rui Carvalho Moreira de Carvalho, Associate Professor,
ISG – Instituto Superior de Gestão
PhD Xiao Wen, Professor,
UESTC - University of Electronic Science and Technology of China
PhD Nelson José dos Santos António, Full Professor,
ISCTE University Institute of Lisbon
PhD Pedro Fontes Falcão, Assistant Professor with Habilitation,
ISCTE University Institute of Lisbon

November, 2023

Declaration

I declare that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed:  Date: 2023.11.20

Name: GU Zhengwei

作者申明

本人郑重申明: 除了论文致谢中明确说明并致以谢意的部分外，所呈交的论文不包含任何他人或作者本人已用于获得任何教育机构的学位和证书而使用过的材料。同时尽 我所知，除了文中特别加以标注引用的内容外，本论文不包含任何其他个人或集体已经发表或撰写的成果作品。

作者签名:  日期：2023.11.20

姓名（拼音）：GU Zhengwei

[This page is deliberately left blank.]

Abstract

The rapid development of family businesses in China is accompanied by a prominent problem of inadequate investment in innovation, and it is crucial to explore the reasons behind. This study examines the involvement of family owners in businesses from three perspectives – ownership, management, and governance, while also considering the impact of top management team stability and the institutional environment. Focusing on family businesses in the manufacturing sector listed on China's A-share market, through analysis, this study drew the following conclusions: (1) As family involvement increases, family businesses tend to prioritize the preservation of socioemotional wealth, leading to a greater emphasis on long-term development and more active engagement in technological innovation activities. When the CEO is a family member, the enterprise is more likely to proactively engage in technological innovation for long-term growth. However, a higher level of participation of family members on the board negatively affects innovation investment. (2) The stability of the top management team and the institutional environment concurrently accentuate or weaken the relationship between family involvement and enterprise innovation.

These findings were further verified through a case study of the Xinzhi Group. Based on the results, we suggest family businesses to enhance ownership, appoint family CEOs, reduce family board members, and stabilize the top management team. This study enriches the research on family businesses and innovation and contributes to the promotion of technological innovation in family businesses.

Keywords: Family business; family involvement; enterprise technological innovation; top management team stability; formal institutions

JEL: M11, M12

[This page is deliberately left blank.]

Resumo

O rápido desenvolvimento das empresas familiares na China pôs em evidência um problema generalizado de investimento inadequado em inovação, tornando crucial explorar as razões por detrás deste fenómeno. Este estudo examina o envolvimento dos proprietários familiares nas empresas a partir de três perspectivas: propriedade, gestão e governação, ao mesmo tempo que considera o impacto da estabilidade da equipa de gestão de topo e do ambiente institucional. Centrado nas empresas familiares do sector industrial cotadas no mercado A-share da China, o estudo analisa e conclui o seguinte: (1) À medida que aumenta o envolvimento familiar, as empresas familiares tendem a dar prioridade à preservação da riqueza social e emocional, levando a uma maior ênfase no desenvolvimento a longo prazo e no envolvimento ativo em atividades de inovação tecnológica. Quando o CEO é um membro da família, a probabilidade de envolvimento proativo na inovação tecnológica para o crescimento empresarial a longo prazo é maior. No entanto, um nível mais elevado de participação dos membros do conselho familiar afeta negativamente o investimento em inovação. (2) A estabilidade da equipa de gestão de topo e o ambiente institucional têm simultaneamente efeitos positivos ou negativos na relação entre o envolvimento da família na empresa e a inovação.

Estas conclusões são reforçadas através de um estudo de caso do Grupo Xinzhi, que conduz a recomendações para que as empresas familiares aumentem os direitos de propriedade, incentivem a nomeação de CEOs familiares, reduzam os membros do conselho familiar e estabilizem a equipa de gestão de topo. Este estudo contribui para a investigação em empresas familiares e inovação e para a promoção da inovação tecnológica nas empresas familiares.

Palavras-chave: Empresas familiares; envolvimento familiar; inovação tecnológica empresarial; estabilidade da equipa de gestão de alto nível; instituições formais

JEL: M11, M12

[This page is deliberately left blank.]

摘 要

中国家族企业的快速发展普遍显示出创新投入不足的问题，探索这一现象的原因非常重要。本文将实际控制人家族对企业涉入分为家族所有权涉入、家族管理权涉入和家族治理权涉入三个维度，同时考虑了高层管理团队的稳定和制度环境的调节作用。本文选择中国 A 股上市公司制造业的家族企业形式作为研究对象，分析并得出结论认为: (1)家族涉入程度越高，家族企业越重视扩展社会情感财富的维系，进而重视企业的长期发展，积极进行技术创新活动；家族内部产生 CEO 为家族企业的长期发展将积极开展技术创新活动；而家族董事会成员参与越多则影响创新的投入。 (2)高层管理团队稳定性和企业所处环境的正是制度会同时对企业内家族涉入情况和创新关系产生正向或者负向的影响。

本文通过信质集团的案例研究获得相同的结论并对家族企业技术创新提出提高控股权，鼓励选择家族内 CEO 管理并减少家族董事会成员，稳定高管团队等建议。

关键词：家族企业；家族介入；企业技术创新；高层管理团队稳定性；正式制度

JEL: M11, M12

[This page is deliberately left blank.]

Acknowledgements

My doctoral dissertation is about to be completed, a significant milestone indeed. At this juncture, I would like to extend my heartfelt gratitude and profound respect to many individuals.

First and foremost, I must thank my supervisor at ISCTE, Professor Pedro Fontes Falcão. During the writing process, Professor Pedro's inspiration and motivation have been instrumental in shaping the dissertation and expanding my thoughts. His expertise and unique insights into innovation have allowed me to explore in depth the relationship between family businesses and innovation. He has offered invaluable suggestions and has consistently shown concern for my progress from thousands of kilometers away, reminding and encouraging me. For many times, Professor Pedro has set aside his other work to dedicate time to assist in refining my research, an effort that I will always remember.

Secondly, I must express my gratitude to my supervisor in China, Professor Li Ping. I thank Professor Li for his guidance and support regarding my research topic and framework. His profound knowledge and extensive experience have been essential in guiding my research journey. Professor Li's patient supervision has fostered my growth and my deep reflection on the topic. I have received his continuous encouragement throughout my study.

I am especially grateful to the head of the program team, Professor Xiao Wen. Professor Xiao's guidance and support have been crucial to my success. Her patient instruction during my thesis writing allowed me to make continuous improvement and refinement, ensuring the quality of the thesis.

Furthermore, my thanks go to all the team members of the program. Thank you for your comprehensive guidance and cooperation throughout my study. Particularly during the pandemic, as we faced various difficulties and challenges, their collective effort, help, and support allowed me to complete this dissertation successfully. Without their support and encouragement, it would not have been possible.

Lastly, I must thank my family for their unconditional support and understanding. Your encouragement and companionship have sustained my perseverance and belief in myself to the very end.

Here, I would like to extend my deepest thanks to everyone who has supported and helped me. Your hard work and sincere assistance have been pivotal in the smooth completion of my

doctoral thesis. This achievement belongs to all of us, and I will carry it with pride in my heart.

Thank you, everyone!

With the sincerest regards !

致 谢

我的博士论文即将完成，这是一项具有重要意义的成就。在此，我想向许多人表达我的真挚感激和深深的敬意。

首先，要感谢我的葡萄牙 ISCTE 学院导师 Pedro Fontes Falcão 教授。Pedro 教授在我创作过程中的启发和激励，对于我论文的撰写和思路的拓展起到了重要的作用。他的专业知识和对创新的独特见解，让我能够深入探究家族企业与创新之间的关联度，并给予我宝贵的建议，同时每一次我的研究进展缓慢之时，Pedro 教授总会在数千公里之外持续关注我的进度，并时时提醒，时时鼓励我，且多次抛开其他工作专用部分时间以帮助改进我的研究，这一切让我始终铭记。

其次，我要感谢我的中方导师李平教授。感谢李平教授在选题和研究架构等工作上给予我的指导和支持。李平教授的丰富知识和深厚经验，为我的研究提供了宝贵的指引。李平教授的耐心指导让我不断成长，深入思考问题，并在整个研究过程中给予我鼓励和支持。

我还要特别感谢我的项目组主任肖文教授。肖文教授在整个项目中的指导和支持无疑是我获得成功的重要关键之一。在论文的整个写作过程中，肖文教授耐心的指导让我能够不断改进和完善，确保整个论文的质量。

此外，我要感谢所有项目组的老师们。感谢在整个过程中的全程指导和合作，特别是在疫情期间，我们面临各种困难和挑战，但大家齐心协力，互相帮助和支持，最终成功完成了这篇论文。没有大家的支持和鼓励，我无法想象能够取得这样的成果。

最后，我要感谢我的家人。感谢你们对我无条件的支持和理解。你们的鼓励和陪伴使我能够坚持到最后，并始终相信我自己。在这里，我向所有支持和帮助过我的人致以衷心的感谢。你们的辛勤付出和真诚帮助使得我的博士论文能够顺利完成。这个成就属于我们所有人，我将铭记于心。

谢谢大家！

致以最诚挚的问候！

[This page is deliberately left blank.]

Contents

List of Tables

[This page is deliberately left blank.]

List of Figures

[This page is deliberately left blank.]

Chapter 1: Introduction

1.1 Research background and significance

1.1.1 Research background

As an organizational form in both ancient and modern times, family businesses can be found all around the world, making significant contributions to economic development and social progress across countries (Anderson & Reeb, 2003; Chu, 2004; Claessens et al., 2000; Y. F. Zhang et al., 2013). Family businesses account for over 30% of large and medium-sized enterprises in Europe and America (Faccio & Lang, 2002; Li et al., 2008). In China, family businesses have developed rapidly since the country's reform and opening-up. They have been expanding and improving in terms of scale and profits for four decades. According to Forbes 2014 Chinese family business survey, family businesses accounted for as much as 50.3% of the 1485 A-share listed Chinese private enterprises, indicating that family businesses are the main body of China's private enterprises (Y. F. Zhang et al., 2013). At the same time, scholars have been increasingly carrying out family business research by focusing on the related issues of family businesses (Anderson & Reeb, 2003; Chrisman et al., 2005; Schulze et al., 2001; Villalonga & Amit, 2006). Therefore, researching the family business and studying the related issues has not only great practical significance but also crucial academic value.

Technical innovation is conducive to enterprises' long-term development. On the one hand, technological innovation is an enterprise's investment in its future growth (Wolfe, 1943). On the other hand, carrying out technical innovation activities enables enterprises to change the industrial structure and meet the needs of the market, so as to improve their competitiveness in the industry. In addition, as innovation is a long-term and multi-stage activity, it requires a large amount of human and material resources. Therefore, when carrying out innovation, enterprises need to compromise short-term interests and prioritize long-term investment planning. For family businesses, innovation means controlling the family, exploring new opportunities, integrating existing resources, cultivating sustainable competitive advantages, and generating more economic values, which is crucial to the long-term development.

However, despite its importance, innovation is not an easy task. According to PWC's 2018 Global Family Business Survey - China Report, 77% of Chinese family business leaders

considered staying ahead in innovation as their primary challenge, significantly outweighing other difficulties they encountered. Despite innovation's importance to the development of all enterprises, research has shown that the research and development (R&D) investment of family businesses is lower than that of non-family businesses (L. Cheng & Cheng, 2014; Chrisman & Patel, 2012; Wu et al., 2017; K. Zhu et al., 2016). Moreover, the China Family Business Development Report also pointed out that currently, family businesses are not active in R&D activities, and the quality of innovation needs to be improved. Therefore, it is imperative for family businesses to enhance the technological innovation level.

For family businesses, family involvement reflects the degree of influence of the family on the enterprise, which is a unique characteristic of family businesses (Chua et al., 1999). For that reason, this research attempts to study the technological innovation of family businesses by focusing on family involvement. At the same time, family businesses' decision-making on technological innovation is affected by both internal and external factors. In a family business, the top management team is the enterprise's strategic decision-maker and driver. Internal collaboration within the top management team is of great significance for enterprise operations, and changes in the top management team can prompt change in the executives' cognition and behavior (K. Zhu et al., 2016). Moreover, as organizations, the senior executives of family businesses can be either family members or non-family professional managers (Chrisman et al., 2003; J. J. Zhang & Ma, 2009), which shows that family businesses are a combination of an economic goal-oriented enterprise system and a non-economic goal-oriented family system (X. Y. Liang et al., 2014). According to executive behavior integration theory, the stability of the top management team is conducive to forming a stable community of interests among the executives, encouraging them to take collective action; on the contrary, if the top management team is not stable, it takes more time to reach a consensus on business decisions of the enterprise (Chrisman et al., 2003; J. J. Zhang & Ma, 2009).

One can conclude that the stability of the top management team is an essential factor that triggers the cognitive and behavioral changes of executives. The relationship between family involvement and technological innovation may lead to different perceptions and strategic choices depending on the stability of the top management team. Therefore, it is of great significance to consider the stability of the top management team as an internal contextual factor in this study. As to the external factors of family businesses, since the top management team's actions depend on the information acquired from the environment, the decision-makers should accurately view and interpret the environmental elements and adjust the enterprise development strategy accordingly (L. Cheng & Cheng, 2014; Z. F. Su et al., 2006). The institutional

environment influences the development of enterprises and should be taken into account during enterprises' decision-making process, especially the formal institutions. At present, the market index is used to measure the formal institutional environment of a region in China. Therefore, this study takes the level of marketization as an external factor affecting the decision-making of family businesses to explore the impact of formal institutions (the level of marketization) on the innovation activities of family businesses.

In summary, given the importance of technological innovation for family businesses, this research attempts to first explore the direct relationship between family involvement enterprise technological innovation, then research on family involvement's impact on enterprise technological innovation considering the internal factor of top management team stability and the external factor of formal institutions, and further study the case of Xinzhi Group, which is one of the largest private enterprises with the best professional management practice.

1.1.2 Research significance

Given the critical role of family businesses in national economy and the vital role of technological innovation in the long-term development of family businesses, this study has both theoretical and practical significance.

1.1.2.1 Theoretical significance

First, this study can further enrich the research on family business innovation. At present, it is still inconclusive regarding whether family involvement fosters or hinders enterprise technological innovation. Most studies have examined the relationship between the two by taking family involvement as a whole. In this study, family involvement is divided into three dimension – ownership, management, and governance.

In addition, we will also explore the moderators' influence on the relationship between family involvement and enterprise technological innovation. Previous related studies have mainly considered the heterogeneity of the top management team. Based on the upper echlons theory, and considering family businesses' emphasis on internal harmony, this study explores the influence of top management team stability on the relationship between family involvement and enterprise technological innovation. Moreover, ass China is in the process of economic transition, the impact of institutional factors on enterprise development cannot be ignored. North (1990) divided institutions into formal and informal institutions due to the difficulties in measuring the informal institutions. For example, family business members as deputies to People's Congress or members of Chinese People's Political Consultative Conference (CPPCC)

represent the social capital of an enterprise and can be taken it as an indicator of informal institutions, but this measurement lacks universality. Therefore, this study only takes into account formal institutions when studying the impact of institutions on the innovation decisions of family businesses.

1.2.2.2 Practical significance

The report of the 20th National Congress of the Communist Party of China pointed out that innovation is the primary driving force, and we must continue to uphold its central role in China's overall modernization. As family businesses have a high proportion and hold an important position in the Chinese economy, they should be the main force driving the country's technological innovation. In addition, the report also proposed to improve the environment for the development of private enterprises, protect the property rights of private enterprises and entrepreneurs per the law, and promote the growth and expansion of the private economy. As family businesses constitute an essential part of private enterprises, the policy created a more favorable environment that is conducive to their long-term development.

Furthermore, technological innovation is conducive to realizing the goal of "sustaining the family business". Innovation activities are an enterprise's investment for its future growth, which enables a family business to improve its competitiveness for long-term development and fosters the realization of its " sustaining" goal. It is hoped that this study can help family businesses exploit the external environment of "mass entrepreneurship and innovation" and the internal team harmony, be aware of the importance of innovation, and actively carry out innovation activities.

1.2 Research content and thesis structure

1.2.1 Research content

This research intends to answer the following three research questions:

(1) How does family involvement affect enterprise technological innovation?

(2) What is the moderating effect of top management team stability on the impact of family involvement on enterprise technological innovation?

(3) What is the moderating effect of formal institutions on the impact of family involvement on enterprise technological innovation?

The structure of this thesis is as follows:

Chapter 1: Introduction

This chapter mainly introduces the research background and explains the theoretical and practical significance of this research. The main research methods, thesis structure, research innovation, and technical roadmap are also described.

Chapter 2: Literature review

This chapter reviews the relevant literature in three aspects. We first review the theory used in this study. Then, the literature on family involvement, enterprise technological innovation, stability of the top management team, and formal institutions is reviewed. Finally, by reviewing the research on the relationship between family involvement and enterprise technological innovation, the research gap is identified, based on which the research direction is determined.

Chapter 3: Theoretical model and research hypothesis

Based on the literature review, considering the practical reality, the research hypotheses are proposed in this chapter, regarding the relationship between family involvement and enterprise technological innovation and the influence of top management team stability and formal institutions thereon.

Chapter 4: Research design and empirical analysis

Based on Chapter 3, this chapter describes the sample selection, variable measurement, data collection, and statistical analysis. Descriptive statistics and correlation analysis were carried out to observe the statistical characteristics and correlation of each variable. Then, multiple regression analysis was performed to examine the hypotheses proposed in this study. Subsequently, the robustness test was conducted to confirm whether the results were consistent.

Chapter 5: Case study

In this chapter, Xinzhi Group Co., Ltd, a typical family business in China's automobile industry, is selected as the case to study the influence of family involvement on enterprise technological innovation. Through this specific case analysis, practical evidence is provided.

Chapter 6: Conclusions and prospects

This chapter summarizes the main findings of this research, puts forward corresponding managerial implications, and points out the limitations of this study.

1.2.2 Technical roadmap

Based on the discussion above, we produced the research roadmap as presented in Figure 1.1.

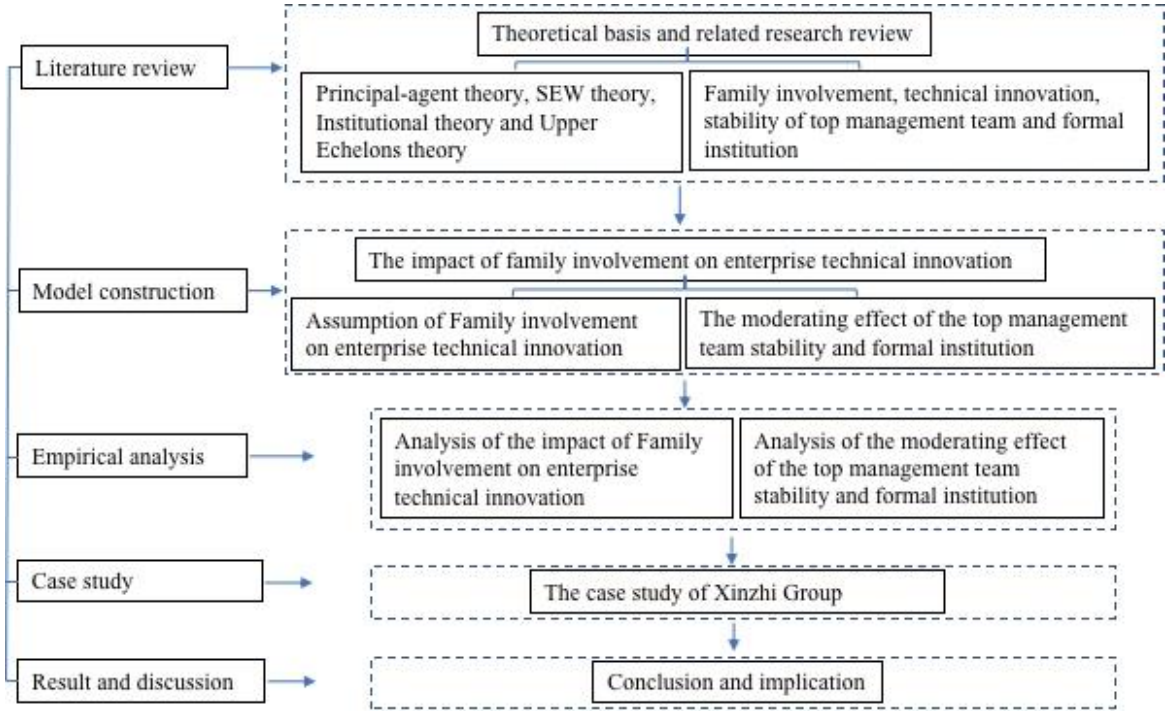


Figure 1.1 Technical roadmap

1.3 Research methods

This research adopts three research methods: literature research, empirical research, and case study.

First, the literature was reviewed by using the literature research method, which lays the foundation for the theoretical deduction of this research.

Then, the empirical research method was used to test the hypotheses proposed in this study. We used STATA15.0 to perform multiple regression analysis for hypothesis testing (including main effects and moderating effects). Robustness test was further conducted to ensure the results are reliable and robust.

Finally, the case study method was used. By studying the typical case, Xinzhi Group Co., Ltd, we carried out in-depth discussion and analysis on the research topic. It makes the demonstration more convincing by providing a practical evidence.

1.4 Main innovation

This research aims to enrich our understanding of the relationship between family involvement and enterprise technological innovation. In previous studies on family involvement and technological innovation, the dimensionality of family involvement is relatively unitary. This study is specifically designed to explore the relationship between family involvement and technological innovation in different dimensions for a more comprehensive understanding of this relationship.

Moreover, this research also explores the internal and external contextual factors that affect the technological innovation of family businesses. Previous studies usually explored the influence of only internal or external contextual factors on the relationship between family involvement and enterprise technological innovation. In this study, we intend to study the influence of both internal and external contextual factors. In addition, in the literature, little attention has been paid to the influence of the stability of the top management team on the decision-making of family businesses, despite its great significance. Therefore, this study will explore the impact of both top management team stability (an internal factor) and formal institutions (an external factor) on the relationship between family involvement and enterprise technological innovation among family businesses.

In addition, different from the previous studies, which are mostly either empirical analyses or case studies, we combine both methods in this research. After the empirical analysis, we further conducted the case study of Xinzhi Group Co., Ltd, providing more practical evidence and making our research more enriched and convincing. The case study allows us to pay more attention to the cultural background of “differential pattern” in China and to present a practical case describing the impact of family involvement on a Chinese family business, enriching the research on family involvement.

[This page is deliberately left blank.]

Chapter 2: Literature Review

2.1 Theories related to family business governance

2.1.1 Principal-agent theory

In their book *The Modern Cooperation and Private Property*, Berle and Means (1932) stated that the advancement of industrial technology results in the expansion of production and enterprise scale. The ownership of an enterprise becomes fragmented because of dilution, which further leads to the phenomenon that the owner has no corresponding control over the property while the person who has the right to control does not have the corresponding ownership. This is called the "divorce between ownership and control". That means, the ownership and control of a company diverge, and the owner is not a 100% manager, which will result in the emergence of a principal-agent relationship. Hence, there exist two types of participants: the principal and the CEO.

However, the information between the principal and the CEO is asymmetric. As Chu (2000) stated, regardless of the social economic system, the information asymmetry between principals and CEOs exists, but the degree of information asymmetry and its manifestation may be different. Asymmetric information refers to the information that is known by one party but unknown by the other party. For example, the managers themselves know their abilities and effort level, but the shareholders of the company know little about it; the CEO' private information such as qualities, abilities, and behavior are not easy to observe. The existence of this kind of hidden information is called ex-ante information asymmetry. In addition, as the principals do not participate in specific production activities, they cannot monitor the CEO's information and effort level, and the CEO might hide such information. Especially in the execution of the contract, there are lots of uncertainties, and the trust level between the principal and the CEO is always challenged. In this case, the agent's opportunism potential is huge. Both principals and CEO are rational in maximizing their benefits. The target of the managers is to maximize their value, while the owner's goal is maximize the shareholders' interests. The two parties' preferences show differences and conflicts, leading to a deviation in maximum decision, and thus, the principal-agent problem is generated.

The presupposition of the principal-agent theory is that there is interest conflict between the principal and the CEO, and the information between the principal and the CEO is asymmetric. The principal-agent concept originated from the fields of economics and finance. They believe that human behavioral motives result from pursuing self-interest, self-protection, and self-status. According to the principal-agent theory, it is not guaranteed that the managers always make the decisions for the shareholders. There may exist conflicts of interest and goals between them. The interest conflict between managers and shareholders is called agency cost (Songini & Gnan, 2014), which can be interpreted as the cost resulting from the interest conflict between related parties. The principal-agent theory holds that people's behaviors should not be driven solely by intrinsic motivation. They must be controlled and managed; otherwise, people will show selfishness.

The basis of the principal-agent theory is the "divorce of ownership and control". Fama and Jensen (1983) pointed out that in order to have an effective decision-making process, the right of decision approval and supervision must be separated from the right of management and implementation. According to Jensen and Meckling (1976), once the managers have the chance, they will make a decision that maximizes their own interests. They also pointed out that the agency cost contains three aspects: the necessary expenses of supervisors and managers, the additional management fee to avoid managers' actions damaging shareholders' interests, and the reduced shareholders' welfare resulting from the divergence between managers' and shareholders' maximum interest decision. There generally exist two kinds of principal-agent relationships in modern enterprises: one is the relationship between controlling and non-controlling shareholders, and the other is the relationship between controlling shareholders and management. The principal-agent theory aims to coordinate the interests of owners and managers to reduce agency costs. By separating ownership and control, owners can monitor managers' behaviors to limit and prevent their incorrect behaviors.

The term "principal-agent" was first put forward by Ross (1973), who pointed out that since owners need to take most or all of the risks to obtain benefits, they are called "the principal", and managers are called "agents" because they may not take a risk for their behaviors. Subsequently, Mirrlees (1976) established a "principal-agent" mathematical model using parameterized distribution formulation. Later, when studying the moral hazard and observing managers' abilities, Holmström (1979) used "the first-order approach" to demonstrate that in context of information asymmetry, when the behavior of the agent is a one-dimensional continuous variable, the optimal contract is the same as the contract used when the agent's behavior is a discontinuous variable. The models of Mirrlees (1976) and Holmström (1979) are

under the condition of "participation constraint" and "incentive compatible constraint", where an agent incentive contract is designed to make the agent's behavior align with the principal's interests (Chua et al., 2009).

The studies of Mirrlees (1976) and Holmström (1979) established a basic analysis framework for developing the principal-agent theory and laid a foundation for subsequent research. Further, Spence (1973) proposed the signal theory: the employers wish to select competent employees but do not know the abilities of employees as their abilities are personal information. Rothschild and Stiglitz (1984) studied the balance of the market. Their "Information discrimination model" aims to make the uninformed party discriminate the factual information of the informed party through contract design and arrangements to reach the balance of the market. Subsequently, Stiglitz and Weiss (1981) addressed credit ratio problems. They improved the credit ration model, and proposed and demonstrated that the expected average profit of borrowers is the non-monotonic function of interest rate (Jaffee & Russell, 1976). High salaries are also considered a kind of incentive to prevent employees' free-riding behaviors (Chrisman & Chua, 2004; Jaffee & Russell, 1976).

Jensen and Meckling (1976) defined agency cost as the expenditure related to principal supervision, agent constraint, and residual loss caused by interest divergence and incomplete contracting. They explicitly hypothesized that owners and managers are self-interested and maximize utility, including both economic and non-economic interests. The divorce of ownership and management leads to the asymmetry of information and benefits, which causes agency cost.

The principal-agent theory was proposed in the context of the Western capital market. In Western developed countries, enterprises generally have relatively dispersed equity, with a high separation of ownership and management. Therefore, the traditional agency theory is a single-weight agency theory (G. F. Feng, 2004).

Fama and Jensen (1983) further extended Jensen and Meckling's research, suggesting that although the divorce of ownership and management may lead to agency threats, the resulting boost in managerial efficiency might outweigh the augmentation in agency costs. This efficiency stems from the enhancement in specialization and the willingness to bear risk generated by efficient risk-sharing. Eisenhardt encapsulated seven characteristics of the principal-agent theory: 1) the key concept of the principal-agent theory is understanding agency threats in agency relationships, which reflect organizational information effectiveness and cost of risk-bearing during the interaction process between the principal (e.g., business owners) and agents (managers); 2) the main subjects analyzed are the principals and agents; 3) this theory

hypothesizes that the decision-makers on the individual level are self-interested, bounded rational, and risk averse; 4) the different preferences and goals, along with the asymmetric information between the principal (primarily representing company interests) and agent (primarily representing personal interests), can lead to contractual conflict and become the hypothesized subject of this theory at the organization level; 5) information is purchasable and tradable; 6) informational asymmetry between principals and agents can lead to moral hazards and adverse selection problems; 7) different objectives and risk preferences between a principal and agent lead to the existence of agency dilemmas (Miller & Breton-Miller, 2006; Miller et al., 2013).

To counteract adverse selection, principals bear higher search and verification costs. In order to control the genesis of moral hazard, principals amalgamate actions such as incentivizing, punishing, and coordinating the management process, to harmonize and supervise agent behavior. The aforementioned actions all constitute the agency costs in principal-agent relationships.

Different from non-family businesses, the ultimate ownership of family businesses is controlled by members of the family, thus, naturally reducing the likelihood of managers encroaching on shareholder wealth. From the agency theory perspective, in traditional family businesses, the agency conflict problem is weakened (Chrisman & Chua, 2004). However, this understanding of the agency problem in family businesses is only from perspective of the owner-manager agent conflict and is not comprehensive enough. Subsequently, Makhija and John proposed that the controlling shareholders have the motive to exploit external minority shareholders, and thus, there exists a second type of agency problem between controlling shareholders and minority shareholders.

The second type of agency problem in family businesses is complex because the enterprise is mostly controlled by the family through a pyramid structure. The pyramid holding mode will enlarge the control of family controllers on the enterprise and increase the possibility of their encroachment on the interests of external small and medium shareholders through “tunnel behavior”.

In addition, the managers of a family business may be family managers or external managers, and a three-layer agency relationship has been proposed. The first layer of the agency problem has two parts: the agency relationship between the owner and family managers and the relationship between the owner and external managers (M. L. Wang & Zhou, 2006).

The reason the agency theory is used in the study of family businesses is that the heterogeneity between family and enterprise makes the principal-agent relationship more

complex (Dyer & Handler, 1994).

The agency problem of family businesses differs from that of public corporations with modern enterprise systems that advocate the separation of ownership and control and show clear behavioral characteristics of principals and agents. For listed family businesses, although the unification of ownership and control is infrequent, the phenomenon of family domination is not uncommon. Hence, it is necessary to consider not only the agency problems between business owners and managers (known as Type I agency problems) but also those between family controlling shareholders and non-controlling shareholders (called Type II agency problems) (Chrisman & Chua, 2004; Villalonga & Amit, 2006).

Firstly, the agency problem between family business owners and managers needs to be divided into different types. The agency problems between family owners and family managers mainly arise within the framework of "altruism". Due to the strong blood tie and nepotism between the two, both parties embed altruistic behavior in daily operations (Chami, 2001). While the altruism of family owners can reduce agency costs to some extent, it can also bring agency costs: the existence of altruism makes it easier for family owners to nepotism and family members working in enterprises may generate free-rider behavior and slackness, which leads to a new "moral hazard". Then, the agency problem of family businesses will intensify with the increase of altruistic levels.

However, the normative pressure of professionalization of family businesses becomes a catalyst for introducing non-family executives, and the self-interest tendency of non-family executives and potential goal conflicts with owners become sources of agency costs in family businesses (L. Cheng et al., 2011). Therefore, in addition to the agency problem between family owners and family managers, the agency problem between family owners and external non-family managers also needs to be included. Without an established management market, family owners are often unable to effectively prevent the opportunistic behavior of non-family managers, and managerial trench behavior is infinite. Especially, considering the current situation of the dual objectives of family business for both economic and non-economic goals (Chrisman et al., 2012), the difference in treatment between family executives and non-family executives (Chrisman et al., 2014), the issue in setting the compensation for the two all contribute to the complexity of the agency issue between family business owners and non-family managers (Jaskiewicz et al., 2017). Therefore, under the background of professionalism in family businesses, the agency problem between family business owners and non-family managers, and how non-family managers influence business behaviors, the ensuing issue of how non-family executives influence business innovation behavior, will become the main

content of subsequent research in this thesis.

Secondly, the traditional principal-agent problem seems to ignore another scenario of agency problems in family businesses, i.e., agency problems arising between family controlling shareholders and other non-controlling shareholders, referred to as Type II agency problems. Particularly in listed family businesses, the pyramid ownership structure, while amplifying the proportion of the owner's control power, also underscores the complexity of family agency issues. Controlling shareholders can leverage their control position in the enterprise to acquire personal benefits at the expense of small and minority shareholders' interests, triggering Type II agency problems (Morck & Yeung, 2003, 2003). If the controlling shareholder is a bank, an investment fund, or a holding company, then the private benefits derived from control power would be diluted among dispersed owners, significantly reducing the motivation for controlling shareholders to infringe upon the interests of minority shareholders. However, if the controlling shareholder is a controlling family or an individual, then the family or individual possesses a strong motive to monitor the behavior of minority shareholders and infringe upon their rights for the sake of personal benefit maximization. Therefore, compared to Type I agency problems, Type II agency problems become more prominent in family businesses.

The different non-economic goals of varying family businesses make it essential to understand the behavior of family businesses based on agency theory.

The principal-agent theory focuses on the agency problem caused by asymmetric information and interests between principals and agents. However, this perspective fails to explain the reason for the agency problem's generation. Hence, the mechanism of agency conflict needs to be further analyzed in order for a more comprehensive understanding of family business behaviors.

2.1.2 Socioemotional wealth (SEW) theory

As an organizational form that has existed for a long time across the world, family businesses have been extensively studied by scholars.

However, the theoretical basis of early research was borrowed from other fields, mainly including the principal-agency theory, the butler theory, and the stakeholder theory.

Studies on family businesses usually emphasize the uniqueness of family ownership: compared with non-family members, family owners have a stronger preference for non-economic goals. However, those borrowed theories cannot fully explain the role of family characteristics in enterprises. Later, the socioemotional wealth (SEW) theory proposed by Gomez-Mejia et al. (2007) solved this problem.

The SEW theory is an extension of the behavioral agency model. The core idea of behavioral agency is that the decision-makers of an enterprise will influence the enterprise's strategic decision for their accumulated endowment in the enterprise. However, when applying this core idea to family businesses, Gomez-Mejia et al. (2007) argued that they use non-economic returns as their primary reference in making strategic decisions. To preserve non-economic objectives, which are considered socioemotional wealth, families can even do so at the expense of economic goals.

Socioemotional wealth belongs to the category of non-economic studies and, according to the initial definition by Gomez-Mejia et al. (2007) and subsequent revisions by scholars, the SEW theory includes the following elements:

(1) Guarantees of the exercise of power

One prominent characteristic of the family business is that family members influence the business's strategic decisions through their control of the company.

(2) The need to maintain family ties

The fuzzy boundary between family and enterprise makes the enterprise a critical place to meet the emotional needs of family members, although it may hinder the decision-making of the enterprise.

(3) Maintenance of family values

Family values can be maintained in the enterprise through corporate culture, and family members' self-value can be realized in the enterprise through adequate family control and management of the enterprise.

(4) Preservation of the family's social capital

The family can extend and maintain the blood-based family social relationship through the enterprise, and this social capital is critical to the image and reputation of the enterprise.

(5) Inheritance willingness

Families usually regard enterprises as long-term investments in the hope of passing them on to their descendants. Cross-generational inheritance is an essential dimension of socioemotional wealth.

The SEW theory has been widely applied in research on innovation investment of family businesses. Family businesses' innovation investment is often constrained by the socioemotional endowment of family business owners (Gomez-Mejia et al., 2011). When a family business raises funds through the stock market or introduces institutional investors, it necessitates the transfer of family control, risking a loss of their socioemotional wealth (Gomez-Mejia et al., 2007). To avoid this, controlling families tend to evade such decisions or actions

due to their loss aversion tendency. This also limits the innovation investment in family businesses as owners direct decisions towards the preservation of non-economic utility of business control (Chrisman & Patel, 2012; Duran et al., 2016).

Chinese scholars K. Zhu et al. (2016) divided socioemotional wealth into restricted socioemotional wealth and extended socioemotional wealth. They localized the related content of the SEW theory into the Chinese context to study innovation and R&D of family businesses. The constraint-based socioemotional wealth is similar to the short-term non-economic goals pursued by businesses, with family control be the primary target. Hence, the altruism brought about by family control (Schulze et al., 2003) and the exclusivity of human and financial resources (Gomez-Mejia et al., 2011) both lead to a shortfall in innovation investment. The extension type of socioemotional wealth pays more attention to the long-term orientation of the business, placing more emphasis on maintaining family reputation and business growth, thereby developing long-term strategic commitments, resulting in an increased proportion of innovation investment.

The SEW theory, as a new theoretical basis for studies of family business, organically combines the family objectives of family businesses with the enterprise's risk-taking and strategic decision-making and provides theoretic support for the impact of familial bond on family businesses (Dou et al., 2014). However, research on the SEW theory is still in the initial stage and needs to be further enriched both theoretically and empirically.

At present, there is certain overlap in the definitions of different dimensions of the SEW theory, and the relationships between these dimensions need to be further clarified. In addition, with the development of the SEW theory, each dimension should be measured through scientific tools and scales.

The SEW theory substantially influences an enterprise's practices and behaviors as well as its innovation (Fitz-Koch & Nordqvist, 2017). The importance of the SEW theory for family businesses in the 21st century was recently discussed by Kammerlander (2022) based on practical observations and cases from prior studies.

2.1.3 Upper echelons theory

Hambrick and Mason (1984) put forward the upper echelons theory in 1984, which holds that strategic decisions within an enterprise are relatively complex; while senior executives try to maintain rationality in business decisions, they will inevitably put forward strategies according to their experience, values, and cognition, and thus, the enterprise's decisions become embodiment of senior executives' characteristics. The upper echelons theory emphasizes the

objective aspects of managers because it is difficult to measure the psychological factors. Even if quantification is possible, the measurement of psychological factors such as the worldview, values, and the insight and analysis ability has low accuracy and can hardly be verified. Comparatively, it is easier to observe and systematically measure objective factors such as education level, gender, and age. In addition, to achieve better development, enterprises need to analyze the relevant information of competitors, including the background of the managers. Once the psychological factors are difficult to measure, the objective characteristics of competitors can be a vital alternative.

The upper echelons theory uses demographic variables to measure relevant psychological characteristics, thus solving the problems of variable measurement and data acquisition difficulties. This theory integrates the bounded rationality framework of the strategic decision-making process with the personal attributes of the CEO and other executives. Further, Hambrick and Mason (1984) expanded the constraint conditions of this theory, providing theoretical support for research on motivation and incentive at the micro level. Until now, the amount of knowledge created within the framework of the upper echelons theory is considerable, with progress in some specific aspects (Busenbark et al., 2016).

The upper echelons theory revealed the significant impact of the top management team—often the decision-makers of a company—on organizational strategy and performance through their individual characteristics. In today's rapidly changing business environment, understanding and applying the insights of the upper echelons theory is crucial for organizational success. First, we recognize that the top management team does not simply make decisions; their values, experiences, and cognitive characteristics can actually shape their strategic choices. That means, the strategic direction of an organization is closely linked to the personal career trajectories and experiences of the top management team. For example, a CEO with extensive international experience may favor a globalization strategy, while a young, diverse-educated top management team might be more inclined to adopt transformative strategies. Moreover, the upper echelons theory indicates that the composite characteristics of a top management team are more effective in predicting organizational outcomes than independent individual traits. This highlights the power of teamwork and how the interaction among team members can solidify the strategic decision-making process. A highly integrated team with diversity can pool information, share resources, and make more coordinated decisions, thereby enhancing the overall performance and innovation capacity of the organization.

However, this theory also faces criticism, particularly the excessive emphasis on

managerial symbolism and observable traits, which may cause an oversight of deeper psychological variables. Thus, scholars have improved the existing framework by incorporating concepts such as managerial discretion and behavioral integration to better capture the complex process of how managers influence organizations (Hambrick & Mason, 1984).

Managerial discretion explains how the degree of freedom that managers have in making decisions affects the effectiveness of enterprises' strategic choices. When the top management team is granted more autonomy, their personal characteristics are likely to have a greater impact on strategy formation.

Behavioral integration emphasizes how a management team can affect organizational performance through effective collaboration. A team with high social integration tends to share information and collectively assume decisions, and this synergistic effect becomes particularly important in today's increasingly complex business environment.

In predicting strategic decisions of competitors, the upper echelons theory provides a unique perspective. Observing the characteristics of the top management team of competitors, such as their diversity, educational background, and work experience, may reveal tendencies in their future strategic behavior. This can be critical timely information for organizations when formulating their own strategies. Strategic leadership focuses on shaping an organization's mission and values through strategic decision-making. Applying this theory to management practice can help organizations build a stronger and more visionary management level. For instance, by fostering elements emphasized in the upper echelons theory, such as diversity and behavioral integration, organizations can create a more adaptive and innovative corporate culture (Busenbark et al., 2016).

In summary, the strength of the upper echelons theory lies in its emphasis on the impact of the characteristics of the top management team on enteprise strategy and performance. This focus on the individual traits of the upper echelon enables managers and researchers to delve deeper into understanding how to propel organizations forward through strategic choices. At the execution level, the theory allows managers to identify and leverage their own and their team's strengths while also recognizing the necessity of enhancing the interaction and decision-making integration among team members. These profound insights of the theory have become key guiding principles in today's management practice. In a fast-evolving business environment, such insights can help businesses better adapt to change, lead innovation, and achieve long-term sustainable development.

2.1.4 Institutional theory

The institutional theory in strategic management can be divided into two schools. One is the economic school, supported by the new institutional economics (North, 1990). This school takes transaction costs as the core and focuses on the efficiency of different institutions. The other is the school of organizational society. This school is based on the theory of organizational sociology, which pays more attention to the legitimacy of institutional choice and institutional construction.

North (1990) is a pioneer of the institutional theory. He defines institutions as a kind of rule or procedure that can restrict human behavior to a certain extent and establish the relationship between cooperation and competition in economic society. Institutions are divided into formal institutions and informal institutions. Formal institutions include a country's constitution, related laws, and regulations; informal institutions include folk customs and moral ethics formed over a long period. In society, both formal and informal institutions play a role in reducing transaction costs and social uncertainty (Williams et al., 2019). According to the institutional theory, many stakeholders can influence each other, and all social norms and social institutions are within this analytical framework. Scott defined institutions from the perspective of organizational sociology. He divided institutions into three dimensions, including regularity, cultural cognition, and normalization. Among them, normalization takes common values as the primary connotation and determines relevant expected behaviors of the whole society (Wu et al., 2017; K. Zhu et al., 2016).

The institutional theory has been shaping scholars' perspectives on the relationship between organizations and their environment since the mid-20th century. The core focus of this theory is why organizations tend to adopt similar structures and practices even though this alignment is not always based on traditional notions of maximizing efficiency or effectiveness. The key proposition is that organizations seek not only to fulfill their missions and objectives but also to gain stability, legitimacy, and societal acceptance.

As organizations grow and evolve, they start to reflect more the characteristics of their institutional environments. These environments are constituted not only by legal frameworks but also by informal elements like cultural norms, ethical standards, and professional practices. The organizations' structural and behavioral homogeneity validates these norms and serves as a sign of societal acceptance.

The institutional theory put forward three main mechanisms of isomorphism: coercive, mimetic, and normative. Through these pathways, societal expectations become significant

guides for organizational decisions and behavior. For instance, changes in laws and regulatory requirements may force organizations to adjust their operations (coercive isomorphism). Uncertainty compels organizations to imitate the successful practices of market leaders or competitors (mimetic isomorphism). Finally, expectations brought about by professional norms and education prompt organizations to adopt certain practices and structures (normative isomorphism).

It is increasingly recognized that the survival and success of organizations are measured not solely on their direct economic performance but also through their legitimacy in the broad social context. Legitimacy is the degree to which organizations are accepted by their environment, manifested in their adherence to common norms, rules, and beliefs. Gaining legitimacy helps to ensure the availability of resources and the viability of the organization. However, early readings of the institutional theory emphasized compliance in organization structures and practices without fully considering the agency of organizations as participants in their institutional contexts. To correct this perception, DiMaggio (1988) introduced the notion of "institutional entrepreneurship", underscoring that organizations could not only follow existing norms but also strive to create and change them.

Further research on the institutional theory suggested directions for future studies, such as how organizations handle and adapt to isomorphic pressures over time and how the impact of legitimacy changes with time. Increasing organizational awareness of the range of strategies available, especially in areas that can affect performance and competitiveness, is critical for the development of the institutional theory.

In practice, the insights of the institutional theory remind managers that their organizations interact with the environment not only on an operational level but also in terms of values and culture. The similarity of organizational structures and behaviors may stem from adapting to external pressures, but it also provides opportunities for those "institutional entrepreneurs" who wish to promote change. For managers who are willing to take risks and seek innovation, understanding and manipulating the institutional context is key to success. This is also the next field of exploration for the institutional theory – how organizations can not only adapt but also shape and reshape norms through interaction with their institutional environment, thus forming new structures and practices.

2.1.5 Theory summary

As a combination of an economic goal-oriented business system and a non-economic goal-oriented family system (W. H. Feng, 2009; Pan, 1998), family businesses pursue non-economic

goals as well as financial goals, which makes it challenging to use a single theory to explain their business decision-making behavior. Similar to most general enterprises, agency problems inevitably exist in the management of family businesses. The difference is that for family businesses, socioemotional wealth is the primary reference for making and implementing business decisions (Gomez-Mejia et al., 2003; Gomez-Mejia et al., 2010). In other words, enterprises' decision-making on whether to carry out technological innovation activities and the intensity of technological innovation uses socioemotional wealth as an essential reference. Therefore, in this study, we selected the SEW theory as the theoretical basis for analyzing the relationship between family involvement and enterprise technological innovation. In addition, the effect of family involvement on technological innovation is also affected by the stability of the top management team (internal contextual factor) and formal institutions (external contextual factor).

At the same time, according to the upper echelons theory, the personal characteristics of senior executives will affect their business decision-making (Hambrick & Mason, 1984), and the top management team's composition and stability will directly affect senior executives' cognition and behavior change. The stability of the top management team is an essential contextual factor that affects senior executives' cognition and behavior, thereby having a significant impact on the enterprise.

Moreover, the institutional environment is a crucial macro-environmental factor affecting enterprise behavior, especially in a transition economy, as it determines the rules of the game for commercial activities and thus induces or constrains the strategic choice of enterprises externally (North, 1990). At present, China's economy is in the transition process, making the function of formal institutions more prominent. Therefore, formal institutions are of great significance to the establishment and execution of family business management decisions. In this study, we analyze the relationship between family involvement and enterprise technological innovation based on the SEW theory while acknowledging agency costs; the moderating effect of top management team stability and formal institutions is based on the view of the upper echelons theory and the institutional theory. These constitute the theoretical basis of this study and serve as the logical framework.

Besides the related theories mentioned above, scholars have also conducted extensive research on the governance structure, inheritance, and performance of family businesses. In literature on family businesses outside of China, we observed a focus shift from the study of internal governance and family characteristics to the in-depth analysis of how to better leverage family characteristics to influence enterprise strategy and entrepreneurship (Li et al., 2008). In

explaining the separation of family interests and corporate interests, a new perspective for the study of family businesses was put forward, shifting from economic outlook to the socioemotional wealth (Zhou, 2018). Meanwhile, the research on family businesses in recent years has provided suggestions for the long-term development of family businesses.

There is extensive research on family businesses in the international literature, providing valuable references for this research, but cannot be simply copied and imitated. For research in the Chinese context, scholars should consider China's unique conditions to build a theoretical approach suitable for the study of Chinese family businesses, which will enrich the knowledge accumulation regarding family businesses in the world.

2.2 Related studies

2.2.1 The evolution of Chinese family businesses

The family business is the commercial organization with the longest history in human society. At present, it is an indispensable and important enterprise form in the economic development of countries around the world. It serves as a continuous driver for promoting economic development, employment, prosperity, social welfare, and technological innovation. Family businesses are playing significant roles in various countries in the world, including those in Europe, the United States, and Asia. In China, family businesses are also very common. According to PwC's 2021 Global Family Business Survey - China Report, among China's private enterprises that contribute more than 60% of the country's GDP, 85% are family businesses. The family planning policy – the "one child" policy, which began in the 1980s, has also greatly affected the changes in China's family structure, limiting the possible choices of intergenerational inheritance to a certain extent. At the same time, China's family businesses have been greatly influenced by the traditional Confucian culture and the transitional market system and regulations, exhibiting unique environmental characteristics behind their prosperity and difficulties, such as information asymmetry, relationship networks, and ownership concentration, among others.

Under the background of the long-term influence of Confucian culture and the increasing importance of the private economy, Chinese families have been playing a vital role in business activities. Family governance has become the initial environment for entrepreneurs to start their businesses, and the family-centered orientation has a profound influence on their business decision-making. Chinese people highly value "the pursuit of long-term development with

cautiousness". Only by understanding this strong family concept in Chinese culture, which involves responsibility, prospects, and endless motives, can we understand how family businesses emerge, exist, and continue, and why they can eventually pass on their success from generation to generation. At the same time, it helps us to better understand the Chinese families' fear of the not rare phenomenon of "prosperity for no more than three generations" in family businesses and their efforts to prevent that from occurring. Due to their respective development environment and characteristics, Japanese family businesses have been compared to "bamboos", Western family businesses have been compared to "oaks", while Chinese family businesses, have been compared to "banyan trees".

When assessing whether a family business can be successfully passed on from generation to generation, the first key point is to find out what the business means to the family. For some families, they may start their venture driven by their family mission. The family's fundamental and intrinsic values determine their specific goals. If family members do not have shared values, inheritance cannot be carried out successfully. When the family has a shared mission, if the first generation has not managed to achieve a certain goal, the second generation will continue to make efforts toward that goal; if the second generation has not accomplished it, the third generation will continue. By doing so, the family business will eventually achieve "specialization, precision, distinctiveness, and innovation". Therefore, the inheritance of family business necessitates several generations' shared goals and common values, which can help them resist short-term interests and focus on long-term goals.

However, most of the Chinese family businesses could not avoid the "curse" of "prosperity for no more than three generations". That is due to many intertwined factors, which cannot be covered by a single explanation. In the early history of Modern China, due to the instability of the national political environment, many Chinese people left their homes to seek opportunities for survival and set up family businesses overseas. As they were hoping to return to the motherland after achieving success, the family businesses they established generally did not have a business model for sustainable development, were driven by short-term benefits, lacked long-term and far-sighted development planning, excessively relied on low-cost advantages, and did not carry out sufficient investment in R&D. Under the constraints of these factors, they were unable to develop products with significant brand values and failed to expand the development scale of their businesses, which constitutes one of the critical reasons why their success could not be passed on to more than three generations.

In the past, Chinese households tended to have a large scale, with multiple wives and numerous children. With such a family structure, family members hold many different opinions,

and the power and authority could not be concentrated. In terms of family property distribution, the "equal distribution mode" was usually adopted, distributing the family property based on head counts. As a result, after three generations, the ownership is increasingly dispersed, and the "fragmentation" of enterprise ownership poses a threat to the enterprise's survival and development.

On the other hand, Chinese family businesses have been deeply influenced by Confucianism, following the "three cardinal principles" (i.e., the officials are subordinate to the emperor, the son is subordinate to the father, and the wife is subordinate to the husband) and the "five constant virtues" (i.e., benevolence, righteousness, propriety, wisdom, and trustworthiness). Although these values ensure the authority of parents in the family, they are also prone to lead to overly authoritarian parents, who do not give voice to other family members. At the same time, guided by these traditional values, the younger generation tends to be obedient, follow the elders' guidance, and give priority to the decisions of their elders, which makes it impossible to ensure the effectiveness of the decision-making. In addition, the development and operation of family businesses tend to rely highly on the "personal relationship" and are prone to "nepotism", while lacking consciousness of the legal power of contracts. Such an operational mode hinders the intergenerational inheritance of the business. In addition, the lack of trust in external individuals and non-family members limits the scale of its talent pool; The preference to the eldest son as the successor, that is, taking age, rather than ability, as the criterion of priority inheritance, undermines the enterprise's capabilities to introduce "capable talents" to drive its development.

Therefore, the inheritance of family businesses is closely related to the distinctive oriental culture of Chinese families and the long history of China's economic and social development background.

(1) The Ming and Qing dynasties

The lineage of China's family businesses can be traced back to ancient times, with family businesses such as the "Jin Merchants" in Shanxi and the "Hui Merchants" in Anhui already flourishing during the Ming and Qing dynasties. Despite the government's predominantly suppressive commercial policies during this era, measures were taken to support and facilitate trade, significantly influencing the circulation of goods and the overall economic prosperity.

During this period, influential forces such as the Jin and Hui Merchants were pivotal in promoting commodity circulation and economic growth through their involvement in large-scale commodity trading and long-distance trade. Their activities led to the establishing of a nationwide market for goods (Pan, 1998). Moreover, commercial establishments in the Ming

and Qing dynasties began adopting distinct symbols, such as the renowned “Lu Xiangsen” for tea sales, “Zhang Xiaoquan” for scissors, and “Wan Fu” for cotton cloth (Chu, 2004). These symbolic enterprises can be viewed as family businesses of that era. By creating commercial symbols or signboards, they could effectively distinguish their products and attract customers, enhancing their reputation and gaining customer trust. In a society where information dissemination was limited at the grassroots level during the Ming and Qing dynasties, establishments with reputable signboards obtained support not only from customers and trade partners but also from financial institutions. This was particularly significant during long-distance trade, where trusted signboards were crucial. For instance, in the cotton cloth trade of the Suzhou region during that time, the success relied heavily on merchants who transported the goods over long distances. Due to the high costs and risks associated with this trade, the reputation of a signboard carried immense importance. This phenomenon is succinctly captured by the sayings, “Opening a store is relatively easy, but establishing a respected signboard is challenging” and “Trust is built on the credibility of the signboard” (Pan, 1998). Once a signboard was established, Ming and Qing merchants diligently worked to maintain their esteemed reputation. Shanxi Piaozhuang, for instance, built its foundation on trust and integrity, remaining steadfast in upholding promises amidst changing circumstances. The Wan Fu cotton cloth signboard, established by Hui merchant Chen Shice, adopted a principle of unwavering commitment to excellence in every aspect of its business operations, from material selection to production processes, thus earning steadfast customer loyalty.

Furthermore, commercial signboards placed great emphasis on technological expertise and management talent. In the cotton cloth sector, for example, the presence of skilled fabric inspectors was crucial in maintaining quality control. The approach and craftsmanship displayed by these inspectors significantly impacted the reputation and success of the cotton cloth signboards. Consequently, fabric inspectors were regarded as the backbone of these signboards.

During the late Qing Dynasty, a series of consecutive defeats in external wars shattered the policy of isolationism, leading to the influx of various goods and commodities into the country, which severely impacted the development of the social economy. The invasion of Western capitalism gradually eroded the traditional small-scale agricultural economy, causing many people to depart from agrarian production and engage in commercial activities. Under the slogan “learning from the West to surpass the West,” local officials utilized their resources to establish privately controlled enterprises. Although the historical “Self-Strengthening Movement” did not vigorously promote the development of the Chinese economy, it liberated

people's thinking. Increasing numbers of adventurous individuals with business acumen began to establish enterprises, incorporating family members into them, thus forming the embryonic stage of modern family businesses in our country.

The outbreak of World War I provided a rare opportunity for developing national industries. Against international turbulence and domestic warlord conflicts, national capital broke through traditional handicraft industries and shifted towards industrial and service sectors. To meet market demand and expand profits, the industrialization movement of family businesses thrived. In this context, family businesses gradually grew in scale, exhibiting spontaneous signs of prosperity. However, with the outbreak of the War of Resistance against Japan and the suppression of the Republican bureaucratic capital, local chambers of commerce were forced to disband or reorganize. Family businesses were compelled to bow down to the power of Republican bureaucratic capital, and they had to expend tremendous efforts to manage their relationship with it. Their living space was squeezed, resulting in meager operations and slow development.

In summary, the benevolence of the Ming and Qing rulers towards commerce, as well as their opening up of trade, played an essential role in the development of the commercial economy at the time. However, in modern times, due to oppressive taxes and levies imposed by the rulers, the dumping of imperialist goods, and the suppression by Republican bureaucratic capital, the once highly prosperous commercial economy of the Ming and Qing eras gradually vanished amidst the chaos of war.

(2) Before the reform and opening-up

After the establishment of the New China (People's Republic of China), the government carried out a socialist transformation of the national industry and handicraft industry. Influenced by "leftist" ideology, the government maintained a suppressive and hostile attitude towards a non-public ownership economy, labeling industrialists and businessmen as "national capitalists" or "red capitalists," which hindered the development of the private economy. During this period, the state-owned economy became the mainstay of the market while private family businesses struggled to grow. In rural areas, the production brigade system led by the People's Commune was implemented, often separating brothers from the same family into different production brigades, suppressing the productive capacity of family-based economies and lowering the enthusiasm for labor among the masses. It was not until the Third Plenary Session of the Eleventh Central Committee that improvements in this situation began to be seen.

(3) After the reform and opening-up

After the reform and opening-up, China gradually transitioned from a planned economy to

a market economy. The Communist Party and the government shifted their focus to economic development, with a clear goal of significantly improving productivity and changing the production relations that were incompatible with the development of productivity. Family businesses seized the opportunity for growth. In rural areas, the household contract responsibility system was implemented, activating the economic production function of families. In urban areas, people began to start businesses as they witnessed policy changes and market opportunities. During this period, family businesses were relatively small in scale, primarily comprised of family members and close friends. With strong market demand, these emerging family businesses accumulated initial capital, laying the foundation for future development.

In 1992, the 14th National Congress of the Communist Party of China established the goal of establishing a socialist market economy and improved the legal status of a family-centered private economy. In 1997, the 15th National Congress further recognized the private economy as an essential component of the national economy and provided clear policy support for developing family businesses. With the tacit approval, support, and encouragement from laws and policies, family businesses experienced significant growth, witnessing rapid increases in enterprises, capital, and personnel. During this stage, "going into business" became a trend, with many government officials and state-owned enterprise workers entering the market economy by establishing their own businesses. Their presence enhanced the overall competitiveness of private enterprises, contributing to the growth and strength of the private economy. However, family businesses in China faced challenges such as development mistakes and insufficient innovation capabilities.

In 2001, China officially joined the World Trade Organization, providing more development space for private family businesses, and some family businesses established their presence in the international market. The 18th National Congress in 2012 emphasized the need to ensure fair participation of various forms of ownership in market competition and eliminate hidden barriers. The 5th Plenary Session of the 18th Central Committee in 2015 encouraged non-state capital to participate in state-owned enterprise reforms, stimulating the vitality of the non-public sector. The 19th National Congress in 2017 emphasized the need to promote and protect the entrepreneurial spirit and establish a clean and positive relationship between the government and businesses. The 4th Plenary Session of the 19th Central Committee in 2019 explicitly called for the improvement of institutions supporting the development of small and medium-sized enterprises (SMEs) and promoting their economic viability and sustainable development. With the support of a series of central government policies, Chinese family

businesses have become an essential force in building a socialist market economy and have made significant contributions to employment, taxation, innovation, and other areas. Additionally, as the market economy developed, the government relaxed policies towards family businesses, especially with the establishment of the SME board, growth enterprise board, and sci-tech innovation board in the stock market, which increased the opportunities for family businesses to go public.

There are two main ways for Chinese family businesses to go public: one is through an IPO for direct listing, and the other is through methods such as mergers and acquisitions for indirect listing. The former is known as founder-controlled family businesses, while the latter is known as non-founder-controlled family businesses (Y. F. Zhang et al., 2013).

In the "Forbes 2017 Top 100 Chinese Family Businesses", the family businesses with a total market value exceeding 100 billion RMB included Midea Group of the He brothers, BYD of the Wang family, and Wens Foodstuffs of the Wen family. According to PwC's 2021 Global Family Business Survey, it was expected that the business growth of mainland Chinese family businesses in 2021 and 2022 would be significantly higher than that of family businesses in other regions. These enterprises emphasize innovation investment, digital transformation, and environmental, social, and governance (ESG) management in the post-pandemic era. Additionally, Chinese family businesses are also participating in mixed-ownership reform, with private capital entering sectors such as telecommunications, electricity, finance, and petroleum. This has realized the complementary advantages and win-win cooperation between state-owned and non-state-owned capital, enhancing the core competitiveness of enterprises.

On September 12, 2023, the All-China Federation of Industry and Commerce released an overview of the Top 500 Private Manufacturing Enterprises in China, a comprehensive assessment that bears a testament to the burgeoning vigor and market prowess of these entities.

The document meticulously reported that the aggregate operational revenue of China's crème de la crème private manufacturing enterprises rocketed to a staggering 2.913 trillion RMB, registering a significant increment of 28.712 trillion RMB from the previous fiscal year, with the enterprises averaging an impressive revenue of 582.65 billion RMB each. The profitability metrics equally painted an optimistic picture, with a collective profit totality amounting to 14.220 trillion RMB and the after-tax net profit reaching 11.765 trillion RMB. A notable highlight is the elevation in the entry threshold for the ranking, now resting at 14.516 billion RMB—a 15.46% year-on-year surge—that underscores an era of sophisticated expansion and refurbishing within the confines of the Chinese private manufacturing landscape.

Achieving pole position on this distinguished roster, Hengli Group stands tall with a

revenue of 6117.57 billion RMB. Proximate in rank and revenue are Zhongwei International Group and Rongsheng Holding Group, stationed at the second and third pedestals with turnovers of 6087.60 billion RMB and 5796.18 billion RMB, respectively. The leaderboard is graced by the likes of Wei Qiao Group, Lenovo Holdings, BYD, Shenghong Holdings, Geely Holding Group, Hengyi Group, and Tsingshan Holding Group, which sequentially round off the top ten, thereby casting a light on the pivotal clout wielded by the Chinese private manufacturing sphere.

From an industry classification standpoint, the prestigious Top 500 list is constituted by enterprises spanning 30 diverse sectors. Dominating the charts, the ferrous metal smelting and rolling processing sector claims supremacy with 92 representations, closely followed by the electrical machinery and equipment manufacturing (52 enterprises) and jointly held by the chemical raw materials and chemical products manufacturing sector as well as the computer, communication, and other electronic equipment manufacturing sector, each with 39 firms staking their claim.

Geographical distribution patterns reveal a primary concentration of the elite 500 in the provinces of Zhejiang, Jiangsu, and Shandong, which cumulatively harbor 246 enterprises—accounting for 49.20% of the total list demographic—a figure that has risen since the prior year. Featuring among the top ten provinces, Shanxi and Hubei have also marked their ascent to the ninth and tenth placements, respectively.

In conclusion, Chinese family businesses have received comprehensive recognition and affirmation in the new reform and opening-up era. They have become an essential force in building a socialist market economy and have significantly contributed to employment, taxation, and innovation, among other areas.

2.2.2 Family business

Family businesses, as an important organizational form widely found in both traditional and emerging markets (Claessens et al., 2000), have had a substantial impact on global economic development (Morck & Yeung, 2003). In Western European countries, family businesses account for 40% of large enterprises (Faccio & Lang, 2002); in East Asian countries and regions, this figure rises to over two-thirds (Claessens et al., 2000); in the United States, family businesses account for one-third of the companies in the S&P 500 index (DeMassis et al., 2014). Compared to regions like Europe and the United States, family businesses in China have sporadically appeared throughout history but have not yet formed a large-scale presence (L. Cheng et al., 2011). The rapid development of Chinese family businesses mainly concentrates

on the more than forty years of reform and opening-up. Nowadays, family businesses have gradually become the driver of the development of China's private economy.

For a long time, family businesses were considered a market phenomenon rather than a research object and did not receive much attention from scholars.

Family business can be understood as the combination of "family" and "business". The involvement of family makes family businesses a unique organizational form, distinguishing it from non-family businesses. What is a family business? Intuitively, people can understand the meaning of this term, but no consensus has been reached among scholars on the exact definition of a family business.

Barnes and Hershon (1994) are among the earliest scholars who included family ownership in the definition of family businesses. They proposed that businesses can be considered family businesses if one or more family members have controlling ownership of the enterprise. The proportion of ownership held by the controlling family in the enterprise, as well as whether family members serve on the board of directors, can be used as criteria to determine if a business is a family business. This definition mainly emphasizes that family members realize family control through their ownership, but does not specify a measurement standard for ownership. It was not until the late 1980s that family businesses gradually became an independent research field (Bird et al., 2002). In 1989, Davis and Tagiuri proposed the three-circle model of family businesses, which intuitively presents the characteristics of family businesses – the uniqueness of family businesses is created through the intersection and overlap of employees, family members, and business owners (J. A. Davis & Tagiuri, 1989). That article clearly explains the different roles, identity differences, and interest relevance in family businesses and has become the foundation of family business research. Since then, several scholars have tried to clarify the specific standards of family ownership involvement. For example, though J. A. Davis and Tagiuri (1989)'s groundbreaking article introduced the connections between different roles in family businesses, it did not provide a systematic definition of family businesses. Claessens et al. (2000) consider an enterprise to be a family business if the controlling family holds at least 5% of the voting rights, while LaPorta et al. (1999) raised this standard to 10%.

In addition to family ownership involvement, the definition of family businesses should also take into account factors such as management involvement. Management involvement focuses on the responsibilities that family members should assume in the business operation and management process, as well as the influence of family members working in the business on the enterprise's strategy. Based on the management involvement principle, Holland and Oliver (1992) provided a more precise definition of a family business: it can be considered a

family business if at least two or more family members have control over the business through management or ownership. Sun (1995) believes that an enterprise is a family business if one or more family members directly or indirectly participate in its management. Direct management of the enterprise means that family members are directly responsible for the daily operations of the business, while indirect management refers to family members hiring non-family professional managers to run the business.

As family business research deepens, it is no longer rigorous enough to use solely family ownership or management involvement to define family businesses. Family control over a business can involve either management rights or control rights individually or the two in combination to varying degrees. For example, a controlling family might only have control rights as they delegate management rights to non-family members. Alternatively, The family may have the dual control of both ownership and management rights. Anderson and Reeb (2003) used both the proportion of ownership held by the family and whether family members hold board seats as the criteria to determine a family business. However, although this definition includes family involvement in both business ownership and management rights, it did not specify a particular standard (Anderson et al., 2003). Gomez-Mejia et al. (2013) believe that the criteria for determining a family business should be that family members hold more than 10% of the company's ownership and have at least two family members on the board of directors.

Initially, research on family businesses predominantly focused on individual cases and did not form an independent research field. It was not until the establishment of the "Family Business Review (FBR)" in 1988 that family businesses gradually became an independent research domain. The "Family Business Review (FBR)", as the first publicly available academic journal dedicated to family business research, marked a milestone in the field. Since then, more scholars have engaged in research on family businesses. However, over the past 30 years, scholars have not reached a consensus regarding the definition of family businesses (Chrisman et al., 2005; Schulze et al., 2001). In international literature, the methods used to determine family businesses generally fall into two types: the essence approach and the involvement component approach (Chrisman et al., 2003).

In the early studies, the definition of family business was based on the double-loop theory, which holds that family businesses have the characteristics of both the enterprise system and the family system. From a qualitative perspective, it emphasizes the influence of family on the business, and family business is defined as an organizational form operated, controlled, and governed by the family. Chua et al. (1999) proposed that a family business is an enterprise

controlled or managed by one or more families. Through the control and management of the enterprise, the family constantly penetrates the vision and intention of the family into the enterprise, hoping that the enterprise can be passed on within the family and finally develop into a family business empire.

Although there is no consensus on the definition of family businesses in the academic circle, according to Chrisman et al. (2005), scholars use two main methods to define the family business: through family involvement components and by essence.

The involvement component approach takes family involvement as a sufficient condition for an enterprise to become a family business, and the main components of family involvement include ownership (Anderson et al., 2003), management, governance (Miller & Breton-Miller, 2006), and transgenerational succession. This is a mainstream method in empirical research. Among family business studies in China, scholars not only emphasize that a family business is an economic entity controlled by the family, but also contend that it is a distinctive organizational form with family ownership control advantage and enterprise governance structure (Chu, 2004; Pan, 1998).

However, the definition by essence emphasizes the heterogeneity of family participation in enterprises, believing that family involvement is a necessary condition for family businesses and can significantly impact enterprise objectives (J. A. Davis & Tagiuri, 1989), intention of family control (Litz, 1995), and enterprise behavior (Chua et al., 1999). See Table 2.1 for a summary of the definitions of family business from various scholars.

Table 2.1 Definition of family businesses in the literature

Classification	Scholars	Definition
Involvement component approach	Donckels and Fröhlich (1991)	Family members own over 60% of the company's shares.
	Chua et al. (1999)	In family businesses, the family dominates, with a willingness to inherit within the family, and the business is managed by the family.
	Anderson and Reeb (2003)	One or more family members control the business's ownership, and family members or descendants manage the business within it.
	Bennedsen et al. (2007)	A younger generation of family members is already controlling the enterprise or may acquire actual control from the founder.
Essence approach	J. A. Davis and Tagiuri (1989)	The family has a significant impact on enterprise strategy.
	Litz (1995)	Family members and their descendants intend to maintain control of the enterprise.
	Habbershon et al. (2003)	Unique and coordinated resources are obtained from family involvement in member interactions.

The family involvement component approach asserts that a family business can be

determined by assessing the degree of family involvement in various aspects, including ownership, management, governance, and transgenerational succession. In terms of ownership, Donckels and Fröhlich (1991) suggested that a family business should have more than 60% of the shares owned by family members. Gersick et al. (2004) argued that a family business should have family ownership and control. Regarding management, Upton proposed that a family business should involve at least two generations participating in the management, with a minimum of two family members engaged in the administration. Regarding transgenerational succession, initially, the focus was primarily on ownership and management; however, some scholars later introduced the notion that the business transfer across generations is a crucial distinction between family and non-family businesses. Chua et al. (1999) argued that the family controls a family business and aims to shape the business vision to serve the interests of family members and their descendants through sustainable development. Ward suggests that the involvement of the next generation of the family in managing and controlling the business is the criterion for defining a family business.

If we consider the involvement component approach as an operational definition, the essence method can be regarded as a theoretical definition. Chua et al. (1999) reviewed different definitions of family businesses and argued that family ownership or management involvement could not comprehensively and accurately reflect the characteristics of family businesses. Compared to the operational definition, the theoretical definition can more accurately capture the essential features of family businesses. Therefore, the authors believe that in addition to maintaining the basic conditions of family members participating in business management, the family also needs to establish a dominant coalition, aiming to pursue the family vision and hoping that the enterprise can be evergreen (Chua et al., 2012). Subsequently, Chrisman et al. (2005) believed that it is the unique resources possessed by family businesses that contribute to family businesses' uniqueness. According to the literature that uses the essence method to define family businesses, the uniqueness of family businesses is manifested in the following aspects: 1) the influence of the family on business strategy (J. A. Davis & Tagiuri, 1989); 2) the intention to maintain family control and the pursuit of transgenerational succession (Litz, 1995); 3) the acquisition and possession of resources and capabilities (e.g., the special resources and capabilities obtained in the daily communication and business process of family members involved in the company) (Habbershon et al., 2003).

However, the essence-based definition of family businesses also has its problems – the difficulty in measuring and quantifying the essential elements of family businesses leads to great operational difficulty for empirical research. In general, regardless of the research

purposes and methods, the existing literature on the definition of family businesses mostly follows the rules of the theoretical or operational definition. While the involvement component approach determines family businesses through the family's involvement in business ownership and management, the essence method believes that the involvement of ownership or management is only a necessary but not sufficient condition for determining family businesses – traits such as family vision and transgenerational succession are also essential.

The essence approach, which primarily focuses on theoretical aspects, faces implementation challenges due to its difficulty in quantification, making it less suitable for identifying and assessing family businesses. Considering data availability, this study, similar to most existing research, adopts the involvement component approach to define family businesses.

Compared to international scholars, researchers in China started studying family businesses at a relatively later stage. However, with the rise of family businesses since China's economic reforms and opening-up, they have been receiving increasing attention from scholars. Chinese scholars have pointed out that, compared to the involvement component approach, the essence approach primarily distinguishes family businesses conceptually at a theoretical level, thus limits its practical applicability (L. Cheng et al., 2011). Some scholars have also noted that the essence approach cannot effectively differentiate family businesses from other types of enterprises. Therefore, most existing studies employ the involvement component approach to define family businesses.

According to Chinese and international literature on family businesses, in general, enterprises are considered family businesses if they meet the following three criteria: 1) members of a particular family have absolute control over the enterprise; 2) at least two family members are involved in the management of the business; 3) the family attempts to pass on the management rights of the enterprise to the next generation. This definition, originating from the involvement component approach, takes into account ownership, management, and transgenerational succession and can adequately capture the characteristics of family businesses. Therefore, in this study on the impact of family involvement on the innovation activities of Chinese family businesses, we adopted this definition for family businesses.

2.2.3 Heterogeneity of family businesses

The discussions on the two approaches to define family businesses mainly serve to distinguish between family businesses and non-family businesses. It should be noted that the differences between different family businesses may be much greater than those between family businesses

and non-family businesses (Neubaum et al., 2019). However, the former has not received sufficient attention from scholars (Astrachan et al., 2002; Chua et al., 2012), making the existing research findings fail to accurately analyze the heterogeneous behavior between family businesses (Combs et al., 2020). In 2012, the journal *Entrepreneurship Theory & Practice* dedicated a special issue to the heterogeneity in family businesses (Chua et al., 2012), analyzing the behavioral diversity of family businesses from the perspectives of goals, resources, and governance (Cennamo et al., 2012), as well as family vision (Barnett et al., 2012), and proposed a research framework centered on goals, resources, and governance. DeMassis et al. (2014) explained the sources of differences between family businesses based on different intentions and capabilities of family businesses, where family involvement brought the intention of family control, and family resources brought the element of capability. The authors pointed out that the absence of either capability or intention would lead to different behaviors and outcomes in different family businesses.

Understanding the heterogeneity of family businesses requires first identifying the sources of heterogeneity. Chrisman et al. (2014) pointed out that the premise of heterogeneity in family businesses lies in differences in goals, resource endowments, and governance structures among different family businesses.

Regarding the resource dimension, the differences in resource endowments acquired by enterprises through the family system would lead to differences in strategic choices, behavioral patterns, and performance outcomes of family businesses. Inferences from related research on the resource-based view suggest that heterogeneous non-specific resources are generated by the combination of family resource endowments and market resources, which in turn produces a large number of heterogeneous resources related to business operations (Forcadell et al., 2018).

In terms of goal dimension, the pursuit of different goals by family businesses is directly related to their heterogeneous behavior, and previous relevant studies mostly focus on goal setting and goal diversity (DeMassis et al., 2013; Kotlar & De Massis, 2013; Williams et al., 2019). The characteristic of family businesses pursuing both economic and non-economic goals becomes the main source of their heterogeneous behavior (Chrisman & Patel, 2012). Current studies exploring the impact of economic and non-economic goals on family business behavior mostly focus on aspects such as the allocation of R&D funds (Wu et al., 2017) and the input and output of innovation in family businesses (Duran et al., 2016).

From a governance perspective, the generation of heterogeneous behavior in family businesses is related to factors such as control rights and ownership. First, different levels of family involvement lead to differences in goals, resources, and governance structures in family

businesses, constituting a significant premise for the generation of heterogeneity in family businesses (Chua et al., 2012). Specifically, as the level of family involvement increases, the controlling family tends to use its strong control authority to guide the enterprise's implementation of diverse strategic goals to achieve both economic and non-economic goals of family businesses (Chrisman et al., 2012). Secondly, the different configurations and combinations of ownership and management rights by the controlling families also affect the configurations of resources and governance structures in family businesses, which in turn affect their behavior (Astrachan et al., 2002).

In view of that, Nordqvist et al. (2014) classified family businesses into nine different types based on three different scenarios of family management and ownership involvement (i.e., family operation, family management, and family investment), and analyzed their differences in incentive systems, power configurations, and legitimacy in terms of corporate behavior, clearly demonstrating the differences in behavior among different types of family businesses. The relationship between family governance arrangements and financial performance is related to the fit degree between family logic and market logic (Miller et al., 2017). In addition, as family businesses are an integration of family and business, Jaskiewicz and Dyer (2017) argued that it is necessary to use the family theory to analyze the characteristics of family businesses in order to obtain a full view of the differences between different family businesses in behavior and performance, which result from different structures, functions, and interaction modes among different families.

In addition, as family businesses grow and become public enterprises, the increasing complexity of their operations leads to a rising demand for professional governance systems and professional management. Therefore, family businesses inevitably face the pressure of normative professional management (L. Cheng, 2005; Stewart & Hitt, 2011), and the promotion of professional management has become a popular discussion topic for entrepreneurs and scholars (Schulze & Gedajlovic, 2010).

Initially, Dyer (1989) pointed out that professionalization is essentially a rational alternative to solve nepotism and family conflicts in family businesses. In other words, professionalization is for family businesses to resemble non-family businesses in aspects such as ownership structure, governance structure, and management (Stewart & Hitt, 2011). Later, Dyer (1989) started focusing on the professional capabilities brought to enterprises by professionalization, emphasizing that the key to professionalization is to incorporate professional management skills into the enterprise process. He summarized three pathways to professionalization: introducing external professional managers, professionalizing family members, and professionalizing non-

family members in the enterprise. Inspired by the research of Dyer (1989), A. Hall and Nordqvist (2008) innovatively explained the process of professionalization from the dimension of corporate culture based on the definition of family business professionalization they put forward. Following that, Flamholtz and Randle (2007) described the elements of professionalization by analyzing its characteristics, including formal plans, formal training, clear responsibilities, performance appraisal, regular meetings, formal governance, and cost control systems. Even though they did not provide a comprehensive definition of professionalization, their analysis of the elements of professionalization has become an important tool for scholars studying professionalization. Stewart and Hitt pointed out in an article that professionalization could not be comprehensively encapsulated by a single concept – it involves multiple dimensions, such as the values of professionalization, introduction of independent directors, and formal training (Stewart & Hitt, 2011).

For family businesses, hiring external non-family managers is an important pathway to realize professional management and thus has become the focus of most research on the professionalization of family businesses (Bennedsen et al., 2007; J. J. Zhang & Ma, 2009). For example, Dekker et al. (2013) proposed a multi-dimensional concept of professionalization. According to these authors, professionalization not only includes the introduction of non-family members, but also the establishment of effective governance structures such as the board of directors and supervisory board, appointment of non-family directors and external directors to realize board professionalization, decentralization of power, introduction of human capital control system, enhancing the activity of top leadership, and establishment of formal financial control systems.

However, in both the management practice and theoretical research of family businesses, professionalization seems to be understood as a single-dimension concept, namely, the introduction of non-family members. This narrow or simplified definition has become a trend in research on the professionalization of family businesses, equating professionalization in family businesses with the introduction of external non-family managers. That led to an outdated and highly inaccurate assumption that family members are inherently non-professional managers. Therefore, for family business professionalization, it must be clear that while non-family members undoubtedly play a crucial role in promoting the professionalized management of family businesses by establishing hierarchical governance structures and clarifying job responsibilities (A. Hall & Nordqvist, 2008), and play an important role in advocating and implementing the principles of professionalized management (Daily & Dollinger, 1992), they are not the only driving factor of family businesses' professionalization. For example,

controlling families can also use professional processes to execute their power in the enterprise's decision-making (Crittenden et al., 2000); successors of family businesses who received professional education and training can also make positive contributions to professionalization (Gedajlovic et al., 2004). Therefore, considering the introduction of non-family members as the only pathway to family business professionalization seems to be somewhat biased.

In this study, the participation of non-family executives is an important research variable. However, we do not equate the involvement of non-family executives with the professionalization of the enterprise. Instead, we believe that in the context of family business professionalization, the involvement of non-family executives is an important strategic behavior to promote the professionalization process and enhance professionalization norms.

The top management team of a family business can be composed of family members as well as external professional managers (Chrisman et al., 2003). Therefore, the dual identity of the top management team has become a source of heterogeneity in family businesses (Barontini & Bozzi, 2018).

The constraints of blood ties, family relationships, and clan culture have long led Chinese family businesses to adhere to the mainstream paradigm. Chinese family businesses possess three main characteristics: patriarchal rule, the primacy of personal relationships, and defensiveness. As a result, the inclusion of family members in executive positions also reflects these characteristics.

1) Long-term cohabitation and education among family members have allowed them to acquire a great deal of tacit knowledge based on the company's operational and management characteristics. Family members have developed a unified set of values and communication methods (Gomez-Mejia et al., 2011). They may be able to convey information through a look or an expression. This informal communication method reduces the cost of communication and ensures smooth internal resource and information flow, making the organization more flexible. Owing to their lengthy tenure in the company, family executives develop a strong emotional attachment, enjoying high job security (J. H. Davis et al., 1997) and garnering great trust (H. B. Cai et al., 2013; Luo & Chung, 2012). Therefore, they often occupy key management positions in the company, such as Chief Financial Officer.

2) Family members who are heavily influenced by family ties tend to have similar values and goals, significantly reducing their propensity for opportunism or rent-seeking behavior (Fama & Jensen, 1983).

3) Long-term exposure to family culture and the inheritance of family spirit mean that

family executives' career aspirations are primarily focused on harmony and stability within the family business, such as maintaining socioemotional wealth and a harmonious family system. This also fosters the stronger entrepreneurial spirit of family executives (Li et al., 2015; Zellweger et al., 2011).

4) Close family ties lead family executives to focus on the family's common vision. Thus, family executives are more focused on the company's long-term development rather than short-term performance (J. H. Davis et al., 1997). In addition, as family executives are both executives and controlling family members with high equity ownership (D. Q. Cheng et al., 2013), they not only focus on the acquisition of benefits by stakeholders, but also pay attention to the company's long-term orientation (Lumpkin et al., 2010).

The role of family members as executives emphasizes the distinctive features of family businesses (Bach & Serrano-Velarde, 2015), but it also has its limitations.

1) The dominance of controlling family members over executive positions reflects the state of unity of ownership and control in the enterprises. In this case, family managers' altruistic, nepotistic, and free-riding behaviors lead to an increase in agency costs (Almeida & Wolfenzon, 2006), reducing governance efficiency and potentially reducing the enterprise's value (Schulze et al., 2001, 2002).

2) Family members often grow up together, and shared life experiences mean that the knowledge and skills acquired show a high degree of homogeneity and specificity. The social network they possess is also highly overlapped, making it difficult to bring heterogenous resources to the enterprise (Gomez-Mejia et al., 2003). The tacit knowledge and skills possessed by family executives may be sufficient to foster the enterprise's development in the short term, but over time, their knowledge and skills may not meet the enterprise's long-term development needs.

As enterprises expand in size and as the institutional environment improves, management based solely on family relationships or blood ties can no longer meet modern organizations' demands for sustainable long-term business development. Sustainable business operations require the reinforcement of external human and financial capital (Chen, 2013; Franks et al., 2012). In this context, professionalization becomes a necessary pathway for family businesses to achieve sustainable development, and the introduction of non-family members becomes an important approach for professionalization in family businesses (L. Cheng et al., 2011; Dekker et al., 2015).

Non-family executives often have their distinctive advantages:

1) Non-family executives often undergo an intense human resources screening process

before entering the enterprise, and thus, their diverse abilities and qualities are deemed to meet the needs of the enterprise's business development. Most of them have received formal and specialized training (Miller et al., 2013), and their professional value lies in their extensive experience in management and branding, as well as specialized expertise such as R&D and marketing (Royer et al., 2008).

2) Non-family executives are not influenced by family ties and have a lower level of emotional attachment to the family (Miller et al., 2013). This brings more objectivity and fairness to the enterprise's management decisions and strategic choices (Blumentritt et al., 2007).

3) Non-family executives' rich social capital can provide a network advantage, providing the enterprise with previously inaccessible resources and information. Family businesses can benefit from the human and social capital brought by non-family executives, resulting in a rapid growth of the company's human capital reserve (Eddleston et al., 2010).

However, while introducing advanced management knowledge, updating rules and regulations, and transforming governance models in the enterprise, non-family executives may also bring conflicts and disagreements with the controlling family in terms of governance philosophy, information exchange, and goal pursuit, resulting in agency costs (Chua et al., 2009). With the continued introduction of non-family executives into the enterprise, due to their distinctive knowledge resources and experiences, an increased emphasis may be placed on the standardization of administrative processes and financial reporting in daily operations and communication. This in turn increases the communication costs between non-family executives and between the controlling family and non-family executives, reducing the flexibility and adaptability of the organization and inadvertently increasing the degree of information asymmetry between the controlling family and non-family executives.

In addition, while focusing on economic performance, family business owners also seek to achieve non-economic goals such as maintaining family control and family reputation, as well as creating jobs for family members (Chrisman & Patel, 2012; Gomez-Mejia et al., 2011). The diverse goals of family businesses make it difficult for non-family executives to accurately understand the controlling family's goal pursuit. To ensure their human capital value and social reputation (Jensen & Murphy, 1990), non-family executives may focus more on the company's economic goals (J. H. Davis et al., 1997).

Therefore, the goal conflicts between non-family executives and the controlling family force the latter to pay high supervision costs to ensure the alignment of goals between non-family executives and the controlling family, resulting in increased agency costs. For that

reason, this study includes the introduction of non-family executives, formal institutions, and top management team stability in the research framework to comprehensively explore the impact of family involvement on enterprise innovation behavior.

2.2.4 Family involvement

Under the influence of family power, when a family business makes strategic decisions, it will be affected not only by economic motives but also by non-economic goals related to the family (Chrisman & Chua, 2004; J. H. Davis et al., 2010). Currently, scholars mostly agree that the degree of family involvement is a determinant factor of family businesses.

Family involvement is a significant characteristic that distinguishes family businesses from non-family businesses (Chua et al., 1999). Family businesses are systems where the "family" and the "enterprise" intertwine, and family involvement refers to the integration of family influence into the enterprise. Research on family involvement is built upon the research on family businesses, and most existing studies define family businesses using the involvement component approach. How family influences the enterprise is diverse. Scholars generally categorize family involvement into explicit and implicit involvement. Direct involvement includes aspects such as controlling ownership, participating in daily business operations, and transgenerational succession (Astrachan et al., 2002; Chrisman et al., 2012; Schmid et al., 2014); while implicit involvement encompass family culture and family experience.

Reviewing relevant studies on the dimensions of family involvement, we found that scholars generally consider that family involvement includes family ownership, family control, family management, transgenerational succession, family vision, and corporate culture (Yang & Li, 2009). However, there is still considerable debate in the academic community regarding which factors play a more crucial role in the strategic decision-making and long-term development of family businesses (Chrisman et al., 2012). In a study on the relationship between family involvement and non-economic objectives in SMEs, family involvement was measured by using secondary data, including the proportion of family ownership, the number of family members in management positions, and the number of generations of family members involved. Employing a non-linear perspective, a study on the impact of family involvement on firm performance divided family involvement into two dimensions: ownership and management involvement. The empirical research found that family ownership involvement had no significant impact on a firm's performance, while family management involvement showed a significant effect. This dimension division also gained support from various scholars, such as Kowalewski et al. (2010). Zattoni et al. (2015) defined family involvement based on

the number of family votes in enterprise decision-making and the level of participation of family members in managing the business. Songini and Gnan (2014) argued that family involvement activities in family businesses encompass not only ownership but also governance involvement and management involvement. Chinese scholars started studying family businesses relatively late. They mainly referred to international scholars' research on family involvement and generally adopted similar division of family involvement dimensions. For instance, Pan (1998) further expanded the criteria for family control. He believes that besides blood ties, enterprises controlled based on political relationships can also be considered family businesses. M. L. Wang et al. (2014) defined family businesses as follows: a) the actual controllers of the enterprise are individuals or families; b) the shareholding family members must hold over 15% of the enterprise's control rights; c) there must be no less than two family members holding top management positions in the enterprise.

Due to its superior data availability and operability, the involvement component approach is dominant in the empirical research of family businesses. Most studies related to family business strategies and performance have adopted this approach to define family businesses (Gomez-Mejia et al., 2013). However, no consensus has been reached regarding the standard of business ownership and management rights involvement either in theoretical research or empirical research. For instance, it is still unclear whether a business needs to meet some or all of the family involvement components to be considered a family business (Yang & Li, 2009). This uncertainty and disparity can lead to divergent research conclusions, affecting the universality of the research results.

In the empirical part of this study, we primarily focus on the explicit mode of family involvement. Referring to existing research findings (Anderson & Reeb, 2003; Chrisman et al., 2012), this study explores the family involvement dimensions such as ownership, management, and governance. In the case study part, we consider the influences of both explicit and implicit family involvement, aiming to provide a more comprehensive analysis of the impact of family involvement on enterprise innovation activities.

The ownership perspective considers family involvement in the enterprise's ownership. Most scholars define the level of family involvement based on the proportion of family ownership: the higher the percentage of family-owned shares, the greater the level of family involvement (Anderson & Reeb, 2003; Chrisman et al., 2012). Some scholars classified family ownership into different levels. For example, Broekaert and Andries (2016) divided family ownership into three groups: 0%-25%, 25%-50%, and above 50%; Decker & Gunther divided family ownership into three levels: 0%, 0%-20%, and above 20%.

The management perspective considers family involvement based on the family's participation in the operational activities of the enterprise. Some scholars examined family management involvement based on the proportion of family members in top management teams (Chrisman et al., 2014; DeMassis et al., 2014). Other scholars focused on whether family members are involved in management activities, using binary variables for measurement (Schmid et al., 2014; Tsao et al., 2015).

The transgenerational perspective considers family involvement from the perspective of generational control in the enterprise. Cucculelli and Marchionne (2012) distinguished between family founders and second-generation family members in their study of family management involvement.

The duration of family control refers to the duration of the family's control over the business. Zellweger et al. (2011) pointed out that family businesses focus on and pursue non-financial (economic) goals and used the duration of family control as a research perspective to expand family involvement's connotation.

Therefore, in the literature, family involvement has been divided into four dimensions: ownership, management, transgenerational succession, and duration of family control. Table 2.2 summarizes the measurement methods used by the cited scholars for each dimension of family involvement.

Table 2.2 Measurement methods of family involvement

Measurement	Scholars	Measurement methods
Ownership	Anderson and Reeb (2003)	Proportion of equity owned by the family
	Chrisman et al. (2012)	Proportion of family ownership
	Broekaert and Andries (2016)	Assigning values to family shareholding: 0-25% as 1, 25% -50% as 2, and over 50% as 3.
Management	Tsao et al. (2015)	Family members in the top management team as 1, otherwise 0
Transgenerational perspective	Broekaert and Andries (2016)	Dividing family business managers into founders, second generation, third generation, and fourth generation
Duration of family control	Zellweger et al. (2011)	The duration a family business is controlled by the family

2.2.5 Enterprise technological innovation

2.2.5.1 Definition of enterprise technological innovation

Schumpeter (1982) first introduced the concept of innovation in his book *The Theory of Economic Development*. He defined innovation as a production function that incorporates entirely new combinations of production elements and conditions into the production system

with the aim of obtaining potential profits. These combinations may include producing new products, adopting new production methods, opening new markets, accessing new sources of raw materials or semi-finished goods, or establishing new organizations. Subsequently, scholars have conducted further research based on Schumpeter's innovation theory and have expanded the concept of innovation.

When it was first proposed, innovation was defined as the variation in technology, by applying existing knowledge to the enterprise's daily production and operation through distinctive technical arrangements and combinations. The source of innovation lies in intellectual activities such as conceptualization, assumption, and the conception of unrealized plans. This concept reflects the two conditions of innovation: the source of innovative ideas and its future transformation in practice. This "two-step" theory is considered a milestone in defining the concept of innovation. Subsequently, Enos (1969) described technological innovation as a complete process involving multiple behaviors that interact and yield results. He extended the concept of technological innovation in enterprises from the initial stages of selecting inventions and designs to subsequent activities such as organizational establishment, planning, and market development. The U.S. National Science Foundation pointed out that the objects of technological innovation include products, processes, and services, and it refers to introducing these objects into the market. Freeman (1995) stated that technological innovation is a comprehensive process that involves technology, processes, and commercialization. Technological innovation may generate new products, processes, and equipment. The *Oslo Manual* (3rd edition), jointly developed by the Organization for Economic Co-operation and Development (OECD) and EUROSTAT, defined innovation as implementing new or significantly improved products, processes, new marketing methods, or new organizational methods in business strategies, workplace organization, or external relationships. Based on this definition, innovation is classified into four different types: product innovation, process innovation, marketing innovation, and organizational innovation. Product and process innovation fall under the category of technological innovation.

2.2.5.2 The measurement of enterprise technological innovation

In the literature on technological innovation, scholars primarily measured technological innovation from two perspectives: inputs and outputs. Technical innovation inputs include R&D expenditure, the proportion of R&D personnel, and other related capital expenditures. Technological innovation outputs are mainly measured by the number of patent grants. Direct indicators of technical innovation inputs include the financial investment or number of

employees involved. For example, Laursen and Salter (2006) used the logarithm of R&D expenditure to measure enterprises' technological innovation inputs. Relative indicators include the ratio of R&D expenditure to the enterprise's operating income or total assets and the ratio of R&D personnel to all employees. R&D expenditure refers to the funds and financial support that enterprises invest in innovation activities. R&D personnel inputs refer to the total number of R&D or technical personnel involved in technological innovation activities. Capital expenditure generally refers to the fixed assets (e.g., hardware equipment) provided by the enterprise for technological innovation activities. Patents refer to the patent rights possessed by patent holders for their inventions and creations. The measurement methods for enterprises' technological innovation are summarized in Table 2.3.

Table 2.3 Measurement methods for technological innovation of enterprises

Scholars	**Measurement methods**
Laursen and Salter (2006)	Ln (R&D investment + 1)
Francis (1999)	R&D intensity = R&D expenditure/operating income
H. B. Hall and Harhoff (2012)	Ln (number of patents + 1)

2.2.6 Family involvement and enterprise technological innovation

Internationally, studies have been carried out on the relationship between family involvement and technological innovation in enterprises, but overall, the number of studies is limited. Currently, no consensus has been reached in the academic community regarding the relationship between family involvement and technological innovation. Miller and Breton-Miller (2006) collected technological innovation data from 676 small family businesses in Canada through telephone interviews without considering the heterogeneity of family involvement. The study found that family businesses showed lower levels of technological innovation. W. Su and Lee (2012) examined the impact of family involvement on R&D expenditure and found that family ownership and board involvement adversely affected R&D expenditure. Fitz-Koch and Nordqvist (2017) investigated the relationship between family ownership involvement and technological innovation inputs in Italian family businesses. The study found that this relationship was influenced by some contextual factors. The research concluded that when a significant portion of family wealth is invested in the industry to protect the family's socioemotional wealth, family ownership would reduce technological innovation inputs.

In addition, the relationship between family involvement and technological innovation inputs can be considered from two aspects. On the one hand, family involvement can lead to

agency problems detrimental to innovation. On the other hand, family involvement can promote innovation through the family's stewardship behavior. As family managers are more like stewards of the business, they are better able to constrain the behavior of the enterprise, assume responsibility, and prioritize long-term development. Therefore, family involvement is beneficial for promoting innovation inputs in enterprises.

Chinese scholars' research on the relationship between family involvement and technological innovation in enterprises generally aligns with international studies, and the conclusions are divided. Scholars have explored the impact of family involvement on technological innovation from different dimensions. K. Zhu et al. (2016) studied the relationship between family ownership involvement and R&D investment and found a significant negative relationship. The reason for this finding may lie in the external institutional environment – the inadequate institutional environment in China constrains Chinese enterprises' R&D expenditures, leading to reduced R&D expenditure of family businesses. Yan and Ye (2014) investigated the influence of family management and ownership involvement on R&D investment. The study indicated that family ownership involvement hinders R&D investment in family businesses, while management involvement promotes R&D investment. Ming et al. (2016) found a significant negative relationship between family ownership involvement and technological innovation inputs (R&D investment), which was further accentuated by complex governance situations and performance difficulties. Using data from the All-China Federation of Industry and Commerce, D. Cai et al. (2016) studied the impact of family management involvement on technological innovation activities. The research showed that family members' participation in management could promote technological innovation activities. N. Zhang and Li (2017) divided family involvement into leadership involvement and management involvement. They found that family leadership involvement positively impacted innovation behavior, while an increase in family ownership involvement would lead to a U-shaped pattern in innovation behavior. Some scholars have explored family involvement from other dimensions. Wu et al. (2017) further divided family control into control capability and control willingness and found that both negatively affected technological innovation. However, family businesses typically show a preference for technological innovation investments (S. Cheng et al., 2014), long-term innovation investments, and high-risk innovation investments in times of crisis (Chrisman & Patel, 2012). In addition, research has indicated that family businesses' process management for innovation investments tends to be more efficient, and their long-term orientation and multi-generational efforts brought about by family inheritance are beneficial (Nordqvist et al., 2014). Duran et al. (2016) suggested in a meta-analysis that a high level of

family control over the business, concentration of family assets, and non-economic objectives centered around the family would lead to higher innovation transformation efficiency in family businesses. This view is consistent with the commonly accepted notion that family businesses are characterized by careful and meticulous management techniques. In addition to differences in the direction, type, and management efficiency of family businesses' innovation investment, Wu et al. (2017) investigated the influence of family relationships on enterprise innovation, dividing family relationships into family cohesion and adaptability, and concluded that family cohesion has an inverted U-shaped relationship with family businesses' innovation, while family adaptability has a significant positive relationship with family businesses' innovation.

2.2.7 Summary

By reviewing the related literature, it can be seen that although attention has been paid to the relationship between family involvement and technological innovation in enterprises, there is currently no consensus regarding the relationship between the two, and further studies are still needed. Therefore, this study attempts to delve into the impact of family involvement on technological innovation in enterprises while considering the influences of internal and external contextual factors.

Through a review of the relevant research on family involvement and technological innovation in enterprises, several issues were identified.

First, the dimensions of family involvement need to be defined. Family involvement can be divided into ownership, management, transgenerational succession, and the duration of family control. The complexity of transgenerational succession has made it an important topic in family business research. However, little attention has been paid to transgenerational succession in research on family involvement; instead, it was studied separately. Existing research usually focuses on a single dimension, such as ownership or management, when studying family businesses. To address this limitation and to comprehensively study family involvement's impact on technological innovation in enterprises, this study will simultaneously consider management, ownership, and governance involvement.

Second, it is necessary to establish standardized measurements for enterprise innovation. In China, previous research mainly used R&D expenditures as the sole indicator of enterprise innovation (S. Cheng et al., 2014; K. Zhu et al., 2016). In the empirical analysis of this study, we will use R&D intensity to measure the level of technological innovation in enterprises, more specifically, the ratio of R&D expenditures to operating income.

Finally, the relationship between family involvement and technological innovation in

enterprises needs further examination. The SEW theory is an essential theoretical foundation for studying family business-related topics. Before 2014, most studies found a negative relationship between family involvement and innovation. This was due to the high risk associated with innovation, which could lead to the loss of socioemotional wealth. As a result, family businesses would reduce their investment in innovation. However, Jaskiewicz et al. (2017) further enriched research on the relationship between family involvement and technological innovation by distinguishing between restricted and extended socioemotional wealth. Technological innovation plays a positive role in the long-term development of family businesses, reflecting a tendency to pursue extended socioemotional wealth. This is significant for achieving their goal of "sustaining the family business." Therefore, family businesses should not overlook the importance of innovation.

Furthermore, as mentioned above, the SEW theory was selected as the main theoretical foundation of this study. Therefore, this study will explore the relationship between family involvement and technological innovation from the perspective of socioemotional wealth, further expanding the research by considering various dimensions.

Through the literature review, it can be found that research on Chinese family businesses should further focus on several aspects. On the one hand, compared to many other countries, traditions such as the "family culture" have a more profound psychological impact in China. Thus, scholars should take into account the "family culture" when constructing the research on family businesses with "Chinese characteristics," which can help to enrich the research on this topic domestically and internationally. On the other hand, with China's rapid economic growth and global market expansion, the Chinese authority has proposed to develop "strategic emerging industries" and "create a conservation-minded enterprise and society" recently, which implies both opportunities and challenges for Chinese family businesses. Under this background, topics such as the long-term development of family businesses, entrepreneurial activity, the ecological environment efficiency, and international competition need scholars' further in-depth study.

Currently, no consensus has been reached among scholars regarding the relationship between family involvement and technological innovation. Some scholars argued for a positive relationship (Jaskiewicz et al., 2017; Q. Liang et al., 2013; Matzler et al., 2014), while others suggested a negative relationship (L. Cheng et al., 2011). Additionally, some scholars suggested a nonlinear relationship between family involvement and technological innovation.

Therefore, this study, building on a review of previous research findings on family traditions, enterprise innovation, and the agency problem, expects to carry out localized

research with “Chinese characteristics” to enrich the family business research, aiming to help enterprises to improve their innovation level, expand the international market, and ensure sustainable development.

[This page is deliberately left blank.]

Chapter 3: Theoretical Model and Research Hypotheses

Based on the literature review, according to the objective reality, hypotheses will be proposed in this chapter, regarding the relationship between family involvement and enterprise technological innovation, and the influence of top management team stability and formal institutions on this relationship.

Based on the discussion in Chapter 2, it can be seen that family involvement, which can be categorized into explicit and implicit involvement, greatly impacts technological innovation in enterprises. This chapter will present the theoretical model and research hypotheses for the empirical research of this study, while Chapter 4 outlines the model construction and quantitative analysis. In other words, Chapters 3 and 4 together constitute the empirical research of this study. Considering the feasibility of measurement, in the empirical research, we only consider the effect of explicit family involvement (i.e., ownership and management involvement). However, implicit family involvement will be included in the case analysis presented in Chapter 5, enabling a comprehensive exploration of the mechanisms and effects of family business involvement on technological innovation in enterprises within the institutional context of China.

Specifically, this chapter presents the theoretical analysis for investigating the relationship between family involvement and technological innovation in enterprises, as well as the moderating effects of top management team stability and formal institutions therein. It includes three subsections: theoretical model, research hypotheses, and a summary of the chapter's content, along with the visualization of the proposed research hypotheses.

3.1 Theoretical model

The empirical part of this study will use deductive logic to comprehensively explore the impact of family involvement on technological innovation in enterprises based on the socioemotional wealth (SEW) theory, upper echelon theory, and institutional theory. This study also attempts to investigate the moderating effects of top management team stability and formal institutions on the main relationship. Specifically, in the empirical research, family involvement will be divided into three dimensions: ownership, management, and governance involvement. We will first examine the impact of family ownership involvement on technological innovation in

enterprises (H1), the impact of family management involvement on technological innovation in enterprises (H2) and the impact of family governance involvement on technological innovation in enterprises (H3). Then, we will investigate the moderating effect of top management team stability on the relationship between family ownership involvement and technological innovation (H1-1), the relationship between family management involvement and technological innovation (H2-1), and the relationship between family governance involvement and technological innovation (H3-1). Finally, we will explore the moderating effect of formal institutions on the relationship between family ownership involvement and technological innovation (H1-2), the relationship between family management involvement and technological innovation (H2-2), and the relationship between family governance involvement and technological innovation (H3-2).

3.2 Research hypotheses

Family involvement is the determinant factor that distinguishes family businesses from non-family businesses (Chua et al., 1999). Drawing on Berle and Means (1932)'s seminal work on the divorce of ownership and control in enterprises, Jensen and Meckling (1976) proposed the agency theory, which posits that the separation of ownership and management rights can lead to agency problems, which became a key concern for modern enterprises. This study operationalizes family involvement into three dimensions: family ownership, management, and governance involvement. Thus, it examines the relationship between family involvement and technological innovation from the perspectives of both ownership and control.

(1) Family ownership involvement and enterprise technological innovation

As described in Chapter 2, currently no consensus has been reached among scholars domestically or internationally regarding the relationship between family ownership involvement and technological innovation in enterprises. Some scholars argued that family ownership involvement was positively related to technological innovation (Jaskiewicz et al., 2017; Jensen & Meckling, 1976; X. Y. Liang et al., 2014; Matzler et al., 2014), indicating that family ownership involvement can promote technological innovation in enterprises. On the other hand, other scholars believe that family ownership involvement is negatively related to technological innovation, suggesting that family ownership involvement can inhibit technological innovation in enterprises. In addition, some scholars suggested a non-linear relationship between family ownership involvement and technological innovation in enterprises, indicating that the relationship between family ownership involvement and enterprise

technological innovation is not a simple linear relationship.

Therefore, previous research findings were divided into positive relationships, negative relationships, and non-linear relationships, which can be attributed to different theoretical frameworks. Based on the SEW theory, family ownership involvement is expected to show a positive relationship with technological innovation in enterprises. That is because, according to the SEW theory, family businesses, driven by the need to protect and extend socioemotional wealth and to achieve long-term goals, will actively engage in innovation activities (Miller et al., 2013). However, based on the agency theory, family ownership involvement is supposed to be negatively associated with technological innovation in enterprises. That is because, according to the agency theory, the agency problem of enterprises can be divided into two types: the first type refers to the agency problem between shareholders and management, and the second type refers to the agency problem between major and small shareholders (Fama & Jensen, 1983, 1983; Jensen & Meckling, 1976; Miller et al., 2013). Family businesses mainly face the second type of agency problem, namely, between major and small shareholders (Anderson & Reeb, 2003). Within family businesses, controlling shareholders often take specific measures to hollow out the enterprise and encroach upon the interests of small and medium shareholders for their benefit. These controlling shareholders are unwilling to use funds for high-risk, innovative activities and, therefore, do not favor innovation activities. Lastly, based on the contingency theory (Wu et al., 2017), the relationship between family ownership involvement and technological innovation in enterprises will produce different results in different contexts, thus exhibiting a non-linear relationship.

The varied research findings may also be due to different research subjects and institutional environments. As for the study on Chinese family businesses, it is necessary to consider the characteristics of Chinese family businesses and the institutional background of China, which is the context of this research.

Socioemotional wealth has been identified as the primary driver of family businesses' decision-making processes (Gomez-Mejia et al., 2007; Gomez-Mejia et al., 2010). Breton-Miller and Miller (2006) suggested that socioemotional wealth can be categorized into two distinct types, namely restricted and extended socioemotional wealth. Restricted socioemotional wealth prioritizes the preservation of family control over the firm, and decision-makers who espouse this type of Socioemotional wealth tend to exhibit a conservative stance toward innovation. In contrast, extended socioemotional wealth emphasizes the transgenerational continuity of family control and reflects decision-makers' long-term strategic orientation.

First, as family ownership involvement increases, it indicates that the family increases its control over the business and places more emphasis on achieving the goal of transgenerational continuity, leading to greater attention to its long-term development and extended investment payback periods. That, in turn, will enhance the enterprise's long-term competitiveness and adaptability to the environment, thus increasing its technological innovation level. In addition, long-term orientation is a significant characteristic distinguishing family businesses from other enterprises (Breton-Miller & Miller, 2006). As family ownership involvement increases, the family business becomes more familiarized, and members become increasingly aligned toward achieving the goal of transgenerational continuity and long-term orientation. Technological innovation activities in the enterprise, which are investments in the enterprise's future, not only help to change its industry structure but also enable the enterprise to integrate resources and cultivate sustainable competitive advantages, thereby creating more economic value and achieving its long-term development (DeMassis et al., 2013). Finally, relying solely on internal funds is insufficient to meet innovation needs. When ownership is highly concentrated in the hands of family members, multiple family controlling shareholders may emerge within the enterprise. This can significantly reduce the ability of controlling shareholders to infringe on the interests of minority shareholders for personal gain. When investors anticipate the role of other significant shareholders in reducing the risk of controlling shareholders engaging in asset-stripping, they demand lower investment risk premiums, enabling the enterprise to obtain external financing at lower costs, thereby providing external financial support for technological innovation.

Therefore, this study proposes the following hypothesis:

H1 (Main Effect 1): *There is a significant positive relationship between family ownership involvement and technological innovation in the enterprise*.

(2) Family management involvement and enterprise technological innovation

Family management involvement reflects the family's responsibilities in managing and operating the enterprise, as well as the family's participation in executing strategic decisions (Chrisman et al., 2012). Family management involvement may be measured by using continuous data or dummy variables. The former mainly includes the proportion of family members on the board of directors or in top management positions (Yang & Li, 2009). In the latter, a value of 1 is assigned when the CEO or chairman of the board is a family member and 0 when they are not (G. Fan et al., 2011; L. B. Fan et al., 2016; Li et al., 2015).

This study adopts the dummy variable measurement method, quantifying family management involvement as whether the CEO is a family member. We chose this approach for

two reasons. Firstly, the selection and appointment of executives is a crucial enterprise management mechanism and an essential indicator of enterprise management efficiency. As the vital decision-maker and executor of enterprise operations, the CEO significantly impacts the enterprise's development (Gu et al., 2006; Miller et al., 2013). Secondly, since information about kinship relationships of other senior executives is not a mandatory disclosure, it is challenging to determine whether other members of the top management team are family members. Relatively, it is easier to ascertain the CEO's relationship with the family business, ensuring the robustness of the study's results.

The CEO's origin, namely, whether they are a member of the controlling family or an external professional manager, constitutes a fundamental characteristic of family businesses. CEOs appointed by controlling family members are known as stewards of the enterprise (J. H. Davis et al., 1997). Family CEOs have a certain level of kinship with the controlling family, making them more concerned about the long-term development of the family business.

The profitability of innovation activities can be accidental, but in the decision-making process, to protect the family's socioemotional wealth, family businesses have a tendency to risk aversion (Gomez-Mejia et al., 2007). Family CEOs' decision-making is likely to focus on the protection of both restricted and extended socioemotional wealth. Restricted socioemotional wealth emphasizes family control over the enterprise, which involves both ownership and management. The family nature makes the family business place ownership in the hands of the family, and family CEOs tend to place management control within the family. Therefore, when family members serve as CEOs, restricted socioemotional wealth is naturally protected. The protection of extended socioemotional wealth is closely related to on the sustained development of the enterprise, and the focus on extended socioemotional wealth guides the CEO's long-term orientation (Chua et al., 1999; Miller et al., 2017). Technological innovation can enhance the enterprise's future performance, and thus, family CEOs are likely to proactively engage in technological innovation activities to promote the long-term development of the family business.

In addition, the uniqueness of family businesses lies in the combination of family and enterprise (Chua et al., 1999). The identity of the "family CEO" serves as the nexus between the CEO, the family, and the enterprise, thereby rendering the destiny of the family business closely intertwined with that of the family CEO. Under the goal of "sustaining the family business," the family CEO prioritizes safeguarding extended socioemotional wealth and actively engages in technological innovation activities. As a "concurring actor" of the family business, the family CEO is better positioned to garner the trust and support of other

shareholders compared to non-family CEOs. The attendant protection of restricted socioemotional wealth does not impede the family CEO's ability to formulate innovative decisions. Furthermore, the presence of kinship ties serves to link the interests of family members, thereby mitigating the incidence of conflicts of interest (Schulze et al., 2003). This, in turn, engenders a climate of mutual trust among internal shareholders, thereby bolstering the support for technological innovation activities.

Therefore, the following hypothesis is proposed:

H2 (main effect 2): *There is a significant positive relationship between family management involvement and enterprise technological innovation*.

(3) Family governance involvement and enterprise technological innovation

The control of enterprise ownership by the family confers upon them the power and legitimacy to protect socioemotional wealth. To reinforce this protection, families tend to consolidate their power through governing bodies, especially after the enterprise's equity is controlled (LaPorta et al., 1999). The role of family members is not only reflected in their involvement in daily management activities but also their fulfillment of governance functions. Currently, scholars consider the family's presence on the board of directors as an essential criterion for measuring their involvement in governance rights. Researchers have mainly adopted two methods to measure the participation of family governance involvement: one is the proportion of family members on the board of directors, as a continuous variable (Q. Liang et al., 2013), and the other is whether the chairman of the board is a family member, as a virtual variable (Luo & Chung, 2012). This study adopts the former method for measuring family governance involvement.

As the core of enterprise governance, the board of directors is the highest decision-making body and bears the mission of the family's prosperity. A higher level of family governance involvement means more family members on the board of directors. These family members represent the common interests of the family. Based on the SEW theory, in formulating enterprise strategies and business decisions, family board members tend to prioritize the satisfaction of family goals and avoid compromising family interests (Gomez-Mejia et al., 2007).

From the perspective of the human capital theory in the resource-based view, an increase in the proportion of family members on the board of directors and the resulting increase in family governance can lead to the formation of a "clique" of family members on the board (Cennamo et al., 2012). Compared to external members, family members grew up in shared family culture and hold shared values, resulting in relatively small differences in professional

knowledge resources. This can be disadvantageous for carrying out innovation activities and can suppress the enterprise's investment in technological innovation. At the same time, family directors, to maintain family control and authority, may show a resistant attitude towards introducing talented external individuals to join the board. The lack of external human resources may reduce the influx of innovative thinking, leading to decision-making paralysis within the enterprise and ultimately affecting investment in technological innovation.

In summary, this study posits that family governance involvement can play a decisive role in determining a family business' orientation and decision-making. Family directors may suppress investment in technological innovation to meet their socioemotional wealth needs. Furthermore, an increase in the proportion of family members on the board of directors may result in lower heterogeneity in professional knowledge resources among board members and a reluctance to introduce talented external individuals to join the board, ultimately leading to decision-making paralysis within the enterprise. Meanwhile, the increase of family members on the board might make board meetings turn into negotiations among various shareholders within the family. Economic distribution discrepancies and emotional conflicts within the family can affect the directors, prompting them to make different choices in the enterprise's development decision-making.

Therefore, on that basis, we propose the following hypothesis:

H3 (main effect 3): *There is a significant negative relationship between family governance involvement and enterprise technological innovation*.

(4) The moderating effect of top management team stability

In this study, top management team stability refers to the stability of the senior executives in the organization, precisely measured by the turnover of top management team members regardless of whether the size of the team changes. Top management team stability is an important contextual factor that triggers cognitive and behavioral changes in senior executives. The different cognitions will lead to different strategic choices, which will, in turn, affect the relationship between family involvement and technological innovation in the enterprise. Therefore, this study chose top management team stability as an internal contextual factor of family businesses to explore its moderating effect on the relationship between family involvement (family ownership involvement, family management involvement, and family governance involvement) and technological innovation.

According to the upper echelons theory, managers' characteristics can affect an enterprise's strategic choices and decisions (Hambrick & Mason, 1984). High top management team stability enables the existing members to overcome conflicts arising from the team's differences

in demographic characteristics, relational characteristics, and cognitive characteristics, which is conducive to forming a highly cohesive team through information sharing and coordination of internal power (H. B. Cai et al., 2013). Therefore, with high top management team stability, the team is more likely to reach a consensus on the enterprise's operational decisions. Although this can increase efficiency in various business aspects within the company, it may also lead to agency problems internally. Hence, further in-depth analysis is needed to examine the moderating effect of top management team stability on the relationship between family involvement and technological innovation in the enterprise.

This study posits that in family businesses, top management team stability can weaken the positive relationship between family ownership involvement and technological innovation. Although family businesses with high levels of family ownership involvement tend to prioritize the protection of extended socioemotional wealth and actively engage in innovative activities, as the level of family ownership involvement increases, the family nature becomes more prominent, making the family business more conservative and prone to agency problems such as free-riding and self-control (Schulze et al., 2002), which will hinder innovation activities. On the one hand, in situations where the top management team is stable, the top management team is more likely to form a clique, where the opportunistic motives of individual executives are likely to be accentuated. Moreover, top management team stability can reduce the cost and difficulty of collective breach of contract by the top management team, exacerbating the agency problem within the family business. Therefore, in situations where the top management team is stable, excessively high levels of family ownership can further exacerbate agency problems and hinder innovation activities.

On the other hand, when the top management team has low stability, it means that the top management team shows higher heterogeneity. A heterogeneous top management team can introduce diverse cognitive patterns and perspectives into the enterprise, leading to higher levels of innovation (J. J. Zhang & Zhang, 2016), making family businesses more likely to engage in innovation activities. Furthermore, low top management team stability can reduce opportunistic behavior among executives (F. F. Zhu, 2018), thus lowering the agency costs of family businesses and alleviating family agency problems caused by high family ownership involvement. In this case, family businesses can pay more attention to achieving the goal of sustainable development and protecting extended socioemotional wealth, making them actively engage in technological innovation activities.

Based on the above analysis, the following hypothesis is proposed:

H1-1 (moderating effect 1-1): *Top management team stability weakens the positive*

relationship between family ownership involvement and enterprise technological innovation.

In this study, family management involvement refers to family members serving as the CEO. When family members serve as the CEO, they are like stewards of the enterprise and will focus on the long-term development of the enterprise and the protection of extended socioemotional wealth, thus actively engaging in technological innovation activities. However, family CEOs are also influenced by the enterprise's top management team when making decisions (Hambrick & Mason, 1984). Therefore, it is necessary to further explore the moderating effect of top management team stability on the relationship between family management involvement and technological innovation in the enterprise.

Carrying out innovation activities requires a lot of external knowledge and practical information. According to the resource dependence theory, each executive can bring to the enterprise distinctive attributes and resources, which will turn into the enterprise's capital. If the top management team shows high stability, it may hinder the absorption of external information, making it difficult for family CEOs to obtain the needed information from the top management team when making innovation-related decisions, which will hinder their decision-making for innovation. In addition, although family CEOs attach great importance to the long-term development of the family business and the protection of extended socioemotional wealth, they may face difficulties in carrying out innovation activities due to their limited abilities. In this case, the resources and skills possessed by the top management team can make up for it. If the top management team remains highly stable, family CEOs may form a particular relationship network with other top management team members, making it difficult for the CEO to receive rational advice for innovation-related decision-making from them. This will lead to reduced decision-making efficiency, which is not conducive to family businesses engaging in technological innovation activities.

Furthermore, with the development of family businesses, as the level of family involvement increases, more family members will join the governance activities of the family business, forming a complex family alliance. In family businesses, the top management team includes both family members and non-family members, and the power allocation among family members can greatly affect the efficiency of family business governance (Chrisman et al., 2003; Schulze et al., 2003). If the top management team remains highly stable, it makes it difficult for the newly joint family members to enter the top management team. In this case, the power will remain in the hands of existing members, leading to deviations in internal control and causing family conflicts and agency problems, which is detrimental to the CEO's decision-making for innovation and the enterprise' engagement in technological innovation activities.

Based on the above analysis, we propose the following hypotheses:

H2-1 (moderating effect 2-1): *Top management team stability weakens the positive relationship between family management involvement and enterprise technological innovation*.

H3-1 (moderating effect 3-1): *Top management team stability accentuates the negative relationship between family governance involvement and enterprise technological innovation*.

(5) The moderating role of formal institutions

In this study, the formal institutional environment refers to the external institutional setting of a country or region. According to the institutional theory, organizations are embedded in the institutional environment. In the process of acquiring, accumulating, and utilizing resources, they are inevitably constrained by institutions. The institutional environment is a critical macro-environmental factor affecting enterprise behavior in transitional economies. The institutional environment determines the rules of the game for business activities and thus exerts external inducement or constraint on enterprise strategic choices (North, 1990). Therefore, formal institutions can significantly impact family businesses' governance mechanism and resource allocation.

Through China's 45 years of reform and opening-up, formal institutions in various regions have been greatly improved, providing a favorable external environment for the innovation activities of family businesses. However, since China is still in a transitional economy, the level of market development varies significantly across regions. That leads to significant regional differences in formal institutions and impacts the entrepreneurial orientation of family businesses. Compared with state-owned enterprises, family businesses are in a weaker position in the development process and face higher levels of external uncertainty, which makes them more sensitive to changes in the external formal institutional environment.

Therefore, this study posits that the effect of family involvement on the technological innovation of enterprises may differ due to the different formal institutional environments across regions, depending on where family businesses are located.

Inadequate formal institutions can lead to increased costs of innovation activities for enterprises. Specifically, in areas where traditional institutions are inadequate, the inadequate market system, excessive government intervention, and a lack of fair and effective legal strategies can hinder the development of innovation activities. Meanwhile, the higher the level of family ownership, the stronger the enterprises' motivation to protect socioemotional wealth. Inadequate formal institutions can increase the risk and uncertainty enterprises face in carrying out innovation activities, as they may lead to the loss of socioemotional wealth. In this case, enterprises may reduce their technological innovation activities. On the other hand, carrying

out innovation activities requires additional funds, and the inadequate formal institutional environment will increase the difficulty for family businesses to obtain financing for innovation activities, exacerbating the financing constraints faced by family businesses. In this case, a higher level of family ownership involvement will bring more burden than advantages to family businesses, as the enterprise is expected to focus on the enterprise's long-term development in addition to the burden for innovation.

In regions with more adequate formal institutions, family businesses are more likely to receive government support and protection. As formal institutions continue to improve, the barriers to innovation for family businesses will gradually decrease, and the competitive environment will become more fair. In addition, regions with adequate formal institutions have higher levels of marketization (G. Fan et al., 2011). In such an environment, non-market factors such as political connections will have reduced impact on enterprises, and information will be more available, reducing transaction costs and making it easier to obtain other resources through market mechanisms (Zou & Ni, 2010).

Therefore, in regions with more adequate formal institutions, family businesses find it easier to obtain relevant funds and resources and face fewer obstacles in carrying out technological innovation activities. From the perspective of ownership, the higher the family ownership involvement, the more actively family businesses will engage in technological innovation activities to achieve their long-term goals. Improving the formal institutional environment creates a favorable external environment for development and favorable financing conditions for innovation activities.

Based on the above analysis, the following hypothesis is proposed:

H2-1 (moderating effect 2-1): *Formal institutions accentuate the positive relationship between family ownership involvement and enterprise technological innovation*.

When making decisions regarding technological innovation, family CEOs and boards of directors need to consider not only internal contextual factors but also changes in external factors – formal institutions. Adequate institutions can have a positive impact on an enterprise's innovation activities. A robust market system and a favorable environment can encourage business owners to establish sound enterprise governance mechanisms that incentivize enterprise innovation. Furthermore, adequate formal institutions can reduce external transaction costs during the innovation process, thereby promoting innovation (Li et al., 2015; Shao, 2015). However, some scholars argue that with the improvement of institutional efficiency, the positive effects of family governance may be weakened, and the inadequacy of the external market may reduce the innovation motivation of family businesses (D. Cai et al., 2016).

Therefore, this study hypothesizes that the impact of family management and governance involvement on technological innovation in enterprises may vary due to regional differences in formal institutions.

When formal institutions are inadequate, family businesses often have to pay a higher cost to obtain the necessary resources for operation (L. Cheng et al., 2011), as the "steward" of the enterprise, the family CEO, is constantly monitoring changes in the external institutional environment and adjusting the enterprise's operational decisions accordingly. Unquestioningly, in an environment with inadequate formal institutions, increasing innovation activities will not only increase the risks faced by the enterprise in production and operation but also undermine the authority of the family CEO within the family and the enterprise. Therefore, in situations with inadequate formal institutions, family CEOs may not favor innovation decisions, thus decreasing the intensity of innovation activities within the enterprise. With the improvement of the formal institutions, the external competitive environment will become more fair, and in this case, innovation activities can bring greater utility to the enterprise. In regions with adequate institutions, the economy and finance are relatively well-developed, creating a more favorable external financing environment for family businesses, which provides family businesses with a greater freedom in operational decision-making (S. B. Zhang & Zhang, 2012). Therefore, in regions with relatively well-developed formal institutions, family businesses find it easier to obtain relevant funds and resources, thus showing less resistance to innovation activities. This gives family CEOs more freedom and space to explore innovation activities. As enterprises managers, family CEOs focus more on the enterprise's growth and long-term survival (Breton-Miller et al., 2011). Therefore, in the face of favorable external environments, family CEOs tend to pay more attention to protecting extended socioemotional wealth, thus making relevant decisions to improve technological innovation in the enterprise.

Furthermore, the fundamental difference between family CEOs and non-family CEOs lies in that family CEOs possess a greater residual claim over the enterprise (Pan, 1998). In a sound formal institutional system, that means, family CEOs can benefit from more innovation returns of the enterprise in the long term. At the same time, when the financing pressure is less, even with high family governance involvement, the board's support for innovation activities will still increase due to the abundant resources for innovation activities

Based on the above analysis, we propose the following hypotheses:

H2-2 (moderating effect 2-2): *Formal institutions strengthen the positive relationship between family management involvement and enterprise technological innovation*.

H3-2 (moderating effect 3-2): *Formal institutions buffer the negative relationship between*

family governance involvement and enterprise technological innovation.

3.3 Summary

This chapter proposed corresponding research hypotheses based on the relevant theories, including the SEW theory, upper echelon theory, and institutional theory. Specifically, the SEW theory was used to analyze the main effect of family involvement (family ownership involvement, family management involvement, and family governance involvement) on enterprise technological innovation. Then, the upper echelon theory was used to analyze the moderation of top management team stability on the main effect. Finally, the institutional theory was used to analyze the moderation of formal institutions on the main effect. In summary, this study proposed a total of nine hypotheses.

H1 (main effect 1): *There is a significant positive relationship between family ownership involvement and technological innovation in the enterprise*.

H2 (main effect 2): *There is a significant positive relationship between family management involvement and enterprise technological innovation*.

H3 (main effect 3): *There is a significant negative relationship between family governance involvement and enterprise technological innovation*.

H1-1 (moderating effect 1-1): *Top management team stability weakens the positive relationship between family ownership involvement and enterprise technological innovation*.

H2-1 (moderating effect 2-1): *Top management team stability weakens the positive relationship between family management involvement and enterprise technological innovation*.

H3-1 (moderating effect 3-1): *Top management team stability accentuates the negative relationship between family governance involvement and enterprise technological innovation*.

H1-2 (moderating effect 1-2): *Formal institutions accentuate the positive relationship between family ownership involvement and enterprise technological innovation*.

H2-2 (moderating effect 2-2): *Formal institutions strengthen the positive relationship between family management involvement and enterprise technological innovation*.

H3-2 (moderating effect 3-2): *Formal institutions buffer the negative relationship between family governance involvement and enterprise technological innovation*.

The theoretical model that incorporates the hypotheses is presented in Figure 3.1.

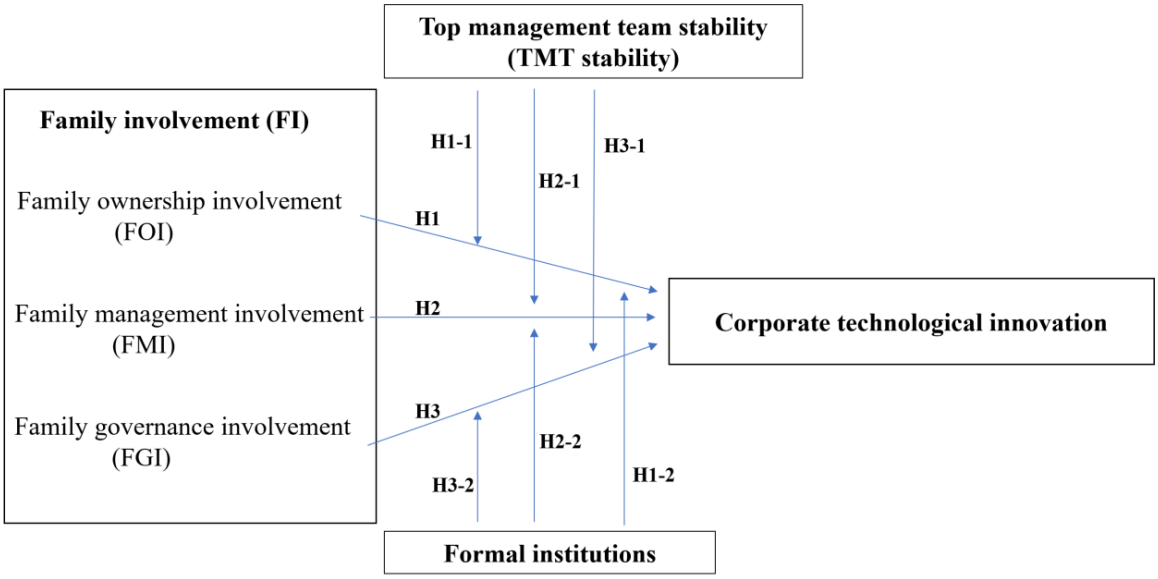


Figure 3.1 Theoretical model

Chapter 4: Research Design and Empirical Analysis

Based on the theoretical model and hypotheses proposed in Chapter 3, we carried out sample selection, data collection, and statistical analysis, which will be described in this chapter. We used STATA 15.0 to process the data obtained. We first performed descriptive statistics and correlation analysis to find out the statistical characteristics and correlation of each variable. Then, multiple regression analysis was carried out to examine the hypotheses proposed in this study. Lastly, the robustness test was conducted to confirm whether the results were consistent with the results of the empirical research.

4.1 Data source and sample selection

Considering the impact of the financial crisis in 2008 and COVID-19 starting at the end of 2019, this study decided to focus on the listed family businesses in the manufacturing industry of the Shanghai and Shenzhen A-share markets from 2015 to 2019. Currently, there is no consensus in the academic community on the definition of family businesses. This study considers enterprises that meet the following three criteria family businesses: (1) the controlling shareholder at the time of listing is a family business; (2) the actual controller of the enterprise can be traced back to a natural person or a family; (3) this natural person or family has substantial control over the enterprise; (4) at least one family member holds shares/management/control over the enterprise or is the controlling shareholder of the enterprise, other than the actual controlling person; (5) the actual controller is directly or indirectly the enterprises' largest shareholder and holds a controlling stake of 25% or more.

In addition, we applied to the following rules for sample selection: (1) Enterprises that received ST or *ST from 2015 to 2019 were excluded. (2) Enterprises with significant missing data were excluded. (3) Since innovation activities are a long-term process, data of enterprises established recently cannot accurately reflect their innovation level; therefore, this study only selected family businesses established before 2015. (4) To reduce the impact of outliers, Winsorization was performed on all continuous variables at the ^{1s}t and 9^{9th} percentiles. Through this screening process, this study finally obtained balanced panel data from 292 listed family businesses from 2015 to 2019, totaling 1,460 observations. The data for this study mainly came from the Guotai An (CSMAR) database and the Tonghuashun (IfinD) database. We also used

data from Wind Information and Sina Finance as supplements. STATA15.0 was used for data processing and hypothesis testing.

4.2 Variable interpretation and model setting

4.2.1 Variable interpretation

4.2.1.1 Measurement of family involvement (FI)

Family ownership involvement (FOI) measures the level of family ownership involvement by calculating the proportion of the total equity held by the controlling family in the enterprise. The higher the ratio of equity owned by the controlling family, the higher the level of family ownership involvement. Specifically, it refers to the ownership of the listed enterprise held by the actual controller through consistent action, multiple-tiered shareholding, cross-shareholding, and other means. The calculation method used is based on the method in LaPorta et al. (1998) and Claessens et al. (2000), which multiplies the ownership proportion of each layer of the equity relationship chain between the actual controller and the listed enterprise and then sums them up. This indicator of family ownership focuses on the proportion of the listed enterprise's ownership held by all actual controllers among family members. When there are multiple actual controllers, their ownership is merged in calculation.

Family management involvement (FMI) was measured using a dummy variable method. Specifically, if a family member serves as the CEO of the family business, FMI is coded as 1; on the contrary, FMI is coded as 0 if a non-family member serves as the CEO of the family business.

Family governance involvement (FGI) was measured by the ratio of family members on the board of directors to the total number of board members, following the measurement method used by Matzler et al. (2014).

4.2.1.2 Measurement of enterprise technological Innovation (INNO)

In this study, enterprise technological innovation was measured by the intensity of R&D investment, more specifically, the ratio of R&D expenditures to operating income.

4.2.1.3 Top management team stability (TSI) measurement

In this study, top management team stability refers to the stability of executives in an enterprise, precisely measured by the turnover of executives regardless of whether the size of the top management team changes. This study employed the method proposed by Crutchley et al. (2002)

to measure top management team stability, with the specific formula as follows:

$$\boldsymbol{SI_{i,i+j}} = \frac{\left[\boldsymbol{M_i} - \#(\boldsymbol{S_i}/\boldsymbol{S_{i+j}})\right] \times \boldsymbol{M_{i+j}}}{\boldsymbol{M_i} \times (\boldsymbol{M_i} + \boldsymbol{M_{i+j}})} + \frac{\left[\boldsymbol{M_{i+j}} - \#(\boldsymbol{S_{i+j}}/\boldsymbol{S_i})\right] \times \boldsymbol{M_i}}{\boldsymbol{M_{i+j}} \times (\boldsymbol{M_i} + \boldsymbol{M_{i+j}})} \quad (4.1)$$

$SI_{i,i+j}$ represents the stability of the top management team from time point i to $i+j$, with a value range of 0 to 1, where a value closer to 1 indicates more robust stability (Crutchley et al., 2002). M_i represents the number of executives in the top management team at time i, while M_{i+j} represents the number of executives in the top management team at time $i+j$. $\#(S_i/S_{i+j})$ represents the number of executives at time i who are not executives at time i+j, while $\#(S_{i+j}/S_i)$ represents the number of executives at time $i+j$ who are not members of the team at time i. The calculation starts from the year of assuming office and ends at the previous year in the case of leaving office during the year.

4.2.1.4 Measurement of formal institutions (INE)

Drawing on previous research, this study used the marketization index of the province where the family business is located to measure the formal institutional environment in that region. Currently, a commonly used method for measuring the formal institutional environment or institutional environment of a region is the marketization index proposed by G. Fan et al. (2011). However, as this marketization index was only publicly available for the years 1998-2009, it was not possible to measure the degree of market development in those regions after 2009. Subsequently, X. L. Wang (2019) released the updated version of the marketization index report, which includes data until 2014. Therefore, this study chose the marketization index released by Wang to measure the institutional environment. As the institutional environment of a region usually does not change significantly in the short term (Li et al., 2016), this study used the 2014 marketization index for the years 2015 and 2016. A higher marketization index indicates a more adequate institutional environment and better-developed formal institutions in the region where the family business is located.

4.2.1.5 Measurement of control variables

To ensure the accuracy and reliability of this study, we additionally selected nine variables as control variables, including enterprise size (Size), financial leverage (Lev), CEO duality (Dua), board size (Board), independent directors ratio (Idratio), enterprise performance (ROE), growth (Grow), resource slack (Slack) and years on the market (Age), while controlling the Year and Industry.

In summary, the variables used in this study are listed in Table 4.1.

Table 4.1 Variables definition and measurement

Variable type	**Variable name**		**Code**	**Explanation and measurement**
Dependent variable	Technical innovation		INNO	R&D investment/Operating income
Independent variables	Family involvement	Family ownership involvement	FOI	Percentage of shares owned by the actual controlling family
		Family management involvement	FMI	1, when the CEO is a family member; 0, otherwise
		Family governance involvement	FGI	Ratio of the number of family members on the board to the total number of directors
Moderators	Formal institutions		INE	Measured by marketization index (X. L. Wang, 2019)
	Top management team stability		TSI	$SI_{i,i+j}\frac{\left[M_i - \#(S_i/S_{i+j})\right] \times M_{i+j}}{M_i \times (M_i + M_{i+j})} + \frac{\left[M_{i+j} - \#(S_{i+j}/S_i)\right] \times M_i}{M_{i+j} \times (M_i + M_{i+j})}$
Control variables	Enterprise size		Size	The logarithm of the enterprise's total assets
	Financial leverage		Lev	Ratio of liabilities
	CEO duality		Dua	1, when the CEO is also serving as the chairman; 0, otherwise
	Board size		Board	The logarithm of the number of members on the enterprise's board of directors
	Independent directors ratio		Idratio	Number of independent directors/Total number of directors
	Enterprise performance		ROE	Return on equity
	Growth		Grow	Revenue growth rate
	Resource slack		Slack	Period expenses/operating income
	Years on the market		Age	The logarithm of the number of years the enterprise has been on the market plus 1
Dummy variables	Year		Year	Dummy variable of the year
	Industry		Industry	Dummy variable of the industry

4.2.2 Empirical model

To examine the hypotheses proposed in Chapter 3, the empirical models were established as follows:

Models (4.2)-(4.4) were established to examine the main effect of family involvement (FOI, FMI, and FGI) on enterprise technological innovation (INNO):

$$\boldsymbol{INNO = \alpha + a_1 FOI + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \tag{4.2}$$

$$\boldsymbol{INNO = \alpha + a_2 FMI + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \tag{4.3}$$

$$\boldsymbol{INNO = \alpha + a_3 FGI + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \tag{4.4}$$

Models (4.5)-(4.7) were established to test the moderating effect of top management team stability (TSI) on the main effect:

$$\boldsymbol{INNO = \alpha + a_4 FOI + b_1 TSI + c_1 (FOI \times TSI) + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \tag{4.5}$$

$$\boldsymbol{INNO = \alpha + a_5 FMI + b_2 TSI + c_2 (FMI \times TSI) + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \tag{4.6}$$

$$\boldsymbol{INNO = \alpha + a_6 FCI + b_3 TSI + c_3 (FGI \times TSI) + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \tag{4.7}$$

Models (4.8)-(4.10) were established to test the moderating effect of formal institutions (INE) on the main effect:

$$\boldsymbol{INNO = \alpha + a_7 FOI + b_4 INE + c_4 (FOI \times INE) + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \tag{4.8}$$

$$\boldsymbol{INNO = \alpha + a_8 FMI + b_5 INE + c_5 (FMI \times INE) + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \tag{4.9}$$

$$INNO = \alpha + a_9 FGI + b_6 INE + c_6(FGI \times INE) + \sum_{i=1}^{9} \beta_i Control_i + Year + Industry + \varepsilon \quad (4.10)$$

if a_1 in model (4.2) is significantly positive, the hypothesis H1 is supported;

if a_2 in model (4.3) is significantly positive, the hypothesis H2 is supported;

if a_3 in model (4.4) is significantly negative, the hypothesis H3 is supported;

if a_4 in model (4.5) is significantly negative, the hypothesis H1-1 is supported;

if a_5 in model (4.6) is significantly negative, the hypothesis H2-1 is supported;

if a_6 in model (4.7) is significantly positive, the hypothesis H3-1 is supported;

if a_7 in model (4.8) is significantly positive, the hypothesis H1-2 is supported;

if a_8 in model (4.9) is significantly positive, the hypothesis H2-2 is supported;

if a_9 in model (4.10) is significantly negative, the hypothesis H3-2 is supported.

4.2.3 Descriptive statistics and correlation analysis

Table 4.2 shows the descriptive statistics of all relevant variables in this study, including the mean value, variance, minimum value, maximum value, and sample size of each variable based on the data from 2015 to 2019.

Table 4.2 Descriptive statistics

Variables	N	Mean	Min	Max	SD
INNO	1,460	0.0448	0.000605	0.173	0.0309
FOI	1,460	0.423	0.0978	0.762	0.152
FMI	1,460	0.617	0	1	0.486
FGI	1,460	0.252	0	0.556	0.113
INE	1,460	9.115	0.806	11.11	1.495
TSI	1,460	0.898	0.615	1.147	0.0980
Size	1,460	22.04	20.05	25.05	0.956
Lev	1,460	0.358	0.0539	0.735	0.169
Dua	1,460	0.421	0	1	0.494
Board	1,460	2.073	1.609	2.485	0.177
Idratio	1,460	0.379	0.333	0.571	0.0531
ROE	1,460	0.0703	-0.430	0.293	0.0963
Grow	1,460	0.161	-0.372	1.590	0.294
Slack	1,460	0.202	0.0338	0.641	0.129
Age	1,460	7.911	2	27	3.894

During the observation period, the mean value of enterprise technological innovation (INNO) was 4.48%, indicating that the R&D investment of family businesses only accounted for a small percentage of the enterprise's operating income. Generally speaking, an enterprise's R&D intensity should reach 2% in order to survive and 5% to be competitive. Therefore, the results indicate that the innovation level of family businesses needs to be improved urgently. In

addition, there is a large gap between the maximum of INNO (17.3%) and the minimum (0.06%), which indicates that different family businesses show a great variation in innovation.

The mean value of family ownership involvement (FOI) was 42.3%, which shows that the "family" nature of Chinese manufacturing family business is remarkable, with the family holding a strong control of the business. The mean value of family management involvement (FMI) was 61.7%, which means, the CEO position in Chinese manufacturing family business is mainly occupied by family members. The mean value of family governance involvement (FGI) was 0.252, the minimum value was 0, and the maximum value was 0.556, indicating that in these listed manufacturing family businesses, not all members of the board of directors are family members, but family members still occupy a certain proportion.

The mean value of top management team stability (TSI) was 89.8%, indicating that the top management team in family businesses in the manufacturing industry has high stability. The mean value of formal institutions (INE) was 9.115, indicating that family businesses are more distributed in regions with mature markets.

In order to preliminarily test the proposed hypotheses, we performed correlation analysis on the variables of each model to preliminarily understand the correlation between each variable. The variables were firstly classified by correlation using Stata 15.0, and then, the multicollinearity among variables was further tested by variance inflation factor (VIF).

Table 4.3 presents the correlation analysis results of the relevant variables in this study.

Table 4.3 Pearson's correlation analysis of variables

	INNO	FOI	FMI	FGI	INE	TSI	Size
INNO	1						
FOI	0.101***	1					
FMI	0.082***	0.126***	1				
FGI	-0.049*	0.144***	0.338***	1			
INE	-0.053**	0.00800	0.0300	-0.0220	1		
TSI	-0.0170	-0.085***	-0.00100	0.074***	0.044*	1	
Size	-0.179***	-0.165***	-0.097***	-0.127***	0.045*	0.087***	1
Lev	-0.218***	-0.152***	0	-0.094***	0.056**	0.00100	0.523***
Dua	0.158***	0.141***	0.555***	-0.0200	0.059**	-0.060**	-0.081***
Board	-0.087***	-0.178***	-0.083***	-0.106***	-0.00800	0.145***	0.171***
Idratio	0.062**	0.177***	0.074***	-0.0380	-0.0270	-0.113***	-0.066**
ROE	-0.084***	0.0210	-0.093***	-0.062**	0.049*	0.104***	0.204***
Grow	0.00900	0.0230	0.0280	0.0100	0.0220	0.0280	0.082***
Slack	0.411***	0.082***	0.049*	0.0100	-0.229***	-0.066**	-0.146***
Age	-0.056**	-0.362***	-0.102***	-0.172***	0.0230	0.00500	0.358***

	Lev	Dua	Board	Idratio	ROE	Grow	Slack
Lev	1						
Dua	0.0300	1					
Board	-0.00600	-0.226***	1				
Idratio	0.0130	0.229***	-0.633***	1			
ROE	-0.110***	-0.0240	0.087***	0.00200	1		
Grow	0.061**	0.067**	-0.00600	0.00600	0.336***	1	
Slack	-0.110***	0.056**	-0.092***	0.119***	-0.199***	-0.056**	1
Age	0.215***	-0.097***	0.080***	-0.0250	-0.0310	-0.117***	-0.0240

	Age
Age	1

Note: ***p<0.01, **p<0.05, *p<0.1

As can be seen from Table 4.3, the correlation coefficient between family ownership involvement (FOI) and enterprise technological innovation (INNO) was 0.101, showing significance at the 0.01 level. In addition, to determine whether there is a linear or nonlinear relationship between family ownership involvement (FOI) and enterprise technological innovation (INNO), we preliminarily examined the fit between family ownership involvement (FOI) and enterprise technological innovation (INNO). The fitting graph in Figure 4.1 shows a straight line with a slope > 0. This indicates that there is a linear relationship between family ownership involvement (FOI) and enterprise technological innovation (INNO), and with the increase of family ownership involvement (FOI) level, the level of enterprise technological innovation (INNO) also increases. Therefore, based on the above-presented results, H1 was supported. That is, when other conditions are controlled, family ownership involvement (FOI) is positively associated with enterprise technological innovation (INNO).

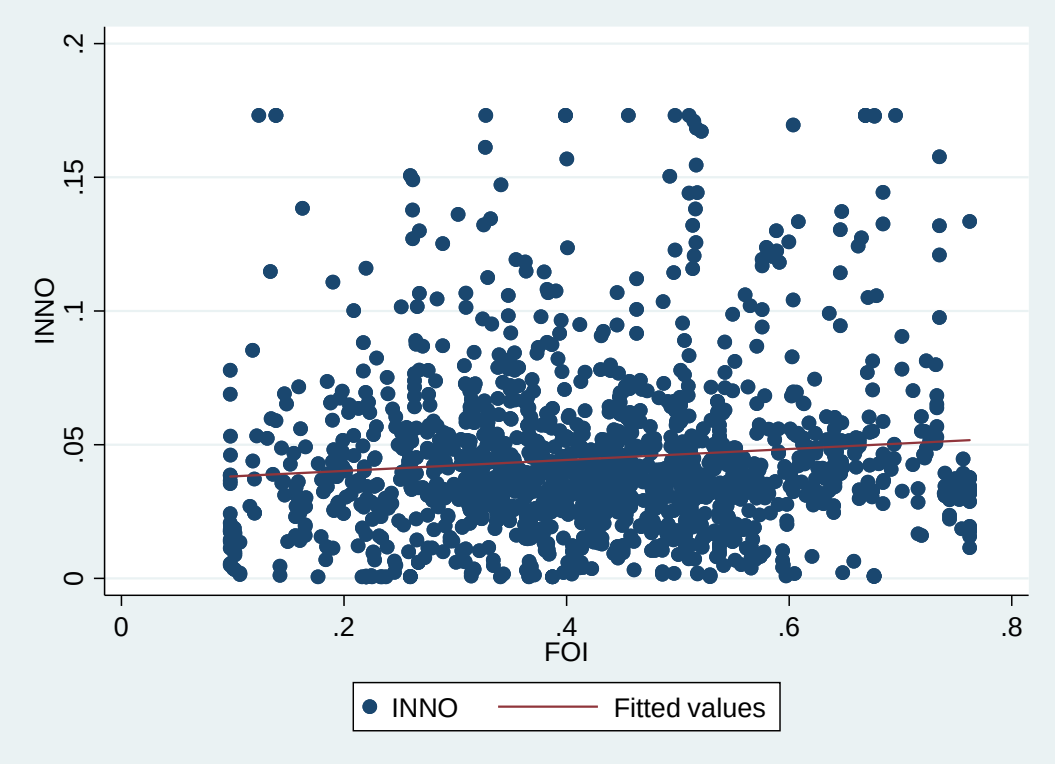


Figure 4.1 Fitting graph for FOI and INNO

The correlation coefficient between family management involvement (FMI) and enterprise technological innovation (INNO) was 0.082 and showed significance at the level of 0.01, which preliminarily supports H2, that is, when other conditions are controlled, family management involvement (FMI) is positively associated with enterprise technological innovation (INNO).

Since it is necessary to test the influence of the product of the explanatory variable and the moderator on the explained variable when considering the moderating effect, regression

analysis would be needed to further examine the moderating effect of top management team stability (TSI) and formal institutions (INE) on the relationship between family involvement and enterprise technological innovation, respectively.

In Table 4.3, no correlation coefficient was found to be excessively high. The results of VIF test are can be found in Table 4.4.

Table 4.4 VIF of the variables

Variable	VIF	1/VIF
INE	1.070	0.937
TSI	1.050	0.950
FMI	1.790	0.558
FOI	1.230	0.811
FGI	1.320	0.758
Size	1.750	0.571
Lev	1.550	0.646
Dua	1.700	0.589
Board	1.840	0.544
Idratio	1.770	0.566
ROE	1.350	0.741
Grow	1.170	0.854
Slack	1.140	0.878
Age	1.350	0.743
	Mean VIF 1.430	

The mean value of the variables' VIF was 1.43, the maximum value was 1.84, and the minimum value was 1.03, all below 2, indicating that there was no significant multicollinearity between the variables. Thus, the data were suitable for subsequent multiple regression analyses.

4.3 Empirical analysis and hypothesis tests

Since the data used in this study is balanced panel data, there may be problems such as heteroscedasticity, serial correlation, and cross-sectional correlation, and the standard error will be underestimated by using the usual panel data estimation method, resulting in biased model estimation results. Considering that the standard error obtained using Driscol-Kraay standard error estimation is unbiased, consistent, and valid (Driscoll & Kraay, 1998), we adopted this method in the subsequent panel data model estimation in this study.

4.3.1 Analysis of the main effects

In this section, we aim to test the main effect, that is, whether family ownership involvement (FOI) and family management involvement (FMI) are significantly positively associated with enterprise technological innovation (INNO), and whether family governance involvement (FGI) is significantly negatively associated with enterprise technological innovation (INNO),

corresponding to the empirical models in (4.2)-(4.4) mentioned above (and repeated below):

$$\boldsymbol{INNO = \alpha + a_1 FOI + \sum_{i=1}^{9} \beta_i Control_i + Year + Industry + \varepsilon} \quad (4.2)$$

$$\boldsymbol{INNO = \alpha + a_2 FMI + \sum_{i=1}^{9} \beta_i Control_i + Year + Industry + \varepsilon} \quad (4.3)$$

$$\boldsymbol{INNO = \alpha + a_3 FGI + \sum_{i=1}^{9} \beta_i Control_i + Year + Industry + \varepsilon} \quad (4.4)$$

if a_1 in model (4.2) is significantly positive, the hypothesis H1 is supported;

if a_2 in model (4.3) is significantly positive, the hypothesis H2 is supported;

if a_3 in model (4.4) is significantly negative, the hypothesis H3 is supported.

In Table 4.5 below, column (1) represents a regression model containing only control variables and the explained variable. From column (1), it can be found that there was a significant positive relationship between enterprise size (Size) and enterprise technological innovation (INNO), which indicates that with the expansion of enterprise scale, the technological innovation level of the enterprise will improve. Financial leverage (Lev) was significantly negatively related to enterprise technological innovation (INNO), suggesting that as financial leverage increases, the enterprise's technological innovation level will decrease. Moreover, there was a significant positive relationship between Dua and enterprise technological innovation (INNO), which suggests that CEO duality (DUA) is conducive to the improvement of enterprise technological innovation level. Enterprises' growth (GROW) was significantly positively related to technological innovation (INNO), showing that the family businesses with higher growth tend to pay more attention to technological innovation activities. There was a significant positive relationship between resource slack (Slack) and enterprise technological innovation (INNO). That means, abundant resources can alleviate the external financing constraints faced by family businesses in the process of technological innovation. The years on the market (Age) was significantly negatively associated with technological innovation (INNO), which implies that with fewer years on the market, the enterprises tend to show a higher level of risk tolerance, making them more likely to actively carry out innovation activities. In addition, the board size (Board), independent directors ratio (Idratio), and return on equity (ROE) showed no significant correlation with enterprise technological innovation (INNO).

Table 4.5 Regression analysis of the main effects

	(1)	(2) H1	(3) H2	(4) H3
FOI		.001*		
		(.005)		
FMI			.001**	
			(.002)	
FGI				-.006***
				(.006)
Size	.003***	.003***	.003***	.003***
	(.001)	(.001)	(.001)	(.001)
Lev	-.037***	-.037***	-.037***	-.037***
	(.005)	(.005)	(.005)	(.005)
Dua	.005***	.005***	.006***	.005***
	(.001)	(.001)	(.002)	(.001)
Board	-.004	-.004	-.004	-.005
	(.005)	(.005)	(.005)	(.005)
Idratio	-.006	-.006	-.006	-.008
	(.015)	(.015)	(.015)	(.015)
ROE	-.007	-.007	-.007	-.007
	(.007)	(.008)	(.008)	(.007)
Grow	.004*	.004*	.004*	.004*
	(.002)	(.002)	(.002)	(.002)
Slack	.117***	.117***	.117***	.117***
	(.006)	(.006)	(.006)	(.006)
Age	-.001***	-.001***	-.001***	-.001***
	(.002)	(.002)	(.002)	(.002)
Year	controlled	controlled	controlled	controlled
Sub_industry	controlled	controlled	controlled	controlled
_cons	-.056**	-.056**	-.05**	-.051**
	(.025)	(.025)	(.025)	(.025)
Observations	1460	1460	1460	1460
R-squared	.463	.463	.463	.463

Note: Standard errors are in parentheses. *** p<.01, ** p<.05, * p<.1

The model of column (2) includes all the variables of column (1) plus the explanatory variable family ownership involvement (FOI), with the purpose of testing whether H1 is supported. According to the correlation coefficient in column (2), there was a positive relationship between family ownership involvement (FOI) and enterprise technological innovation (INNO), which was significant at the 10% level, indicating that with the increase in family ownership involvement (FOI) level, the level of enterprise technological innovation (INNO) will be improved. Specifically, with a higher level of family ownership involvement, family businesses tend to pay more attention to the protection of extended socioemotional wealth and their long-term development orientation. To achieve the goal of "sustaining the family business", they are more inclined to carry out technological innovation activities. Hence H1 was supported.

The model of column (3) includes the explanatory variable family management involvement (FMI) on the basis of column (1), with the purpose of testing whether H2 is

supported. It can be seen from the correlation coefficient in column (3) that family management involvement (FMI) and enterprise technological innovation (INNO) were positively related to each other, showing significance at the 5% level, which indicates that as family management involvement (FMI) level increases, the level of enterprise technological innovation (INNO) will be improved. Specifically, when a family member serves as a CEO, restricted socioemotional wealth is naturally protected, and family CEOs tend to actively carry out technological innovation activities for the purpose of protecting extended socioemotional wealth and promoting the long-term development of the enterprise, thus supporting H2.

The model of column (4) includes the explanatory variable family governance involvement (FGI) on the basis of column (1), with the purpose of testing whether H3 is supported. From the correlation coefficient in column (4), it can be seen that there was a negative relationship between family governance involvement (FGI) and enterprise technological innovation (INNO), which showed significance at the 1% level, indicating that the higher the level of family governance involvement (FGI), the lower the enterprise's technological innovation (INNO) level. Specifically, more family involvement in governance means more family members can influence the business objectives and decision-makings. To prevent the socioemotional wealth of the family business from being infringed, they are more inclined to favor conservative decisions, thus reducing investments in technological innovation. Therefore, H3 was supported.

In summary, the results supported H1, H2 and H3 proposed in this study.

4.3.2 Analysis of the moderating effect

As shown in Figure 4.2, if the relationship between the dependent variable Y and the independent variable X (the magnitude and direction of the regression slope) changes with the change of the third variable Z, then Z is said to play a moderating role between X and Y, and Z is called the moderate variable (or the moderator). In this section, we examine the moderating effect of top management team stability (TSI) and formal institutions (INE), respectively.

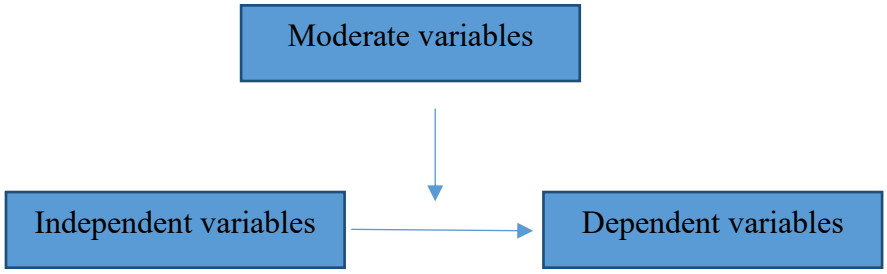


Figure 4.2 Analysis model

Models (4.5)-(4.7) were established to test the moderating effect of TSI on the main effect, as mentioned above (and repeated below):

$$INNO = \alpha + a_4 FOI + b_1 TSI + c_1(FOI \times TSI) + \sum_{i=1}^{9} \beta_i Control_i + Year + Industry + \varepsilon \quad (4.5)$$

$$INNO = \alpha + a_5 FMI + b_2 TSI + c_2(FMI \times TSI) + \sum_{i=1}^{9} \beta_i Control_i + Year + Industry + \varepsilon \quad (4.6)$$

$$INNO = \alpha + a_6 FCI + b_3 TSI + c_3(FGI \times TSI) + \sum_{i=1}^{9} \beta_i Control_i + Year + Industry + \varepsilon \quad (4.7)$$

if a_4 in model (4.5) is significantly negative, the hypothesis H1-1 is supported;

if a_5 in model (4.6) is significantly negative, the hypothesis H2-1 is supported;

if a_6 in model (4.7) is significantly positive, the hypothesis H3-1 is supported;

Table 4.6 presents the regression analysis results regarding the moderating effect of top management team stability (TSI). The model of column (1) aims to test H1-1. From the correlation coefficient, it can be seen that FOI×TSI, the cross-product term between family ownership involvement (FOI) and top management team stability (TSI), was negatively associated with enterprise technological innovation (INNO), showing significance at the 10% level. This result indicates that top management team stability (TSI) weakened the positive relationship between family ownership involvement (FOI) and enterprise technological innovation (INNO). That means, when the top management team is stable, family businesses with a high proportion of family ownership are likely to be more conservative in business decision-making. At the same time, the high stability of the top management team may lead to agency problems within the family business, which will reduce the decision-making efficiency of the enterprise, having an adverse impact on the technological innovation decision-making of the enterprise, resulting in the reduced technological innovation. Therefore, H1-1 was supported.

Table 4.6 Regression analysis of TSI's moderating effect

	(1) H1-1	**(2) H2-1**	**(3) H3-1**
TSI	.031*	-.009*	.004**
	(.019)	(.01)	(.015)
FOI	.047**		
	(.038)		
FOI×TSI	-.05*		
	(.042)		
FMI		.002**	
		(.012)	

FMI×TSI		-.001	
		(.013)	
FGI			-.029***
			(.051)
FGI×TSI			.025**
			(.057)
Size	.003***	.003***	.003***
	(.001)	(.001)	(.001)
Lev	-.036***	-.037***	-.037***
	(.005)	(.005)	(.005)
Dua	.005***	.006***	.005***
	(.001)	(.002)	(.001)
Board	-.005	-.005	-.006
	(.005)	(.005)	(.005)
Idratio	-.007	-.005	-.007
	(.015)	(.015)	(.015)
ROE	-.008	-.008	-.008
	(.008)	(.008)	(.008)
Grow	.004*	.004*	.004*
	(.002)	(.002)	(.002)
Slack	.117***	.117***	.117***
	(.006)	(.006)	(.006)
Age	-.001***	-.001***	-.001***
	(.002)	(.002)	(.002)
Sub_industry	Controlled	Controlled	Controlled
Year	Controlled	Controlled	Controlled
_cons	-.082***	-.055**	-.051*
	(.03)	(.026)	(.029)
Observations	1460	1460	1460
R-squared	.464	.464	.464

Note: Standard errors are in parentheses. *** p<.01, ** p<.05, * p<.1

The model of column (2) in Table 4.6 tests whether H2-1 is supported. It can be seen that the correlation coefficient of FMI×TSI, i.e., the cross-product term of family management involvement (FMI) and the of top management team stability (TSI), was negative. However, there was no significant correlation between these two variables. The results indicate that top management team stability (TSI) did not significantly affect the positive relationship between family management involvement (FMI) and enterprise technological innovation (INNO), and thus, H2-1 was not supported.

That may be due to several possible reasons: 1) although the family CEO, as the executor of enterprise decisions, is greatly influenced by the top management team, the development of innovation activities requires the support of sustained and stable policies, on which, the stability of the top management team does not have much influence; 2) as a member of the top management team, family CEOs are familiar with the decision-making process of the enterprise and tend to proactively make dynamic adjustments in executing innovation decisions and developing innovation activities, which will not be significantly affected by the change of the top management team.

The model of column (3) in Table 4.6 aims to test whether H3-1 is supported. From the correlation coefficient, it can be seen that FGI×TSI, i.e., the cross-product term of family governance involvement (FGI) and top management team stability (TSI), was positively associated with enterprise technological innovation (INNO), showing significance at the 5% level. This indicates that top management team stability (TSI) accentuated the negative relationship between family governance involvement (FGI) and enterprise technological innovation (INNO). When the top management team is highly stable, the family members are more able to influence business orientation and decision-making. To prevent the socioemotional wealth of the family business from being infringed, family board members tend to favor conservative strategies in enterprise strategic decision-making and avoid innovation activities with high risks, thus constraining the enterprise's investments in technological innovation. Hence, H3-1 was supported.

Models (4.8)-(4.10) were established to test the moderating effect of formal institutions (INE) on the main effect, as mentioned above (and repeated below):

$$\boldsymbol{INNO = \alpha + a_7 FOI + b_4 INE + c_4(FOI \times INE) + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \quad (4.8)$$

$$\boldsymbol{INNO = \alpha + a_8 FMI + b_5 INE + c_5(FMI \times INE) + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \quad (4.9)$$

$$\boldsymbol{INNO = \alpha + a_9 FGI + b_6 INE + c_6(FGI \times INE) + \sum_{i=1}^{9} \beta_i\, Control_i + Year + Industry + \varepsilon} \quad (4.10)$$

if a_7 in model (4.8) is significantly positive, the hypothesis H1-2 is supported;

if a_8 in model (4.9) is significantly positive, the hypothesis H2-2 is supported;

if a_9 in model (4.10) is significantly negative, the hypothesis H3-2 is supported.

The regression analysis results regarding the moderating effect of INE are shown in Table 4.7 below.

Table 4.7 Regression analysis of INE's moderating effect

	(1) H1-2	**(2) H2-2**	**(3) H3-2**
INE	.004***	.002***	.006***
	(.001)	(.001)	(.001)
FOI	.074***		
	(.022)		
FOI×INE	.008***		

	(.002)		
FMI		.034***	
		(.008)	
FMI×INE		.004***	
		(.001)	
FGI			-.178***
			(.031)
FGI×INE			-.021***
			(.003)
Size	.003***	.002***	.003***
	(.001)	(.001)	(.001)
Lev	-.038***	-.037***	-.036***
	(.005)	(.005)	(.005)
Dua	.006***	.006***	.005***
	(.001)	(.002)	(.001)
Board	-.004	-.005	-.004
	(.005)	(.005)	(.005)
Idratio	-.007	-.004	-.004
	(.015)	(.015)	(.015)
ROE	-.008	-.008	-.009
	(.007)	(.007)	(.007)
Grow	.004*	.005**	.004*
	(.002)	(.002)	(.002)
Slack	.115***	.114***	.117***
	(.007)	(.006)	(.006)
Age	-.001***	-.001***	-.001***
	(.002)	(.002)	(.002)
Sub_industry	controlled	Controlled	controlled
Year	controlled	Controlled	controlled
_cons	-.079***	-.065***	-.096***
	(.026)	(.024)	(.026)
Observations	1460	1460	1460
R-squared	.467	.47	.476

Note: Standard errors are in parentheses. *** p<.01, ** p<.05, * p<.1

The model of column (1) in Table 4.7 aims to test whether H1-2 is supported. From the correlation coefficient, it can be found that FOI×INE, i.e., the cross-product of family ownership involvement (FOI) and formal institutions (INE), was positively associated with enterprise technological innovation (INNO), showing significance at the 1% level. This indicates that formal institutions (INE) accentuated the positive relationship between family ownership involvement (FOI) and enterprise technological innovation (INNO). That means, formal institutions can significantly affect the innovation decisions of family businesses. The development of technological innovation activities requires a large amount of funds and resources. As the internal funds of family businesses are limited, it is difficult to meet the needs of continuous technological innovation by solely relying on internal funds. Running in an environment with adequate formal institutions, enterprises with concentrated family shares can make full use of such favorable external conditions to obtain funds and resources required for technological innovation activities, thus relieving the financial pressure from technological

innovation activities and enabling them to actively carry out technological innovation activities. Therefore, H1-2 was supported.

The model of column (2) in Table 4.7 tests whether H2-2 is supported. From the correlation coefficient, it can be found that FMI×INE, i.e., the cross-product term between family management involvement (FMI) and formal institutions (INE), was positively associated with enterprise technological innovation (INNO), showing significance at the 1% level. This indicates that formal institutions (INE) accentuated the positive correlation between family management involvement (FMI) and enterprise technological innovation (INNO). That means, when faced with a favorable formal institutional environment, family CEOs are more likely to favor technological innovation decisions and strive to improve the technological innovation level of the enterprise so as to strengthen the long-term orientation and realize the goal of "sustaining the family business". Therefore, H2-2 was supported.

The model of column (3) aims to test H3-2. From the correlation coefficient, we can find that FGI×INE, i.e., the cross-product term of family governance involvement (FGI) and formal institutions (INE), was negatively associated with enterprise technological innovation (INNO), showing significance at the 1% level. This indicates that formal institutions (INE) buffered the negative relationship between family governance involvement (FGI) and enterprise technological innovation (INNO). That means, when faced with a favorable formal institutional environment, family board members will be more willing to take innovation risks and tend to focus more on the long-term development of the enterprise, thus reducing their resistance to technological innovation activities. Hence, H3-2 was supported.

4.3 Summary

Building upon the theoretical model and hypotheses of Chapter 3, this chapter presented the sample selection, variable measurement, data collection, and statistical analysis of the empirical analysis. The obtained data was processed using STATA 15.0. We first conducted descriptive statistics and correlation analysis to observe the statistical characteristics and relationships of the variables. Subsequently, multiple regression analysis was employed to test the hypotheses proposed in this study.

The empirical study in this chapter focused on listed family businesses in the manufacturing industry of the Shanghai and Shenzhen stock markets from 2015 to 2019. The selection criteria for the sample enterprises were as follows: (1) the controlling shareholder at the time of listing is a family business; (2) the actual controller of the enterprise can be traced back to a natural

person or a family; (3) this natural person or family has substantial control over the enterprise; (4) at least one family member holds shares/management/control over the enterprise or is the controlling shareholder of the enterprise, other than the actual controlling person; (5) the actual controller is directly or indirectly the enterprises' largest shareholder and holds a controlling stake of 25% or more. Additionally, enterprises meeting any of the following criteria were excluded: (1) enterprises that received ST or *ST from 2015-2019; (2) enterprises with significant missing data; (3) enterprises established after 2015 (as their innovation activities may not be accurately reflected in the data due to their short establishment period). To mitigate the impact of outliers, Winsorization was applied to all continuous variables at the 1st and 99th percentiles. After screening, we eventually obtained balanced panel data of 292 listed family businesses, with a total of 1460 observations over the 5-year period from 2015 to 2019.

Through main effect testing, the related hypotheses proposed in Chapter 3, namely H1, H2, and H3, were supported. Furthermore, the moderating effect analysis revealed that the hypotheses H1-1, H3-1, H1-2, H2-2, H3-2 were supported, while H2-1 was not. More specifically, both family ownership involvement and family management involvement showed a significant positive relationship with enterprise technological innovation. However, family governance involvement was significantly negatively associated with enterprise technological innovation. Top management team stability weakened the positive relationship between family ownership involvement and enterprise technological innovation. Formal institutions accentuated the positive relationship between family ownership involvement and enterprise technological innovation and the positive relationship between family management involvement and enterprise technological innovation. Top management team stability accentuated the negative relationship between family governance involvement and enterprise technological innovation, while formal institutions buffered this negative relationship. However, top management team stability did not significantly weaken the positive relationship between family management involvement and enterprise technological innovation.

[This page is deliberately left blank.]

Chapter 5: Case Study

5.1 About Xinzhi Group

5.1.1 Company profile

Founded in July 1990, Xinzhi Group Co., Ltd. is a listed company (Stock Code: 002664) that has long been committed to the supply of motors and their core parts based on independent innovation, product R&D, and mold development. It is a national high-tech enterprise recognized as one of the top ten enterprises in China's automotive electronics and electrical appliances industry, a green enterprise in Zhejiang Province, and an advanced certified enterprise by the customs. The company mainly engages in the R&D, production, and sales of various motors and their core parts. It provides professional supporting services for many Chinese and global large motor and electrical manufacturers, such as Valeo, Bosch, and Denso, among others. It is the world's largest supplier of stator cores for automobile generators. The company has approximately 3,000 employees and generates annual sales revenue of over 420 million USD.

The company's main products include automotive generator stators and assemblies, automotive micromotor rotors, electric bicycle stators and assemblies, elevator traction machine stators, electric tool motor rotors, VVT (Variable Valve Timing) systems for automobiles, and household appliance motor rotors. These products are primarily applied in the automotive, electric bicycle, household appliance, electric tool, and special equipment industries.

(1) Key drivers of the company's performance

Opportunities from the development of electric bicycle market. In recent years, urbanization and economic growth have led to a significant increase in urban population and motor vehicle numbers globally. Issues such as traffic congestion and environmental pollution have become increasingly prominent. Electric bicycles, due to their cost-effectiveness, energy efficiency, convenience, and ability to alleviate traffic pressure, have gained popularity and received extensive attention and government support worldwide. The industry's long-term prospects are positive. The implementation of new national standards in various regions has dramatically boosted the development of the electric bicycle industry. The transition period

enacted by different regions is mainly focused between 2021 and 2023. After the transition period, all vehicles failing to meet the standards will be prohibited from road use. This means that most existing stock replacement targets should be achieved by 2023, leading to huge opportunities in the market. Additionally, with the global economic recovery and market liberalization, export business will experience improvement and growth, especially in emerging markets such as Southeast Asia and Central and Eastern Europe, providing additional growth opportunities and further enhancing export business.

Opportunities from the household appliance industry. In the household appliance industry, there is a new market demand driven by product upgrades. For durable consumer goods such as household appliances, most consumers tend to use them until the end of their life cycle, avoiding replacement unless necessary. Generally, household appliances have a limited lifespan for safe use, and if they are used beyond this lifespan, it not only reduces their performance but also increases safety risks. Moreover, frequent product iteration and the emergence of high-end and intelligent products will shorten the replacement cycle for consumers, spurring new demand for household appliances and further promoting the development of the industry.

Opportunities from the development of new energy businesses. The *Suggestions of the Central Committee of the Communist Party of China on Formulating the 14th Five-Year Plan for National Economic and Social Development and Long-Term Goals for 2035*, explicitly emphasized the importance of accelerating the green and low-carbon development, advancing the green transformation of critical industries and essential sectors, and reducing carbon emissions intensity. Currently, various industries are conducting research and analyses, seeking to formulate and implement plans around this goal. Developing new energy vehicles is not only a primary focus of industrial transformation and upgrading but also an important strategic measure to address climate change, reduce emissions, and promote green development. Currently, China is implementing a development strategy of "resource conservation and environmental friendliness," and the government has implemented vital policies in support of new energy vehicles. Through the current fiscal support, the government strives to promote energy conservation and emission reduction and accelerate the development of the new energy industry, leading to the new wave of automotive sales. With increased demand and policy support, China's automotive industry has maintained a strong production and sales trend. According to the statistics and analysis by the China Association of Automobile Manufacturers, in 2022, its automobile production and sales reached 27.021 million and 26.864 million vehicles, respectively, with year-on-year growth of 3.4% and 2.1%, continuing the trend from the previous year. Among them, the annual sales of new energy vehicles reached 6.887 million

units, with a market share of 25.6%, an increase of 12.1% compared to the previous year.

(2) Development stage of the industry:

The company belongs to the motor segment industry, primarily following the development trend of the motor industry (with a focus on the automotive sector). Motors are widely used and are needed in almost every sector of the national economy. With continuous economic development, product upgrades, energy efficiency improvements, and the opportunities brought by consumption upgrades, the motor industry has been developing rapidly.

(3) Position of the company within the industry:

The company has been focusing on the motor components industry for over 30 years. It is recognized as a national high-tech enterprise, among the top ten enterprises in the Chinese automotive electronics and electrical industry, a technology hub in Zhejiang Province, a provincial-level R&D center for high-tech enterprises, a management innovation demonstration enterprise in Zhejiang Province, a green enterprise in Zhejiang Province, a demonstration enterprise for innovation transformation in Zhejiang Province, and an advanced certified enterprise for AEO (Authorized Economic Operator) by the customs authority. The company has also been honored with accolades such as the Zhejiang Well-known Brand Product and Zhejiang Well-known Export Brand.

5.1.2 Core competitive advantages

The company is a globally leading supplier of motor spare parts with an extensive customer base in the industry. Through long-term innovative development, the company has accumulated rich product experience and a mature management system. It possesses unique competitive advantages in terms of product features and technical services, forming a solid moat in its core business areas. Its core strengths are mainly reflected in the following aspects:

(1) Stable strategic customer advantage

Due to the high quality requirements for motor spare parts, various international organizations and national or regional industry associations have established standards for the quality control and management of motor spare parts products. Parts suppliers must pass the evaluation of these organizations (i.e., third-party certification) to be selected as potential suppliers by the leading motor manufacturers. After obtaining the third-party certification, the motor spare parts company still needs to go through further evaluation by the motor assembly plant (i.e., second-party accreditation). Only after passing this evaluation can they become part of the motor assembly plant’s procurement system. Second-party certification audits usually focus on specific products. Once suppliers pass the second-party certification, they become

qualified suppliers of that particular specification for this motor assembly plant. Typically, both parties sign long-term, open-ended procurement contracts until the motor assembly plant ceases production or no longer places orders with the supplier. Due to the lengthy cycle, high technical and quality requirements, and significant investments in second-party certification, once a stable supply-demand relationship is established, motor assembly plants generally are unlikely to change suppliers. Xinzhi Group's primary customers are large Chinese and international motor assembly manufacturers and their parts enterprises. They have established long-term partnerships, which helps to consolidate the company's competitive advantages and industry position.

(2) Excellent mold development capabilities and front-end service capabilities

The key to the company's leading production technology lies in the R&D and production of precision stamping molds. The company utilizes advanced precision processing equipment such as imported CNC continuous track coordinate grinders, CNC slow wire cutting machines, and CNC optical curve grinders to ensure the required accuracy in the manufacturing process of the punching slot molds. In the design of shaping molds, the company adopts structures with prestressing, embedded elements, and multi-stage ejection. The working components are made of hard alloy, ensuring the dimensional accuracy and positional tolerance requirements of the stator cores. From the beginning of cooperation with motor assembly part enterprises, the company has invested resources to establish a technical team with solid mold development and manufacturing capabilities. They engage with customers during the product design phase, participate in front-end mold design, and provide mold solutions for new products. Simultaneously, the company manufactures molds in its mold center, which has established the indispensability and irreplaceability of its products among customers, ensuring guaranteed order acquisition and gaining customers' recognition and reliance. The company has vigorously promoted new product development and technological improvement based on customer needs and industry trends, engaging in ongoing research projects.

Additionally, the company has a highly skilled smart manufacturing line development team. They combine the capabilities mentioned above to independently develop production lines that cover and comply with the application and implementation of new energy. These lines are replicable and promotable, effectively guaranteeing the stable progress of the company's new energy business and ensuring the delivery of new energy orders (such as fully automatic production lines for new energy permanent magnet rotor cores, automated production lines for new energy motor multi-layered flat wire stators, and automatic production lines for new energy motor permanent magnet synchronous and AC asynchronous motors).

(3) Rigorous quality assurance system

The quality of components determines the quality of motors, and meeting product quality standards and maintaining stability are essential for specialized component manufacturing companies to win orders. The company possesses advanced equipment such as high-speed punching presses, argon welders, precision CNC coordinate grinders, precision CNC slow wire cutting machines, OK7725 wire cutting machines, ultrasonic cleaning machines, GCF-200 gear feeders, CJ6-1004 slot insulation inserters, high-speed milling machines, optical curve grinders, gantry grinders, tool grinders, internal and external cylindrical grinders, Yasuda coordinate borers, large-scale gantry processing centers, Hermle machining centers, and Roders' 5-axis milling and grinding machines. These are leading devices in the domestic industry, cover the entire process of motor stator and rotor development, production, testing, and inspection, and guarantee machining accuracy, production efficiency, and product quality stability. During product manufacturing, the company arranges quality control processes and procedures based on past production experience and computer-aided simulation. Through repeated testing, it eventually determined the production process flow, effectively improving product quality and reducing defect rates. Stable and excellent product quality is a critical factor in attracting customers, especially large domestic and international customers. At the same time, the company continuously introduces advanced management strategies, establishing complete and adequate systems in standardized production, quality management, metrology, production environment, sales process control, process and tool management, and human resources management. This overall enhancement of process control capability and learning ability ensures high stability and reliability in production. The company has passed the certification of the IATF16949:2016, GB/T45001-2022 IDT ISO45001:2018 standards, GB/T24001-2016/ISO14001:2015 standards, ISO/IEC 27001:2013, and ISO 9001:2015. Its product quality is leading in the industry and has gained unanimous customer recognition.

(4) Distinctive core advantages and strong specialized production capabilities

The company positions its market in the high-end specialized manufacturing of motor spare parts, in which relatively few companies venture. It focuses on producing and manufacturing motor stators and rotors and has accumulated unique technological advantages. The company caters to various clients with different machine design and production requirements, and the multi-disciplinary nature of its products facilitates the exchange and integration of product development technologies, contributing to enhanced technological innovation capabilities. The scale advantage of specialized production helps reduce manufacturing costs. The continuous enrichment, renewal, and upgrading of product portfolio effectively mitigate market risks

associated with single-product reliance while steadily increasing profitability. The accurate market positioning and years of dedicated work in high-end specialized manufacturing of motor spare parts ensure the company's production capabilities and distinctive core advantages.

(5) Regional advantages

The company is located in Taizhou City, Zhejiang Province, one of the regions in eastern China with a cluster of motor and related industries. The upstream and downstream sectors of motor spare parts are concentrated in Taizhou City. The company gives a full play to this regional advantage to achieve a specialized division of labor and improve production efficiency. Additionally, the Eastern China region boasts a developed economy and convenient transportation, providing a favorable environment for the companies' development. In particular, Zhejiang Province has a vibrant private economy, creating a relaxed business environment with strong policy support for the company.

The financial data of Xinzhi Group in the past decade is presented in Table 5.1.

Table 5.1 The financial results of Xinzhi Group from 2010 to 2022 (Unit: 10 thousand RMB)

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Revenue	53,925.81	78,295.26	98,532.00	132,533.76	155,362.51	150,832.49	177,957.18
Operating cost	42,785.92	60,855.48	76,346.09	103,404.89	118,374.87	111,417.57	128,804.58
Gross profit margin	20.66%	22.27%	22.52%	21.98%	23.81%	26.13%	27.62%
Net profit	4,394.93	7,772.73	10,997.53	14,406.93	18,589.07	20,218.92	23,095.78
Total assets	72,071.97	90,037.26	149,781.83	160,505.55	186,415.39	274,151.86	260,601.09
Total liabilities	31,947.06	42,723.09	43,505.14	42,387.67	52,577.87	121,076.89	86,925.71
Debt ratio	44.33%	47.45%	29.05%	26.41%	28.20%	44.16%	33.36%
Net equity	40,124.91	47,314.16	106,276.70	118,117.87	133,837.52	153,074.96	173,675.38
Return on equity	10.95%	16.43%	10.35%	12.20%	13.89%	13.21%	13.30%
Year	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	
Revenue	241,868.16	263,079.68	297,197.01	287,828.77	335,563.74	371,712.37	
Operating cost	186,074.61	200,575.17	225,266.56	234,328.07	289,916.01	351,633.14	
Gross profit margin	23.07%	23.76%	24.20%	18.59%	13.60%	5.40%	
Net profit	26,041.75	25,582.47	30,603.19	31,615.43	20,400.22	21,087.85	
Total assets	349,278.30	344,086.52	424,900.67	539,802.53	669,497.06	778,095.68	
Total liabilities	144,282.35	115,300.32	165,177.46	266,269.45	378,190.14	465,817.96	
Debt ratio	41.31%	33.51%	38.87%	49.33%	56.49%	59.87%	
Net equity	192,822.21	216,263.84	259,723.21	273,533.08	291,306.91	312,277.72	
Return on equity	13.51%	11.83%	11.78%	11.56%	7.00%	6.75%	

Source: Xinzhi Group’s annual report

Based on the collected information from 2010 to 2022, we found that:

(1) The company's development strategy always revolved around its core business, with revenue showing a steady annual growth trend. The total growth was five times that of 2010, with a compound annual growth rate of nearly 50%.

(2) The growth rate of operating costs exceeded that of revenue, mainly due to factors such as the upward fluctuation of raw material prices (e.g., cold-rolled sheet, silicon steel, special steel).

(3) The decrease in gross profit margin is mainly due to rising operating costs and intense competition in the industry.

(4) The net profit growth rate was lower than revenue, mainly due to the declining gross profit margin and increasing expenses. The company had to invest heavily in R&D from 2017 onwards.

(5) Total assets grew more than 9.8 times, while total liabilities increased by 13.6 times. The debt ratio consistently remained below 50%. In 2021, the debt ratio exceeded 50%, mainly due to a 12% increase in short-term borrowings, as the interest rates on large deposits were slightly higher than the discount rates for bills. The company utilized more bill discounting loans in the current period. In 2022, the debt ratio was 59.87, primarily due to a significant increase in accounts payable for materials and equipment.

5.2 Involvement of the Yin Xingman family

5.2.1 Participation of the Yin Xingman family in Xinzhi Group

Mr. Yin Xingman, born in November 1956, is a member of the Communist Party of China and a graduate of the MBA program of Tsinghua University Zhejiang Business School. He founded Xinzhi Group and has been managing and operating the group since 1990. He is also the current controlling shareholder of Xinzhi Group.

Mr. Yin Wei, the eldest son of Mr. Yin Xingman, the controlling shareholder, was born in April 1981. He holds a bachelor's degree in management granted by McGill University in Canada. He has previously served as Assistant General Manager, Supervisor, Deputy General Manager, and General Manager of Xinzhi Limited. He is currently the Chairman of Xinzhi Electric Motor.

Ms. Ye Xiaoqing, the wife of Mr. Yin Xingman, the controlling shareholder, was born in April 1956. In 1990, she co-founded Xinzhi Electric Motor with her husband and has held

positions such as Purchasing Department Manager, Director of the Purchasing Center, and Director of Xinzhi Group. She has retired and no longer holds a position in the company.

Mr. Yin Qiang, the second son of Mr. Yin Xingman, the controlling shareholder, was born in March 1983. He graduated from Brighton University in the United Kingdom with a bachelor's degree. He is currently a company shareholder but does not hold a position.

5.2.2 Family ownership involvement

The company was founded in 1990 and has undergone significant milestones in terms of restructuring, listing, and development. Before the IPO in 2012, Xinzhi Group was in a growth stage in both scale and performance, with relatively stable ownership structure and business operations. Therefore, this study focuses on the period from its restructuring in 2010 (the starting point of IPO preparation) to 2022. The shareholding ratios of related shareholders from 2010 to 2021 are shown in Table 5.2.

Table 5.2 Shareholding ratio of the founder's family from 2010 to 2021

Shareholder name	Shareholding	Shareholding ratio	Relationship
Year 2010			
Xinzhi Industrial	54.27 million	54.27%	The actual controller, Yin Xingman, holds 90% of its shares, while Ye Xiaoqing holds 10%.
Ye Xiaoqing	15 million	15%	Spouse of the actual controller
Chuang Ding Investment	6.7 million	6.7%	Yin Wei, the actual controller's son, holds 100% of its shares.
Yin Qiang	5 million	5%	Son of the actual controller
In total	80.97 million	80.97%	
Year 2012			
Xinzhi Industrial	54.27 million	40.7%	The actual controller, Yin Xingman, holds 90% of its shares, while Ye Xiaoqing holds 10%.
Ye Xiaoqing	15 million	11.25%	Spouse of the actual controller
Chuang Ding Investment	6.7 million	5.02%	Yin Wei, the actual controller's son, holds 100% of its shares.
Yin Qiang	5 million	3.75%	Son of the actual controller
In total	80.97 million	60.72%	
Year 2014			
Xinzhi Industrial	81.405 million	40.7%	The actual controller, Yin Xingman, holds 90% of its shares, while Ye Xiaoqing holds 10%.
Ye Xiaoqing	22.5 million	11.25%	Spouse of the actual controller
Chuang Ding Investment	10.05 million	5.02%	Yin Wei, the actual controller's son, holds 100% of its shares.
Yin Qiang	7.5 million	3.75%	Son of the actual controller
In total	121.455 million	60.72%	
Year 2015			
Xinzhi Industrial	162.81 million	40.7%	The actual controller, Yin Xingman, holds 90% of its shares, while Ye

			Xiaoqing holds 10%.
Ye Xiaoqing	33.75 million	8.44%	Spouse of the actual controller
Chuang Ding Investment	20.1 million	5.02%	Yin Wei, the actual controller's son, holds 100% of its shares.
Yin Qiang	11.25 million	2.81%	Son of the actual controller
In total	227.91 million	56.97%	
Year 2016			
Xinzhi Industrial	102.81 million	25.7%	The actual controller, Yin Xingman, holds 90% of its shares, while Ye Xiaoqing holds 10%.
Yin Xinman	54 million	13.5%	Actual controller
Ye Xiaoqing	39.75 million	9.94%	Spouse of the actual controller
Yin Qiang	11.25 million	2.81%	Son of the actual controller
Yin Wei	10.05 million	2.51%	Son of the actual controller
In total	227.91 million	56.97%	
Year 2017			
Yin Xinman	52.8048 million	13.5%	Actual controller
Ye Xiaoqing	39.75 million	9.94%	Spouse of the actual controller
Yin Qiang	11.25 million	2.81%	Son of the actual controller
Yin Wei	10.05 million	2.51%	Son of the actual controller
Chuang Ding Investment	10.05 million	2.51%	Yin Wei, the actual controller's son, holds 100% of its shares.
In total	227.91 million	30.97%	
Year 2018			
Yin Xinman	44.8048 million	11.2%	Actual controller
Ye Xiaoqing	39.75 million	9.94%	Spouse of the actual controller
Yin Qiang	11.25 million	2.81%	Son of the actual controller
Yinshui longfeng 24th fund	10.79665 million	2.7%	Yin Xinman and Yin Wei hold 100% of its shares.
Chuang Ding Investment	10.05 million	2.51%	Yin Wei, the actual controller's son, holds 100% of its shares.
Yin Wei	8.38995 million	2.1%	Son of the actual controller
In total	227.91 million	31.26%	
Year 2021			
Yin Xinman	43.8048 million	10.85%	Actual controller
Ye Xiaoqing	39.75 million	9.84%	Spouse of the actual controller
Yin Qiang	11.25 million	2.79%	Son of the actual controller
Yinshui longfeng 24th fund	13.89 million	3.44%	Yin Xinman and Yin Wei hold 100% of its shares.
Chuang Ding Investment	10.05 million	2.49%	Yin Wei, the actual controller's son, holds 100% of its shares.
Yin Wei	6.29255 million	1.56%	Son of the actual controller.
In total	227.91 million	30.96%	

Source: Xinzhi Group's annual report

On April 14, 2010, the company underwent a comprehensive restructuring and became a limited liability company. It was listed on the Shenzhen Stock Exchange in March 2012. The details of the capital increase and stock expansion are as follows:

(1) In April 2010, the company underwent a comprehensive restructuring and became a limited liability company with a registered capital of 67 million RMB.

(2) In July 2010, there was a capital increase, and the registered capital increased to 100 million RMB.

(3) In March 2012, the company was listed on the Shenzhen Stock Exchange. As of December 31, 2012, the company's registered capital was 133.34 million RMB, with a market capitalization of 1.74 billion RMB.

(4) In the first half of 2014, the company implemented an equity distribution. Based on the total share capital of 133.34 million shares as of June 30 of that year, additional shares were distributed to shareholders from the capital reserve at a ratio of five shares for every ten shares held. As a result, the registered capital was changed to 200.01 million RMB. As of December 31, 2014, the company's market capitalization was 2.72 billion RMB.

(5) On April 23, 2015, the company implemented an equity distribution plan for 2014, where ten additional shares were issued to each shareholder for every ten shares held, using the capital reserve. As a result, the company's total share capital increased to 400.02 million. In the same year, Ye Xiaoqing and Yin Qiang reduced their holdings by 11.25 million shares and 3.75 million shares, respectively. As of December 31, 2015, the company's market capitalization was 12.536 billion RMB.

(6) As of December 31, 2016, the company's total market capitalization was 10 billion RMB, and the entire share capital remained unchanged at 400.02 million shares. However, there was a change in the shareholding percentages of the Yin family. Through a share transfer agreement, Yin Xingman and Ye Xiaoqing acquired 60 million shares of Xinzhi Industrial and Trading from Xinzhi Group. Yin Wei acquired 10.05 million shares of Xinzhi Investment from Chuandong Investment.

(7) On April 12, 2017, the controlling shareholder, Xinzhi Industrial and Trading, and the controller, Yin Xingman, signed a "Share Transfer Agreement" with Changying Tianqi (Beihang University). According to the agreement, Xinzhi Industrial and Trading transferred 102,810,000 company shares, and Yin Xingman moved 1,195,200 company shares to Changying Tianqi at a transfer price of 23.26 RMB per share. The total transfer price amounted to 2,419,160,952 RMB, with 2,391,360,600 RMB for Xinzhi Industrial and Trading and 27,800,352 RMB for Yin Xingman.

After the transfer, Changying Tianqi (Beihang University) held a 26% stake in Changying Xinzhi and became the company's largest shareholder. According to the company's announcement, the identity of the controlling shareholder was unclear, and the actual controller remained Yin Xingman and his concerted action parties, collectively known as the Yin family. As of December 2017, the company's total market capitalization was 10.756 billion RMB.

(8) As of December 31, 2018, the company had no controlling entity, and the actual controller was the Yin family, with a shareholding proportion of 31.26%. In the following years, the Yin family conducted two internal share transfers, maintaining a shareholding proportion of around 31%. As of December 31, 2020, the company had a total market capitalization of 5.932 billion RMB.

(9) As of December 31, 2021, the company implemented two equity incentive plans. On March 1, 2021 (date of authorization), 38 incentive recipients were granted 3.84 million restricted shares at a price of 6.37 RMB per share. On September 1, 2021 (date of approval), ten incentive recipients were awarded 560,000 restricted shares at a price of 9.27 RMB per share. In total, 4.4 million restricted shares were granted to incentive recipients. Due to reasons such as recipients leaving the company, 540,000 unvested restricted shares were repurchased and canceled. A total of 3.86 million restricted shares (already listed) were granted to the incentive recipients.

The total number of shares of the company increased from 400,020,000 to 403,880,000 shares. The shareholding of the Yin family remained unchanged (internally adjusted), but the shareholding ratio decreased to 30.96%. As of the end of 2021, the company's total market capitalization was 7.94 billion RMB.

Therefore, the shareholding of the Yin family in Xinzhi Group has been subject to changes over time. Initially, when the company first went public, the family held an absolute majority stake (over 50%), granting them complete control. However, once they were eligible to reduce their holdings, family members started selling shares on the stock market to generate cash (Chinese law prohibits the actual controller and related parties from reducing their shareholdings under any circumstances within three years after an initial public offering). Nevertheless, their shareholding remained in the absolute majority, allowing them to maintain control. It wasn't until 2017 that Xinzhi Group introduced strategic investors, who became its largest shareholder. However, the Yin family's combined shareholding remains the largest, making them the ongoing controlling family of the company.

5.2.3 Family governance involvement

When the family is directly involved in the board of directors, they can participate in the company's operational decision-making, which can reduce the agency costs generated by external managers. In implementing high-risk, innovative R&D activities and innovative transformation strategies, the family's involvement in the board of directors can play a relevant role.

The board of directors of Xinzhi Group has undergone continuous changes. Before its listing in 2010, the board consisted of seven members. In 2012, it was expanded to nine members, including six internal directors and three independent directors. Before 2014, the number of family members on the board of directors maintained at three to four. Since 2015, family members have gradually withdrawn from the board. As of 2017, only Yin Xingman's son, Yin Wei, continued to serve as the chairman, while the rest of the members had already exited.

The resumes of the other directors are as follows:

Mr. Ma Qiancheng was born in February 1980. From August 2003 to June 2007, he served as the Sales Department Head and Regional Manager of Beiqi Foton Motor Co., Ltd. From July 2007 to August 2011, he worked as the Manager of the Automotive Research and Consulting Department at Beijing Suorong Management Consulting Co., Ltd. From September 2011 to March 2015, he served at Tsinghua University New Energy Vehicle Engineering Center and was the Executive Deputy General Manager of Beijing Qibaihuatong Technology Co., Ltd. He participated in the establishment of the China Electric Vehicle 100-People Association, a national third-party think tank in the field of electric vehicles, and co-founded China's largest grassroots organization for electric vehicle enthusiasts, the Electric Car People's Association, serving as the Secretary-General. Since March 2015, he has been the Founder and CEO of Sanfu Technology (Beijing) Co., Ltd. Since June 2015, he has been the Director of Changying Xinzhi Technology Co., Ltd.

Mr. Qin Xiangqiu was born in September 1976. He graduated from Huazhong University of Science and Technology with a bachelor's degree. From June 2008 to June 2009, he served as Deputy General Manager and General Manager of Wuhu Weiling Electric Motor Manufacturing Co., Ltd. From July 2009 to April 2012, he served as the General Manager of Household Electric Motor Company. From April to December 2012, he was the Deputy General Manager of Midea Weiling Holdings Company's Business Unit. From February to August 2013, he served as the Assistant General Manager of Xinzhi Electric Motor Co., Ltd. He is currently the Director and General Manager of Changying Xinzhi Technology Co., Ltd.

Mr. Xu Zhenghui was born in December 1983. In February 2007, he joined Xinzhi Electric Motor Co., Ltd. and has held positions such as Workshop Director, Production Vice Director, and Deputy General Manager. He is currently the Director and President of the company, Supervisor of Zhejiang Xinge Refrigeration Equipment Technology Co., Ltd., Executive Director and Manager of Chengdu Xinzhi Technology Co., Ltd., Chairman of Taizhou Liangsu Technology Co., Ltd., Executive Director of Shanghai Xinzhi Industrial Co., Ltd., Executive

Director and Finance Head of Ningde Xinzhi New Energy Technology Co., Ltd., Executive Director and Manager of Xinzhi Electric Motor (Chongqing) Co., Ltd., Executive Director of Shanghai Jinghe Investment Management Co., Ltd., and Executive Director and General Manager of Xinzhi Electric Motor (Changsha) Co., Ltd.

The annual changes in the company's board of directors from 2011 to 2022 are shown in Table 5.3.

Table 5.3 Annual changes in the board of directors from 2011 to 2022

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Director	Yin Xingman	Yin Xingman	Yin Xingman	Yin Xingman	Yin Xingman	Yin Xingman						
Director	Ye Xiaoqin	Ye Xiaoqin	Ye Xiaoqin	Ye Xiaoqin								
Director	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei
Director	Xiang Zhaoxian	Xiang Zhaoxian	Xiang Zhaoxian	Xiang Zhaoxian	Xiang Zhaoxian							
Director		Huang Qin										
Director		Ji Jianxin	Ji Jianxin									
Director			Yin Qiang	Yin Qiang								
Director				Qin Xiangqiu	Qin Xiangqiu	Qin Xiangqiu	Qin Xiangqiu	Qin Xiangqiu	Qin Xiangqiu	Qin Xiangqiu		
Director					Lin Qiang	Lin Qiang						
Director					Ma Qiancheng	Ma Qiancheng	Ma Qiancheng	Ma Qiancheng	Ma Qiancheng	Ma Qiancheng	Ma Qiancheng	Ma Qiancheng
Director						Xu Zhenghui	Xu Zhenghui	Xu Zhenghui	Xu Zhenghui	Xu Zhenghui	Xu Zhenghui	Xu Zhenghui
Director							Zhang Guang					
Director							Yu Deyun	Yu Deyun				
Director									Bai Zhiming	Bai Zhiming	Bai Zhiming	
Director									Fu Junhui	Fu Junhui	Fu Junhui	
Director											Li Haiqiang	Li Haiqiang
Director												Zhou

Director												Sujiao Yu Fan
Independent directors	Chen Changrong	Chen Changrong	Chen Changrong	Chen Changrong	Chen Changrong							
Independent directors	Yang Jing	Yang Jing										
Independent directors	Rao Yulei	Rao Yulei	Rao Yulei	Rao Yulei	Rao Yulei	Rao Yulei	Rao Yulei	Rao Yulei				
Independent directors			Cheng Weihua	Cheng Weihua	Cheng Weihua	Cheng Weihua	Cheng Weihua	Cheng Weihua				
Independent directors						Wang Hongyang	Wang Hongyang	Wang Hongyang	Wang Hongyang	Wang Hongyang	Wang Hongyang	
Independent directors									Chen Yuan	Chen Yuan		
Independent directors									Zhang Yong	Zhang Yong	Zhang Yong	
Independent directors											Zhou Yuejiang	Zhou Yuejiang
Independent directors												Chen Yiming
Independent directors												Mao Meiying

5.2.4 Family management involvement

Mr. Yin Xingman, the founder and actual controller of the listed company Xinzhi Group, served as the Chairman and General Manager of the company for a long time before its listing. His wife, Ye Xiaoqing, has been consistently involved in the company's competitive management, procurement, and financial work. His eldest son, Yin Wei, has been serving as the company's General Manager since 2012 until being replaced by Qin Xiangqiu in 2017. Since 2017, the company has adopted a professional management approach, with the position of General Manager held by experienced managers. However, the company has experienced instances of management instability. The information on the company's management level is summarized as follows.

Mr. Chu Ruiming, born in March 1979, graduated from Dongbei University of Finance and Economics with a bachelor's degree. From December 2004 to April 2006, he worked as a Budget Manager in the Electrical Motors Division of Midea Group. From May 2006 to February 2010, he served as the Assistant Manager of the Finance Department and Financial Manager of a subsidiary in the Electrical Motors Division of Midea Group. From March 2010 to December 2012, he held the position of Senior Manager in the Finance Center of the Eastern China region at Midea Group's Procurement Center. From May to September 2013, he served as the Finance Department Manager of a subsidiary of Xinzhi Electric Motors Co., Ltd. From September 2013 to September 2015, he was the Cost Management Department Manager of the Finance Center at Xinzhi Electric Motors Co., Ltd. Since September 2015, he has been serving as the Chief Financial Officer of Changying Xinzhi Technology Co., Ltd.

Mr. Fu Junhui was born in July 1973. He holds a bachelor's degree in Engineering from Beijing University of Aeronautics and Astronautics and a master's degree in Law from Peking University. From July 1997 to April 2004, he worked in the Student Affairs Department and Armed Forces Department of Beijing University of Aeronautics and Astronautics as a Deputy Director and Lecturer. From May 2004 to April 2008, he served as the Deputy General Manager and Secretary of the Party Committee of the Logistics Group at the Beijing University of Aeronautics and Astronautics. From May 2008 to April 2016, he was the Secretary of the Party Committee of the Unmanned Aerial Vehicle Design and Research Institute at the Beijing University of Aeronautics and Astronautics. Since May 2016, he has been the General Manager of Beijing Beihangtianyu Changying Drone Technology Co., Ltd. and has served as the Deputy Commander of several national key drone models. Since January 2018, he has been a Director of Changying Xinzhi Technology Co., Ltd. Since October 2019, he has been serving as the

Deputy General Manager of Changying Xinzhi Technology Co., Ltd.

Mr. Li Haiqiang, born in September 1977, holds a bachelor's degree from Yanshan University. In September 2000, he began working at Tiantai City Automobile Motor Factory. Since April 2010, he has been responsible for the Sales Center at Changying Xinzhi Technology Co., Ltd.

Mr. Chen Shihai, born in November 1982, holds the qualification certificate of the board secretariat of the Shenzhen Stock Exchange and the independent director qualification certificate. From 2005 to July 2009, he worked at Tiantai City Huangyan Yuantai Industry and Trade Co., Ltd. In July 2009, he joined the Securities Department of Xinzhi Electric Motors. Since August 2011, he has been the representative of the securities affairs of Changying Xinzhi Technology Co., Ltd. Since October 2019, he has been serving as the Deputy General Manager and Board Secretary of Changying Xinzhi Technology Co., Ltd.

The changes in the company's management team from 2011 to 2022 are summarized in Table 5.4.

Table 5.4 Changes in the management team from 2011 to 2022

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
CEO	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Yin Wei	Qin Xiangqiu	Qin Xiangqiu	Qin Xiangqiu	Qin Xiangqiu	Xu Zhenghui	Xu Zhenghui
Vice president	Xiang Zhaoxian	Xiang Zhaoxian	Xiang Zhaoxian	Xiang Zhaoxian	Xiang Zhaoxian							
Vice president	Zhu Bin	Zhu Bin	Zhu Bin	Zhu Bin	Zhu Bin							
Vice president	Li Huifang	Li Huifang	Li Huifang									
Vice president	Shi Yong	Shi Yong										
Vice president	Chen Fazhong	Chen Fazhong										
Vice president			Qin Xiangqiu	Qin Xiangqiu	Qin Xiangqiu	Qin Xiangqiu						
Vice president					Chu Ruimin	Chu Ruimin	Chu Ruimin	Chu Ruimin	Chu Ruimin	Chu Ruimin	Chu Ruimin	Chu Ruimin
Vice president						Yi Shenshen						
Vice president							Dong Zheng					
Vice president							Fu Junhui	Fu Junhui	Fu Junhui	Fu Junhui	Fu Junhui	
Vice president									Xu Zhenghui	Xu Zhenghui		
Vice president									Chen Shihai	Chen Shihai	Chen Shihai	Chen Shihai
Vice president										Li Haiqiang	Li Haiqiang	Li Haiqiang

Source: Xinzhi Group's annual report

5.3 Analysis of Xinzhi Group's R&D

5.3.1 Industry status

Xinzhi Group operates in the cutting edge industries, such as new energy vehicles and electric bicycles, which show prominent development trends. Given Xinzhi's industry position and responsibilities, it requires substantial R&D investment for the company to lead industry development and achieve its goals with its customers.

(1) Development trends and prospects of the new energy vehicle industry

According to the statistics and analysis from the China Association of Automobile Manufacturers, the production and sales of automobiles in 2022 reached 27.021 million and 26.864 million units, respectively, representing a year-on-year growth of 3.4% and 2.1%, continuing the growth trend from the previous year. Passenger vehicles, driven by supporting policies, have significantly contributed to the overall growth. New energy vehicles have experienced explosive growth and entered a new phase of development and expansion, gradually replacing traditional fuel vehicles. Some EU countries have even explicitly set timelines for phasing out fuel vehicles, further promoting the development of the new energy vehicle industry. The prospects for this industry's development are very optimistic, as new energy vehicles are not only environment-friendly but also energy-efficient. The upward market trend for new energy vehicles will continue.

With the progress of global economic and market integration, the position of the automotive parts industry in the automotive industry chain continues to rise. The steady growth of the worldwide automobile manufacturing sector in recent years has driven the rapid development of China's automotive parts industry. This year, with the continuous expansion of the global automotive market and intensified market competition, Chinese automotive parts companies are increasing investments to enhance their capabilities in independent R&D, technological innovation, and overseas market development, leading to enhanced product competitiveness. Given the development trends of technological innovation, the automotive parts industry will continue to evolve towards intelligence, electrification, connectivity, and sharing, with the emergence of new revolutionary technologies such as new materials, intelligent connectivity, big data, and artificial intelligence, as well as new product concepts, new organizational and operational models, and cross-sector business models. Therefore, the automotive parts industry will gradually expand into emerging fields.

In the context of the "carbon peak" and "carbon neutrality" era, supported by national policy and industry technological innovation, Chinese automotive parts companies will gradually improve their technical capabilities and innovation capacities, master core technologies for key components, accelerate import substitution, and shift toward high-quality development. The automotive parts supporting industry also holds vast development potential and market opportunities.

(2) Development trends and prospects of the household appliance industry (Refrigerator and freezer components)

Driven by national energy-saving and environmental protection policies, green and energy-efficient household appliances are increasingly favored by consumers. China's household appliance consumer market is entering simultaneously a golden period and a transformation period. Small household appliance companies are striving towards the "low carbon, energy-saving, and green" development, and the small household appliance industry in China is entering a new development phase. Product upgrades give rise to new market demands: For durable consumer goods like household appliances, most consumers tend to keep using them until the end of their life cycle and do not seek replacement unless necessary. Generally, household appliances have a certain lifespan for safe use. Overuse not only reduces the products' performance but also increases safety hazards. In addition, frequent iterations of household appliance products and the emergence of high-end, intelligent products will shorten the replacement cycle for consumers, thus generating new demands for household appliances and further promoting the development of the industry.

(3) Development trends and prospects of the electric bicycle industry

With the introduction of the "Dual Carbon" goals (i.e., "carbon peak" and "carbon neutrality"), the Chinese government has increased policy support for green transportation on two wheels. China's electric bicycle industry is currently leading the global market in terms of market size. From both an environmental and energy perspective, electric bicycles will undergo significant development in the future, which will greatly impact many industries (positively or negatively), making the electric bicycle industry potentially a new driver of economic growth. In China, electric bicycles have unique market advantages as many major cities face severe traffic problems and excessive automobile exhaust emissions. As a small, medium-speed, and short-distance daily transportation tool, electric bicycles can be a good solution. They have excellent development conditions and broad application prospects in China.

The implementation of the new vehicle-related policies has largely promoted the development of the electric bicycle industry in various regions. The transitional periods enacted

by different regions mainly fall between 2021 and 2023, after which all non-compliant vehicles will be prohibited from road use. Most existing stock replacement targets must be completed by 2023, bringing tremendous opportunities to the entire market. Additionally, with the recovery of the global economy and policy liberalization, the export business will improve and enhance, especially in emerging markets such as Southeast Asia and Central and Eastern Europe, creating incremental space for growth.

5.3.2 Company development strategy

In 2023, leveraging over 30 years of experience in the electric motor components industry, the company was determined to transform and upgrade towards intelligent manufacturing. It continues to strive to become a global first-class electric motor components service provider and upholds the principles of responsibility, pragmatism, and efficiency. The vision is to create high-energy-efficient and lightweight electric motor components, becoming a benchmark in the domestic stamping industry. The company persistently implement the strategic principles of "three optimizations, one stability, and strict control from start to finish."

Based on the foundation of the automotive industry, the company strives to further deepen its layout and investment in relevant businesses, particularly in the field of new energy vehicles. The company seeks to seize new development opportunities, achieve industrial transformation and upgrading, and give full play to its advantages. While consolidating existing customers, the company actively explores new clients, new business opportunities, and new product development. Solid progress is made in the comprehensive deepening of reforms and management capabilities enhancement. Drawing from its experience in traditional industries such as automotive, electric bicycles, elevators, home appliances, and Variable Valve Timing (VVT), the company also seeks the complementary development of the new energy industry. Efforts are made to implement a batch of high-efficiency, more economical, and high-value-added new projects, adding momentum to the company's rapid growth.

Xinzhi actively explores innovative models while considering the company's actual situation. In terms of technology and process, it strives to promote the transformation towards high-performance, lightweight, and low-cost products, fostering its product structure adjustments. At the same time, the company continues to advance the intelligent upgrading and transformation of production lines to achieve the goal of high-quality delivery.

5.3.3 R&D expenditure

Throughout its development, Xinzhi Group has consistently adhered to the development policy of "technology as the king, innovation as the foundation" and made significant investments in R&D. As shown in Table 5.5, Xinzhi's R&D expenditures have continuously increased over the past decade. It has risen from approximately 20 million RMB in 2011 to over 100 million RMB. In 2020, it peaked at around 140 million RMB and slightly decreased to 128 million RMB in 2021. In 2022, the R&D expenditures remained almost in line with the previous year.

Table 5.5 R&D expenditures and growth of Xinzhi Group

	R&D expenditure	Growth rate
2011	￥25,756,139.52	
2012	￥31,106,054.62	20.77%
2013	￥42,492,318.21	36.60%
2014	￥49,142,583.37	15.65%
2015	￥51,938,681.43	5.69%
2016	￥65,165,804.33	25.47%
2017	￥85,785,095.86	31.64%
2018	￥105,452,315.81	22.93%
2019	￥117,359,459.93	11.29%
2020	￥148,058,629.59	26.16%
2021	￥128,674,086.89	-13.09%
2022	￥129,002,439.19	0.26%

Source: Xinzhi Group's annual report

Looking at the graph in Figure 5.1, we can see that the R&D growth rate of Xinzhi Group has fluctuated over the years. The years 2013, 2017, and 2020 witnessed the highest growth rates, while 2015 and 2021 experienced significant declines.

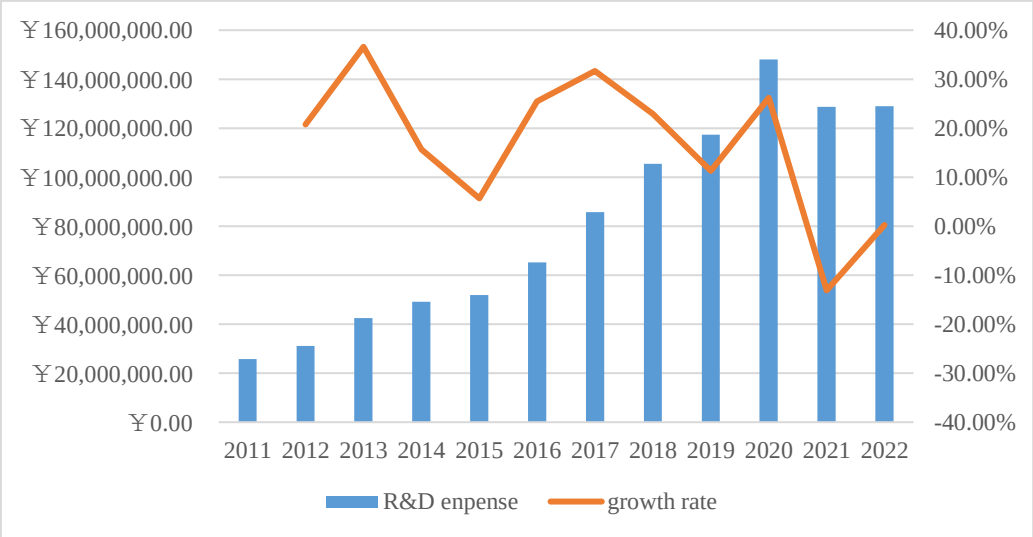


Figure 5.1 The R&D expenditure and growth rate

Source: Xinzhi Group's annual report

Since R&D expenditures also include material consumption, measuring the intensity of

R&D investment cannot solely rely on the absolute amount invested. It is also essential to consider the ratio of R&D expenditures to operating income (see Table 5.6), which represents the relative value change of their R&D investment intensity.

Table 5.6 Proportion of R&D expenditures to operating income and its growth rate

	Operating income	R&D expenditure	Ratio of R&D expenditures to operating income	Growth rate
2011	￥782,952,620.04	￥25,756,139.52	3.29%	
2012	￥985,320,007.79	￥31,106,054.62	3.16%	-4.03%
2013	￥1,325,337,634.18	￥42,492,318.21	3.21%	1.56%
2014	￥1,553,625,144.65	￥49,142,583.37	3.16%	-1.34%
2015	￥1,508,324,941.41	￥51,938,681.43	3.44%	8.86%
2016	￥1,779,571,807.74	￥65,165,804.33	3.66%	6.34%
2017	￥2,418,681,635.21	￥85,785,095.86	3.55%	-3.14%
2018	￥2,630,796,841.15	￥105,452,315.81	4.01%	13.01%
2019	￥2,971,970,129.12	￥117,359,459.93	3.95%	-1.48%
2020	￥2,878,287,718.82	￥148,058,629.59	5.14%	30.26%
2021	￥3,355,637,393.07	￥128,674,086.89	3.83%	-25.46%
2022	￥3,717,123,722.66	￥129,002,439.19	3.47%	-9.49%

Source: Xinzhi Group's annual report

From Table 5.6, it can be observed that the company's operating income has been growing steadily over the past decade, except for the year 2020. The R&D investment has followed a similar trend, and the proportion of R&D expenditures has remained between 3% and 5%. Further, we conducted a statistical analysis on the growth of the ratio of R&D expenditures to operating income. The resulting line graph in Figure 5.2 illustrates the trend of the balance of R&D expenditures on operating income in greater detail. Interestingly, this line graph roughly aligns with the line graph that shows the absolute increase in R&D expenditures in Figure 5.1.

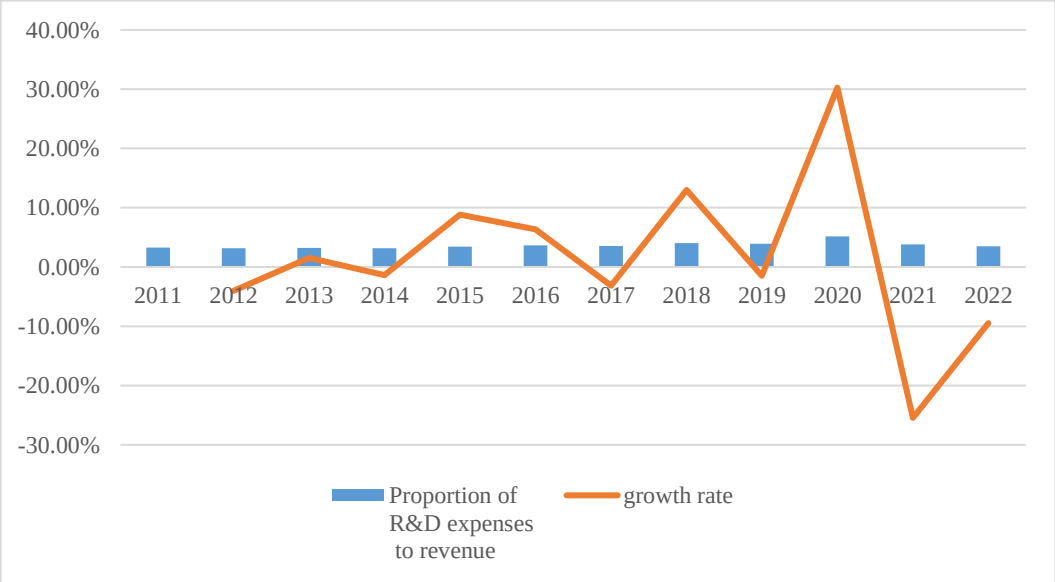


Figure 5.2 Ratio of R&D expenditures to operating income and its growth rate

Source: Xinzhi Group's annual report

5.3.4 R&D personnel in Xinzhi Group

There is a close relationship between the number of R&D personnel and the R&D level of an enterprise, although this relationship may vary in different contexts and industries. Generally speaking, having more R&D personnel may indicate more robust R&D capacity and a higher R&D level for an enterprise. A larger number of R&D personnel may imply that the enterprise has invested more resources and efforts in technological innovation, as more human resources are allocated towards pursuing new technological breakthroughs, developing new products, or improving existing ones. More R&D personnel means the enterprise can engage in more experiments, research, and development activities, thus enhancing the enterprise's R&D capabilities and technical level.

However, the number of R&D personnel is not the sole factor that determines the R&D level of an enterprise. Other factors, such as organizational management of the R&D team, resource allocation, R&D processes, and innovation culture, also significantly impact an enterprise's R&D level. In other words, although the number of R&D personnel is an essential indicator, an enterprise's R&D level also depends on the combined effect of other factors. A comprehensive R&D strategy and good management practices are equally crucial in enhancing an enterprise's R&D.

As in Table 5.7, since 2011, Xinzhi Group has continuously expanded its scale, with the total number of employees increasing from 1,364 to 4,277 in 2022. During this period, the total number of employees went through a plateau period of approximately five to seven years, where the employee count remained relatively stable. However, the number of R&D personnel increased year by year, from 148 to 451, more than tripled. Nevertheless, the situation is different when looking at the proportion of R&D personnel. The balance of R&D personnel in the company increased from 10.85% to the highest point of 16.67% in 2020 before dropping back to 10.54% in 2022, returning to the level of ten years ago. Figure 5.3 depicts the number of employees and number of R&D personnel of Xinzhi Group from 2011 to 2022.

Table 5.7 The number of employees and number of R&D personnel of Xinzhi Group

	Total Employees	Number of R&D	Ratio
2011	1364	148	10.85%
2012	1608	196	12.19%
2013	1842	231	12.54%
2014	2106	253	12.01%
2015	2317	275	11.87%
2016	2505	281	11.22%
2017	2718	328	12.07%
2018	2971	432	14.54%
2019	2976	463	15.56%

2020	2945	491	16.67%
2021	3180	430	13.52%
2022	4277	451	10.54%

Source: Xinzhi Group's annual report

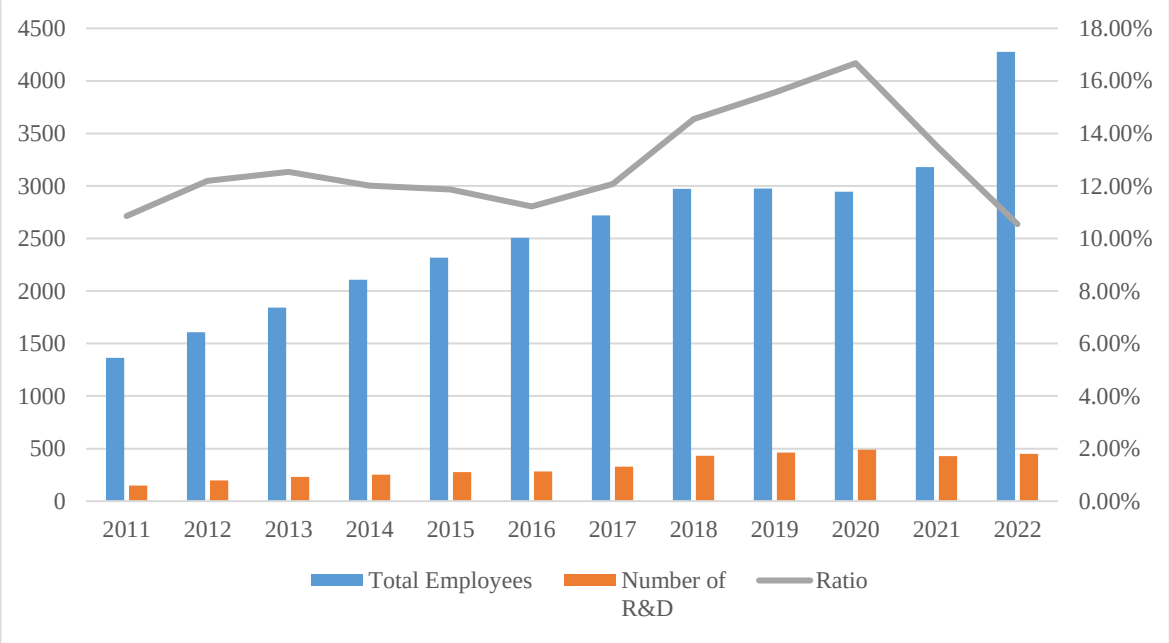


Figure 5.3 The number of employees and number of R&D personnel of Xinzhi Group

Source: Xinzhi Group's annual report

5.3.5 R&D investment trends of Xinzhi Group

As analyzed earlier, Xinzhi Group has invested significant human and material resources in R&D over the past decade, maintaining a relatively high level, with some fluctuations from year to year. However, the trend of R&D expenditures and the number of R&D personnel over the years may not be able to fully reflect the management's thinking and direction regarding R&D investment, as it should take into account various factors such as material prices and the company's operational situation in each year.

If we use the ratio of R&D expenditures to operating income as a reference, the impact of material prices on the absolute amount of R&D expenditures each year can be effectively avoided. By considering the year-on-year changes in this ratio, we can better understand the management's determination towards R&D investment.

Similarly, due to the company's continuous growth and expansion, it is challenging to comprehensively evaluate the company's R&D level based solely on the number of R&D personnel. Therefore, we chose the year-on-year changes in the proportion of R&D personnel to all employees as an indicator better to reflect the management's commitment to R&D investment.

Therefore, we considered the annual growth rates of R&D expenditures as a proportion of operating income and the annual growth rates of the proportion of R&D personnel to all employees as indicators of the company's R&D investment intensity. These two indicators provide a macro perspective to understand the dynamic changes and resource allocation in R&D within the company.

The annual growth rate of R&D expenditures as a proportion of operating income reflects the trend of changes in the company's financial investment in R&D. If this ratio increases each year, it indicates that the company is gradually intensifying its investment in R&D, likely implying an increasing emphasis on R&D activities and greater resource allocation for innovation and technological advancements.

The annual growth rate of the proportion of R&D personnel to all employees reflects the trend of changes in the size of the company's R&D team relative to the entire organization. If this proportion increases yearly, it means the company continually expands its R&D workforce, indicating a commitment to developing the R&D team to support more innovation and technology development.

These two indicators provide a dynamic perspective that helps understand the development trends of a company's R&D capabilities. They can reflect the long-term investment and commitment of the company to R&D activities, as well as the evolution of the scale and effectiveness of the R&D team. When these two indicators are combined, they offer a more comprehensive view to a company's R&D investment, as shown in Table 5.8, which exhibits the annual growth rates of Xinzhi Group's R&D investment.

Table 5.8 Annual growth rates of Xinzhi Group's R&D investment

	Annual growth rates of the proportion of R&D personnel to all employees	**Annual growth rates of the ratio of R&D expenditures as a proportion of operating income**
2011		
2012	12.34%	-4.03%
2013	2.89%	1.56%
2014	-4.21%	-1.34%
2015	-1.20%	8.86%
2016	-5.49%	6.34%
2017	7.58%	-3.14%
2018	20.49%	13.01%
2019	7.00%	-1.48%
2020	7.16%	30.26%
2021	-18.90%	-25.46%
2022	-22.02%	-9.49%

Source: Xinzhi Group's annual report

As illustrated in Figure 5.4, the growth rates of the proportion of R&D personnel to all employees and the ratio of R&D expenditures to operating income followed a similar trend

from 2011 to 2022. In 2012, there was a decrease in the proportion of R&D personnel while the ratio of R&D expenditures to operating income increased. In 2022, the proportion of R&D personnel decreased while the ratio of R&D expenditures to operating income increased. Excluding the year 2020, where the ratio of R&D expenditures significantly surpassed the growth rate of the proportion of R&D personnel, the trends of these two indicators remained aligned. It can be inferred that these two indicators are essentially synchronized and can effectively reflect the management's attitude and direction toward R&D within the company.

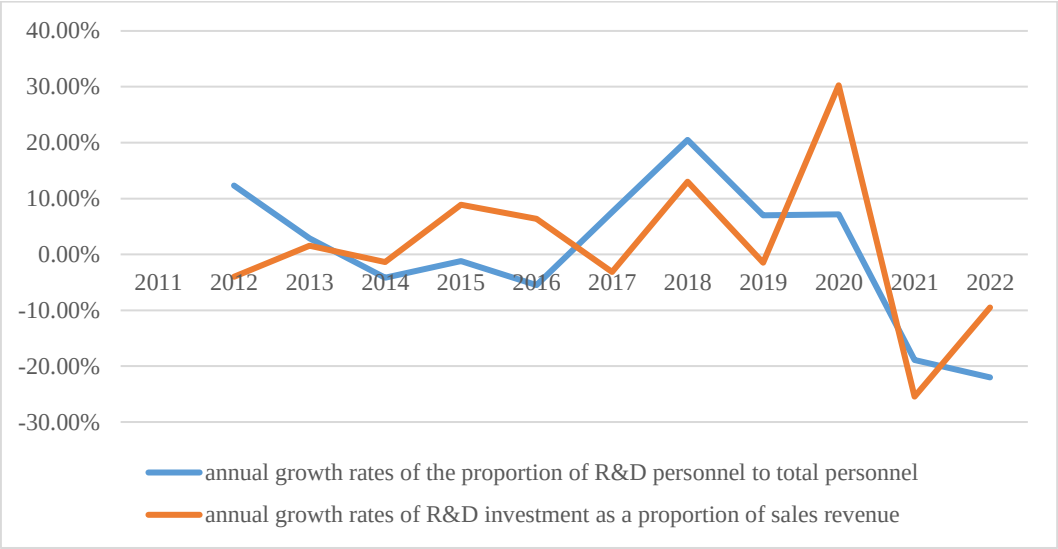


Figure 5.4 Annual growth rates of Xinzhi Group's R&D investment

Source: Xinzhi Group's annual report

5.4 Impact of family involvement on technological innovation in Xinzhi Group

(1) Family ownership involvement and technological innovation

Since the IPO of Xinzhi Group in 2012, the ownership percentage of the founding family declined from 60% in 2012 to 30.97% in 2017. In 2015, the company became eligible for a secondary market reduction of shares under Chinese laws and regulations, indicating a strong desire for share reduction by the founding family during this period. In the same period, there was a decrease in the proportion of R&D personnel to all employees. Furthermore, in 2018, we observed an increase in the family's ownership percentage through market share acquisition, rising from 30.97% to 31.26%. It is apparent in 2018 that both proportion of R&D personnel to all employees and ratio of R&D expenditures to operating income experienced a significant increase. Conversely, in 2021, due to the reduction in stock holdings on the secondary market by the founding family, both indicators showed a substantial decline.

Therefore, we can infer from the case of Xinzhi Group that family ownership involvement is positively associated with R&D investment, and the relationship is relatively strong.

(2) Family management involvement and technological innovation

The year 2017 was a significant year for the company, as it saw a considerable decrease in the ownership of the founding family, as well as a drastic reduction in their representation on the board of directors. Moreover, the position of CEO was for the first time occupied by a non-family member, Mr. Qin Xiangqiu. Mr. Qin, who previously held a management position at Midea Group, one of China's most successful private enterprises, graduated from Huazhong University of Science and Technology. He was also one of the earliest members of Midea Group's professional management team, with extensive experience in corporate management. After serving as Deputy CEO of Xinzhi Group for three years, Mr. Qin gained recognition within the company and was appointed CEO. We can observe a significant decline in both technological innovation indicators for the company in 2016 and 2017.

Therefore, from the case of Xinzhi Group, we can infer a positive relationship between family management involvement and technological innovation, which is relatively strong.

(3) Family governance involvement and technological innovation

Since its IPO, Xinzhi Group has undergone several adjustments within its board of directors. Initially, the eldest son of Mr. Yin, the majority shareholder, served as a board member and CEO. The second son joined the board in 2013 and served as a director for two years. However, in 2015, the majority shareholder's wife and second son resigned from the board, leaving only the founder, Mr. Yin Xingman, and his eldest son, Mr. Yin Wei, in office. In 2017, only Mr. Yin Wei remained on the board, serving as both CEO and Chairman. Since 2017, the family's representation on the board has been reduced to a single position.

From the above analysis, we can deduce that the control by the founding family over the company was relatively contradictory in the first few years after going public. While their shareholding was continuously reducing, the changes within the board of directors indicated a further intent to control the company. Eventually, the family completely exited the board in 2017. By examining the trends in the ratio of R&D expenditures and the proportion of R&D personnel, we can see that from 2013 to 2015, there two indicators were not always synchronized. The decrease in family governance was generally positively associated with innovation and R&D. However, there were two fluctuations during this period. We speculate that the strengthening of family governance undermined R&D innovation. In other words, family governance involvement has a negative relationship with technological innovation of the company.

(4) Influence of top management team stability on the relationship between family involvement and technological innovation

Within the top management team of Xinzhi Group, there were two fundamental changes. The first was in 2017, when the CEO position changed from a family member to a professional manager. The second change occurred in 2021 when Mr. Qin Xiangqiu, a professional manager, was replaced by Mr. Xu Zhenghui as CEO. We can see that the family's shareholding decrease in 2021 had a significantly greater impact on R&D compared to its shareholding increase in 2018. It is worth noting that 2021 was the only year with a change in CEO, making it the least stable year for the top management team. Hence, we can conclude that the instability of the top management team reinforced the impact of ownership involvement, suggesting that top management team stability can weaken the positive relationship between family ownership involvement and technological innovation.

By studying the executive changes in Xinzhi Group, we can clearly notice that the company started transitioning towards professionalization after the change in CEO in 2017. Before that, the management team was relatively stable. In 2013, when four family members became board members, we can observe that the ratio of R&D personnel to all employees followed a downward trend. However, the ratio of R&D expenditures to operating income showed a rare inconsistency. Thus, in 2013, due to the involvement of family governance, there was a short-term negative effect on R&D, and the highest stability in the management team was marked by this period. Therefore, we can infer that the stability of the top management team accentuated the negative relationship between family governance involvement and technological innovation within the company.

Since 2017, Xinzhi Group has handed over the entire company's management to professional teams. As family management involvement has a positive relationship with enterprise technological innovation, we would expect to see a significant decline in R&D investment after this transition. However, in this case, such a decline did not occur. We further discovered that the top management team experienced significant instability after 2017, with one or two executives being changed annually. Given that the management team consisted of only four to six individuals, this represents a considerable adjustment. Additionally, the total number of executives fluctuated annually, ranging from four to six. Consequently, the management team became highly unstable, resulting in significant variations in annual R&D investment. Therefore, we can infer that the top management team stability did not weaken the relationship between family management involvement and technological innovation.

Chapter 6: Conclusions and Prospects

The 20th National Congress Report of the Communist Party of China emphasized that innovation is the primary driving force and that the core position of innovation in the overall modernization of China should be upheld. As the proportion and importance of family businesses in China's national economy continue to increase, family businesses have become the backbone driving technological innovation in China. Moreover, policies for optimizing the environment for private enterprises' development and regulations for protecting private enterprises' property rights and entrepreneurial rights have created a more favorable environment for the development of family businesses, fostering their long-term growth.

Technological innovation is critical for the long-term development of businesses. It represents an investment for future growth, enables enterprises to transform their industrial structure, meet market demands, and enhance their competitiveness within the industry. Furthermore, innovation is a long-term, multi-stage activity that requires significant resources, such as talent and material resources. Therefore, enterprises need to overcome short-term behaviors and plan for long-term investment when engaging in innovation. For family businesses, innovation means exploring new opportunities, integrating existing resources, and cultivating sustainable competitive advantages to create more economic value to the company.

Based on this background, this study searched and reviewed relevant literature and previous studies to understand the relationships and influence mechanisms between family involvement and technological innovation in family businesses, and further developed relevant concepts and definitions. Drawing from theoretical frameworks such as agency theory, socioemotional wealth (SEW) theory, upper echelons theory, and institutional theory, we determined the research methods and outlined the research roadmap. Through empirical analysis of a sample of family businesses in the manufacturing industry listed on the A-share market in China, this study examined the influence of family ownership involvement, family management involvement, and family governance involvement on technological innovation of businesses. Additionally, the study examined the influence of top management team stability and formal institutions on the above-mentioned three main relationships. Meaningful research results were summarized and analyzed. The findings of the empirical research are consistent with the conclusions drawn from the case study of Xinzhi Group, a representative listed private company in China, considering its significant changes in ownership, management, and governance over the past ten years.

This chapter summarizes the main conclusions of this study, discusses its limitations, provides innovative and practical recommendations, and suggests future research directions.

6.1 Main conclusions

(1) Positive and significant relationship between family ownership involvement and technological innovation

There is a positive and significant relationship between family ownership involvement and technological innovation in businesses. Family businesses actively engage in innovation activities due to the need for protecting extended socioemotional wealth and enhancing long-term orientation. Family ownership involvement means that family members are involved in the strategic direction and goals of the business. An increase in family ownership involvement indicates that the family firmly holds control over the business and places more emphasis on its own long-term development in achieving the goals of sustainable development and transgenerational succession. Therefore, family businesses tend to adopt longer investment payback period and strive to enhance their long-term competitive and adaptive capabilities to enhance their level of technological innovation. Additionally, in family businesses, the family members usually possess extensive industry experience and knowledge, which they will pass on to the next generation. With an increase in family ownership involvement, family members are more likely to participate in decision-making and management, leveraging their expertise and experience to drive technological innovation. Closer collaboration and cooperation among family members facilitate the flow of resources and knowledge, providing support for technological innovation. Moreover, family businesses often prioritize long-term development goals rather than maximizing short-term profits. They are more inclined to take a long-term investment perspective, providing continuous financial and resource support for technological innovation in the business. Furthermore, family ownership involvement creates a stable decision-making environment and corporate culture. The close relationships and mutual trust among family members contribute to ensuring decision-making coherence and consistency. This stable decision-making environment and corporate culture provide support and motivation for the continuous allocation of resources and efforts towards technological innovation.

Family businesses typically focus on transgenerational succession, indicating their emphasis on the long-term development of the business. An increase in family ownership involvement makes it more likely for family members to contribute to transgenerational succession strategies and plans, using technological innovation to maintain and enhance the

competitiveness of the business.

In summary, the positive and significant relationship between family ownership involvement and technological innovation in businesses can be attributed to factors such as the protection of socioemotional wealth, the pursuit of sustainable development and transgenerational succession, focus on long-term development, and a stable decision-making environment and corporate culture. These factors jointly drive the active efforts of family businesses in technological innovation and provide support for their long-term competitiveness and sustainable development.

(2) Positive and significant relationship between family management involvement and technological innovation

When family management involvement exists in a family business, in addition to ownership, the family undertakes responsibilities in managing and operating the business and are involved in its strategic decision-making. As the family nature is a fundamental characteristic of family businesses, whether the CEO is a member of the controlling family or an external professional manager is an important factor. CEOs who are family members are referred to as "stewards" of the business, as they have a kinship relationship with the family and therefore prioritize the long-term development of the family business. As family businesses are inclined to protect socioemotional wealth in the decision-making process, they have a higher inclination towards risk avoidance.

Family CEOs focus on protecting both the restricted and extended socioemotional wealth in their managerial decisions. Restricted socioemotional wealth emphasizes family control over the business. Having family members as CEOs ensures that the management authority remains in the hands of the family, thus protecting restricted socioemotional wealth in combination with family ownership. The protection of extended socioemotional wealth is related to the sustained development of the business and guides the CEO's long-term orientation. As technological innovation enhances future performance of the business, family CEOs are likely to actively engage in technological innovation to promote the long-term development of the family business.

Family businesses are a combination of family and business. Family CEOs play a role in connecting family and business, greatly affecting the rise and fall of family businesses. To achieve the goal of "sustaining the family business", family CEOs focus more on protecting extended socioemotional wealth and are inclined to actively drive technological innovation. In addition, as "unified actors" of family businesses, family CEOs are more likely to gain trust and support of other shareholders, reducing the occurrence of conflicts of interest and providing

greater support for technological innovation activities. The existence of kinship relationships further strengthens the connections and trust among family members, facilitating collective efforts in driving technological innovation and the long-term development of the family business.

(3) Negative relationship between family governance involvement and technological innovation

In family businesses, the family's control over ownership grants them power and legitimacy in protecting socioemotional wealth. The family strengthens this protection through the board of directors, in which family members play important roles. However, there are also problems associated with family governance involvement. Family members on the board play significant roles in the operational decision-making and daily management of the family business, representing family interests and giving priority to meeting family goals while avoiding harm to family interests. The higher the percentage of family members in the board of directors, the stronger the family's control. However, a high percentage of family members on the board may lead to a phenomenon of "groupism," where the limited heterogeneity in professional knowledge among family members, due to growing up in the same family background, may restrict the introduction of innovative thinking and fresh perspectives, suppressing investment in technological innovation. Furthermore, family directors may resist the entry of external talents to maintain family control and authority. Such resistance may limit the enterprise's ability to access external talents, resulting in decision-making rigidity and a lack of innovative viewpoints.

Therefore, family governance involvement has a significant impact in family businesses. Family members on the board play a decisive role in business operations and decision-making, and a high percentage of family members in the board of directors may result in low heterogeneity in the professional backgrounds of board members, limit the inflow of innovative thinking, and hinder the entry of external talents, leading to decision-making rigidity.

(4) Moderating effect of top management team stability

In a situation where the top management team has high stability, it is easier for them to reach a consensus on the enterprise's strategic decisions. Although this can improve the efficiency of various business operations, it may also lead to internal agency problems. With a stable top management team, it is more likely for them to form a collective interest group, which can amplify the executives' individual opportunistic motives. This can lower the costs and difficulties of collective breach of contract by the top management team, thereby exacerbating the agency problems within family businesses. Therefore, with a stable top management team,

the agency problems caused by excessive family ownership involvement can be further intensified, which hinders the development of innovative activities.

Family businesses with highly concentrated family ownership tend to exhibit conservative decision-making behaviors if the top management team is highly stable. At the same time, high stability of the top management team may lead to internal agency problems within family businesses and reduce decision-making efficiency, thus negatively affecting the enterprise's technological innovation decisions and weakening its technological innovation capabilities.

However, top management team stability is not directly related to the level of family management involvement. Although the family CEO, as the decision-maker of the enterprise, is largely influenced by the top management team, the continuity and stability of policies are also needed to support innovation activities. In this regard, the stability of the top management team cannot significantly impact the family CEO's execution of innovation decisions. Additionally, as a member of the top management team, the family CEO is familiar with the decision-making process of the enterprise and is likely to proactively make dynamic adjustments during the execution of innovation-related decisions and the development of innovative activities, which is unlikely to be significantly affected by changes in the top management team.

When the top management team is highly stable, family members are more capable of grasping the company's goals and decision-making directions. In order to protect the socioemotional wealth of the family business, family board members tend to choose conservative strategies in corporate strategic decision-making, avoiding high-risk innovative activities, which in turn suppresses the enterprise's investment in technological innovation.

(5) Moderating effect of formal institutions

Through 45 years of reform and opening-up, China has witnessed varying degrees of improvement in formal institutions across different regions, providing a favorable external environment for innovation activities in family businesses. However, due to the ongoing economic transition in China, the development level of local markets varies significantly, which results in notable differences in formal institutions across regions. Well-developed formal institutions in certain regions are associated with higher levels of marketization and reduced influence of non-market factors such as political connections on businesses. This implies easier access to information, lower transaction costs, and smoother acquisition of other resources through market mechanisms. Therefore, in regions with relatively sound formal institutions, relevant funding and resources are more accessible to family businesses, making them more likely to engage in technological innovation activities.

As developing entities in a relatively vulnerable position, family businesses face higher levels of external uncertainty. In regions with adequate formal institutions, family businesses are more likely to receive support and protection from the government. In such scenarios, as the ownership concentration of the family increases, family businesses display a stronger desire to protect their socioemotional wealth. With continuous improvements in formal institutions, the competitive environment becomes more equitable, and the barriers to innovation activities for family businesses gradually decrease. Consequently, family businesses with higher levels of family ownership involvement would be more proactive in engaging in technological innovation activities in order to achieve long-term development goals. The improvement of the formal institutional environment provides family businesses with a favorable external environment for survival and development and better financing conditions for innovation activities.

Family management involvement and governance involvement have a significant impact on technological innovation in enterprises. At the same time, enterprise technological innovation is closely related to the improvement of formal institutions. Family CEOs and the board of directors need to consider both internal and external factors when making decisions regarding technological innovation, especially changes in the external formal institutional environment. Adequate formal institutions can drive businesses to establish effective corporate governance mechanisms that incentivize innovation and reduce external transaction costs, thereby promoting innovation.

Therefore, the impact of family management involvement and governance involvement on enterprises' innovation in may vary depending on the levels of formal institutions in a given region. In situations where formal institutions are inadequate, family businesses often need to incur high costs to obtain the necessary resources for operation. Family CEOs tend to closely monitor changes in the external institutional environment and adjust their business decisions accordingly. In such cases, family businesses may not increase innovation activities to reduce business risks and maintain the authority of the family CEO within the family and the enterprise. With the continuous improvement of formal institutions, the external competitive environment becomes more equitable, and innovation activities can bring greater benefits to enterprises. In regions with well-developed formal institutions, family businesses have easier access to funding and resources and thus are less resistant to innovation activities. This gives family CEOs more decision-making autonomy, leading to a more proactive promotion of innovation activities to enhance the enterprise's technological innovation level. Moreover, with lower financing pressures, boards of directors with high family involvement are more supportive of

innovation activities to achieve their goal of "sustaining the family business".

6.2 Practical implications

China's manufacturing family businesses have undergone decades of rigorous development since the country's reform and opening-up. They have continuously adapted to social and market changes and have achieved outstanding results in their respective fields. Through capital markets, many of these family businesses have become listed companies, showcasing their tremendous internal drive and core competitiveness. Based on an extensive empirical analysis and a case study of Xinzhi Group, a representative family business, we intend to provide recommendations and insights for enterprises seeking to improve their innovation capabilities, achieve transformation and upgrades, and remain competitive. Specifically, we put forward the following measures.

(1) Maintaining confidence in and ownership control over the enterprise. The controlling family can consider increasing equity to maintain a considerable proportion of ownership. This can be achieved through capital injection, acquisitions, mergers, and other methods. Increasing equity allows the family to better maintain its influence within the enterprise, instilling market confidence and demonstrating a positive role in driving innovation, transformation, and upgrades.

(2) Avoiding excessive participation of family members in the board of directors. To ensure continuous innovative development and long-term success and sustainability, the board of directors needs to possess professional knowledge, extensive experience, diverse perspectives, and decision-making abilities. Excessive family involvement in the board of directors may result in a lack of diversity and professionalism, limiting the board's foresight and decision-making capabilities.

(3) Cultivating successors and new-generation leaders within the family. To maintain control over ownership and confidence in sustained development, families should strengthen the training and development of successors. Young family members should be provided with comprehensive training and development opportunities to be equipped with the skills necessary for enterprise management and leadership. Family CEOs can better serve the interests of the family and effectively enhance the development momentum and innovation of the family business.

(4) Maintaining top management team stability for the long-term development of family businesses. Family businesses typically have long-term orientation and aim for

transgenerational succession. A stable top management team enables accumulation of experience, can better understand the core values and business philosophies of the family business, and are more likely to contribute to its transgenerational succession and sustained development. In addition, a stable top management team is conducive to building trust between family members and executives, facilitating their cooperation and decision-making. However, a stable top management team does not mean a lack of dynamics and innovation. Family businesses should maintain an open mindset, continuously introducing external talents and new ideas to adapt to market changes and challenges.

(5) Choosing an environment with more adequate formal institutions for investment and business development. In an environment with more adequate formal institutions, the local regulations and policies related to environmental protection, sustainable development, and social responsibility tend to be stricter and clearer. By complying with these regulations, enterprises can better manage environmental risks and mitigate potential legal and reputational risks. Environmental investment and business development require a long-term perspective and continuous investment. Furthermore, in an environment with a more adequate formal institution, enterprises can access more resources and support, which is conducive to continuous innovation and development and the achievement of long-term sustainability goals.

6.3 Limitations and future research

In this study, drawing upon the concepts and findings of previous relevant research, we explored the relationship between family involvement and technological innovation in Chinese family businesses. We chose listed manufacturing family businesses in China as our search sample for empirical analysis and case study. However, this study is not without limitations:

(1) The definition of family businesses and the selection of samples may have certain limitations. Due to the vast size of China’s economy, different provinces or cities have different time spans of reform and opening-up and are in varied stages of economic development. Consequently, the emergence and development of private enterprises differ across regions. Additionally, China’s manufacturing sector boasts a wide range of industries, making it diverse and complex. Different family businesses may vary significantly in terms of their industries, positions, and resource endowment. Thus, it is challenging to develop a generalized definition of family businesses.

(2) In the case analysis of Xinzhi Group, the limitations of a single case prevent us from studying the moderating role of formal institutions in the company’s development, and thus,

we were unable to obtain relevant research evidence. Therefore, further realities and cases could be studied in the future to enlarge the research scope and extend our understanding.

[This page is deliberately left blank.]

Bibliography

Almeida, H. V., & Wolfenzon, D. (2006). A theory of pyramidal ownership and family business groups. *The Journal of Finance*, *61*(6), 2637-2680.

Anderson, R. C., Mansi, S. A., & Reeb, D. M. (2003). Founding family ownership and the agency cost of debt. *Journal of Financial Economics*, *68*(2), 263-285.

Anderson, R. C., & Reeb, D. M. (2003). Founding-family ownership and firm performance: Evidence from the S&P 500. *The Journal of Finance*, *58*(3), 1301-1328.

Astrachan, J. H., Klein, S. B., & Smyrnios, K. X. (2002). The F-PEC scale of family influence: A proposal for solving the family business definition problem. *Family Business Review*, *15*(1), 45-58.

Bach, L., & Serrano-Velarde, N. (2015). CEO identity and labor contracts: Evidence from CEO transitions. *Journal of Corporate Finance*, *33*, 227-242.

Barnes, L. B., & Hershon, S. A. (1994). Transferring power in the family business. *Family Business Review*, *7*(4), 377-392.

Barnett, T., Long, R. G., & Marler, L. E. (2012). Vision and exchange in intra–family succession: Effects on procedural justice climate among nonfamily managers. *Entrepreneurship Theory and Practice*, *36*(6), 1207-1225.

Barontini, R., & Bozzi, S. (2018). Family firm heterogeneity and CEO compensation in continental Europe. *Journal of Economics and Business*, *97*, 1-18.

Bennedsen, M., Nielsen, K. M., Perez-Gonzalez, F., & Wolfenzon, D. (2007). Inside the family firm: The role of families in succession decisions and performance. *The Quarterly Journal of Economics*, *122*(2), 647-691.

Berle, A., & Means, G. (1932). *The modern cooperation and private property*. MacMillian.

Bird, B., Welsch, H., Astrachan, J. H., & Pistrui, D. (2002). Family business research: The evolution of an academic field. *Family Business Review*, *15*(4), 337-350.

Blumentritt, T., Keyt, A., & Astrachan, J. (2007). Creating an environment for successful nonfamily CEOs: An exploratory study of good principals. *Family Business Review*, *20*, 321-335.

Breton-Miller, I., & Miller, D. (2006). Why do some family businesses out‐compete? Governance, long-term orientations, and sustainable capability. *Entrepreneurship Theory and Practice*, *30*, 731-746.

Breton-Miller, I., Miller, D., & Lester, R. H. (2011). Stewardship or agency? A social embeddedness reconciliation of conduct and performance in public family businesses. *Organization Science*, *22*(3), 704-721.

Broekaert, W., & Andries, P. (2016). Innovation processes in family firms: the relevance of organizational flexibility. *Small Business Economics*, *47*, 771-785.

Busenbark, J. R., Krause, R., Boivie, S., & Graffin, S. D. (2016). Toward a configurational perspective on the CEO: A review and synthesis of the management literature. *Journal of Management*, *42*(1), 234-268.

Cai, D., Luo, J. H., & Tang, G. Y. (2016). 家族成员参与管理、制度环境与技术创新 [Family involvement in management, institutional environment and technical innovation]. *Science Research Management*, *5*(37), 85-93.

Cai, H. B., Li, H. B., Park, A., & Zhou, L. A. (2013). Family ties and organizational design: Evidence from Chinese private firms. *The Review of Economics and Statistics*, *95*(3), 850-867.

Cennamo, C., Berrone, P., Cruz, C., & Gomez-Mejia, L. (2012). Socioemotional wealth and proactive stakeholder engagement: Why family-controlled firms care more about their stakeholders. *Entrepreneurship Theory and Practice*, *36*(6), 1153-1173.

Chami, R. (2001). What is different about family businesses? *IMF Working Papers*, *1*, 1.

Chen, J. L. (2013). 家族控制与民营企业债务融资:促进效应还是阻碍效应? [Family control and debt financing of private enterprises: Promotion effect or block effect?]. *Journal of Finance and Economics*, *7*(39), 27-37.

Cheng, D. Q., Yang, J. X., & Dong, Z. Y. (2013). 家族控制、职业化经营与公司治理效率——来自 CEO 变更的经验证据 [Family control, professional management and corporate governance efficiency: Evidence from CEO turnover in Chinese listed companies]. *Nankai Business Review*, *4*(16), 55-67.

Cheng, L. (2005). 超越钱德勒命题——重新评价《看得见的手》[Beyond Chandler's proposition - Reevaluating the visible hand]. *Journal of Management World*, (05), 160-165.

Cheng, L., & Cheng, H. L. (2014). 家族涉入、社会情感财富与企业慈善捐赠行为——基于全国私营企业调查的实证研究 [The clan involvement, the socio-emotional wealth and the corporate charitable contributions:A case study based on the survey of the private enterprises all over China]. *Journal of Management World*, (08), 90-101+188.

Cheng, L., Wang, M., & Zhu, J. A. (2011). 中国家族企业的现代转型——第六届"创业与家族企业成长"国际研讨会侧记 [The modern transformation of Chinese family businesses: A sidenote of the 6th international symposium on "Entrepreneurship and family business growth"]. *Journal of Management World*, (04), 163-166.

Cheng, S., Xiao, X. X., Yang, Y., & Zou, Z. R. (2014). CEO 权力、战略差异与企业绩效——基于环境动态性的调节效应 [CEO power, strategic deviation and firm performance:moderating effects of environmental dynamics]. *Finance and Trade Research*, *1*(25), 7-16.

Chrisman, J. J., & Chua, J. (2004). Comparing the agency costs of family and non‐family firms: Conceptual issues and exploratory evidence. *Entrepreneurship Theory and Practice*, *28*, 335-354.

Chrisman, J. J., Chua, J. H., Pearson, A. W., & Barnett, T. (2012). Family involvement, family influence, and family–centered non–economic goals in small firms. *Entrepreneurship Theory and Practice*, *36*(2), 267-293.

Chrisman, J. J., Chua, J. H., & Sharma, P. (2005). Trends and directions in the development of a strategic management theory of the family firm. *Entrepreneurship Theory and Practice*, *29*(5), 555-575.

Chrisman, J. J., Chua, J. H., & Zahra, S. A. (2003). Creating wealth in family firms through managing resources: Comments and extensions. *Entrepreneurship Theory and Practice*, *27*(4), 359-365.

Chrisman, J. J., Memili, E., & Misra, K. (2014). Nonfamily managers, family firms, and the winner's curse: The influence of noneconomic goals and bounded rationality. *Entrepreneurship Theory and Practice*, *38*(5), 1-25.

Chrisman, J. J., & Patel, P. C. (2012). Variations in R&D investments of family and nonfamily firms: Behavioral agency and myopic loss aversion perspectives. *Academy of Management Journal*, *55*(4), 976-997.

Chu, X. P. (2000). 家族企业研究:一个具有现代意义的话题 [Family businesses: A topic with modern significance]. *Social Sciences in China Press*, (5), 51-58.

Chu, X. P. (2004). 华人家族企业的界定 [Defining the Chinese family firms]. *Economic Theory and Business Management*, (1), 49-53.

Chua, J. H., Chrisman, J. J., & Bergiel, E. B. (2009). An agency theoretic analysis of the professionalized family firm. *Entrepreneurship Theory and Practice*, *33*(2), 355-372.

Chua, J. H., Chrisman, J. J., & Sharma, P. (1999). Defining the family business by behavior. *Entrepreneurship Theory and Practice*, *23*(4), 19-39.

Chua, J. H., Chrisman, J. J., Steier, L. P., & Rau, S. B. (2012). Sources of heterogeneity in family firms: An introduction. *Entrepreneurship Theory and Practice*, *36*(6), 1103-1113.

Claessens, S., Djankov, S., & Lang, L. H. P. (2000). The separation of ownership and control in East Asian Corporations. *Journal of Financial Economics*, *58*(1), 81-112.

Combs, J. G., Shanine, K. K., Burrows, S., Allen, J. S., & Pounds, T. W. (2020). What do we know about business families? Setting the stage for leveraging family science theories. *Family Business Review*, *33*(1), 38-63.

Crittenden, W., Athanassiou, N., & Kelly, L. (2000). Founder centrality and strategic behavior in the family owned firm. *Entrepreneurship Theory and Practice*, *25*, 27-42.

Crutchley, C. E., Garner, J. L., & Marshall, B. B. (2002). An examination of board stability and the long-term performance of initial public offerings. *Financial Management*, *31*(3), 63-90.

Cucculelli, M., & Marchionne, F. (2012). Market opportunities and the owner identity: Are family firms different? *Journal of Corporate Finance*, *18*(3), 476-495.

Daily, C. M., & Dollinger, M. J. (1992). An empirical examination of ownership structure in family and professionally managed firms. *Family Business Review*, *5*(2), 117-136.

Davis, J. A., & Tagiuri, R. (1989). The influence of life stage on father-son work relationships in family companies. *Family Business Review*, *2*(1), 47-74.

Davis, J. H., Allen, M. R., & Hayes, H. D. (2010). Is blood thicker than water? A study of stewardship perceptions in family business. *Entrepreneurship Theory and Practice*, *34*(6), 1093-1116.

Davis, J. H., Schoorman, F. D., & Donaldson, L. (1997). Toward a stewardship theory of management. *The Academy of Management Review*, *22*(1), 20-47.

Dekker, J., Lybaert, N., Steijvers, T., & Depaire, B. (2015). The effect of family business professionalization as a multidimensional construct on firm performance. *Journal of Small Business Management*, *53*(2), 516-538.

Dekker, J., Lybaert, N., Steijvers, T., Depaire, B., & Mercken, R. (2013). Family firm types based on the professionalization construct. *Family Business Review*, *26*, 81-99.

DeMassis, A., Frattini, F., & Lichtenthaler, U. (2013). Research on technological innovation in family firms: Present debates and future directions. *Family Business Review*, *26*(1), 10-31.

DeMassis, A., Kotlar, J., Chua, J. H., & Chrisman, J. J. (2014). Ability and willingness as sufficiency conditions for family-oriented particularistic behavior: Implications for theory and empirical studies. *Journal of Small Business Management*, *52*(2), 344-364.

DiMaggio, P. (1988). Interest and agency in institutional theory. In L. Zucker (Ed.), *Institutional patterns and culture* (pp. 3-22). Ballinger Publishing Company.

Donckels, R., & Fröhlich, E. (1991). Are family businesses really different? European experiences from STRATOS. *Family Business Review*, *4*(2), 149-160.

Dou, J., Zhang, L., & Wang, N. (2014). 社会情感财富框架的理论溯源与应用前沿追踪——基于家族企业研究视角 [Theoretical origin and application frontier of socioemotional wealth framework: A family firm perspective]. *Foreign Economics & Management*, *12*(36), 64-71.

Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *The Review of Economics and Statistics*, *80*(4), 549-560.

Duran, P., Kammerlander, N., Van Essen, M., & Zellweger, T. (2016). Doing more with less: Innovation input and output in family firms. *The Academy of Management Journal*, *59*(4), 1224-1264.

Dyer, W. G. (1989). Integrating professional management into a family owned business. *Family Business Review*, *2*(3), 221-235.

Dyer, W. G., & Handler, W. (1994). Entrepreneurship and family business: Exploring the

connections. *Entrepreneurship Theory and Practice*, *19*(1), 71-83.
Eddleston, K., Kellermanns, F., & Zellweger, T. (2010). Exploring the entrepreneurial behavior of family firms: Does the stewardship perspective explain differences? *Entrepreneurship Theory and Practice*, *36*, 347-367.
Enos, J. L. (1969). *Evaluation of improvements in petroleum refining technology*. Oxford Institute for Energy Studies.
Faccio, M., & Lang, L. H. P. (2002). The ultimate ownership of western European corporations. *Journal of Financial Economics*, *65*(3), 365-395.
Fama, E. F., & Jensen, M. C. (1983). Agency problems and residual claims. *The Journal of Law & Economics*, *26*(2), 327-349.
Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *The Journal of Law and Economics*, *26*(2), 301-325.
Fan, G., Wang, X., & Ma, G. (2011). 中国市场化进程对经济增长的贡献 [Contribution of marketization to China's economic growth]. *Economic Research Journal*, *9*(46), 4-16.
Fan, L. B., Liu, Y. F., & Yang, J. H. (2016). 家族化管理与企业绩效:规模与家族成员所有权结构的调节效应 [Family management and corporate performance: The moderating effects of firm size and concentration of family ownership]. *Management Review*, *5*(28), 96-106.
Feng, G. F. (2004). 双重委托代理理论:上市公司治理的另一种分析框架——兼论进一步完善中国上市公司治理的新思路 [Double principal-agent theory: Another analysis framework of listed companies' governance]. *Economic Research Journal*, (12), 16-25.
Feng, W. H. (2009). *The causal analysis and countermeasure study of the difficulty on Chinese family business financing* [Master's thesis]. Jilin University.
Fitz-Koch, S., & Nordqvist, M. (2017). The reciprocal relationship of innovation capabilities and socioemotional wealth in a family firm. *Journal of Small Business Management*, *55*(4), 547-570.
Flamholtz, E. G., & Randle, Y. (2007). *Growing pains: transitioning from an entrepreneurship to a professionally managed firm*. John Wiley & Sons.
Forcadell, F. J., Úbeda, F., & Zúñiga-Vicente, J. Á. (2018). Initial resource heterogeneity differences between family and non-family firms: Implications for resource acquisition and resource generation. *Long Range Planning*, *51*(5), 693-719.
Francis, B. D. (1999). Using learning networks to help improve manufacturing competitiveness. *Technovation*, *19*, 373-381.
Franks, J., Mayer, C., Volpin, P., & Wagner, H. F. (2012). The life cycle of family ownership: International wvidence. *The Review of Financial Studies*, *25*(6), 1675-1712.
Freeman, C. (1995). The national system of innovation in historical perspective. *Cambridge Journal of Economics*, *19*, 5-24.
Gedajlovic, E., Lubatkin, M., & Schulze, W. (2004). Crossing the threshold from founder management to professional management: A governance perspective. *Journal of Management Studies*, *41*, 899-912.
Gersick, K., Lansberg, I., Desjardins, M., & Dunn, B. (2004). Stages and transitions: Managing change in the family business. *Family Business Review*, *12*, 287-297.
Gomez-Mejia, L., Campbell, J., Martin, G., Hoskisson, R., Makri, M., & Sirmon, D. (2013). Socioemotional wealth as a mixed gamble: Revisiting family firm R&D investments with the behavioral agency model. *Entrepreneurship Theory and Practice*, *38*(6), 1351-1374.
Gomez-Mejia, L., Cruz, C., Berrone, P., & Castro, J. (2011). The bind that ties: Socioemotional wealth preservation in family firms. *The Academy of Management Annals*, *5*, 653-707.
Gomez-Mejia, L., Haynes, K., Núñez-Nickel, M., Jacobson, K. J. L., & Moyano-Fuentes, J. (2007). Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills. *Administrative Science Quarterly*, *52*, 106-137.
Gomez-Mejia, L., Larraza-Kintana, M., & Makri, M. (2003). The determinants of executive

compensation in family-controlled public corporations. *Academy of Management Journal*, *46*, 226-237.

Gomez-Mejia, L., Makri, M., & Larraza-Kintana, M. (2010). Diversification decisions in family-controlled firms. *Journal of Management Studies*, *47*, 223-252.

Gu, Q., Deng, D. Q., & Lu, Q. (2006). 现金流权与控制权分离下的公司价值——基于我国家族上市公司的实证研究 [Corporate value of separating cash-flow rights from control: Empirical study on family owned public firms in China]. *Accounting Research*, (4), 30-36.

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.

Hall, A., & Nordqvist, M. (2008). Professional management in family businesses: Toward an extended understanding. *Family Business Review*, *21*, 51-69.

Hall, H. B., & Harhoff, D. (2012). Recent research on the economics of patent *Annual Review of Economics*, *4*(1), 541-565.

Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, *9*(2), 193-206.

Holland, P. G., & Oliver, J. (1992). An empirical examination of the stages of development of family business. *Journal of Business and Entrepreneurship*, *4*, 27.

Holmström, B. (1979). Moral hazard and observability. *The Bell Journal of Economics*, *10*(1), 74-91.

Jaffee, D. M., & Russell, T. (1976). Imperfect information, uncertainty, and credit rationing. *The Quarterly Journal of Economics*, *90*(4), 651-666.

Jaskiewicz, P., Block, J. H., Miller, D., & Combs, J. G. (2017). Founder versus family owners' impact on pay dispersion among non-CEO top managers: Implications for firm performance. *Journal of Management*, *43*(5), 1524-1552.

Jaskiewicz, P., & Dyer, G. W. (2017). Addressing the elephant in the room disentangling family heterogeneity to advance family business research. *Family Business Review*, *30*(2), 111-118.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305-360.

Jensen, M. C., & Murphy, K. J. (1990). Performance pay and top-management incentives. *Journal of Political Economy*, *98*(2), 225-264.

Kammerlander, N. (2022). Family business and business family questions in the 21st century: Who develops SEW, how do family members create value, and who belongs to the family? *Journal of Family Business Strategy*, *13*(2), 100-147.

Kotlar, J., & De Massis, A. (2013). Goal setting in family firms: Goal diversity, social interactions, and collective commitment to family-centered goals. *Entrepreneurship Theory and Practice*, *37*(6), 1263-1288.

Kowalewski, O., Talavera, O., & Stetsyuk, I. (2010). Influence of family involvement in management and ownership on firm performance: Evidence from Poland. *Family Business Review*, *23*(1), 45-59.

LaPorta, R., Lopez-De-Silanes, F., & Shleifer, A. (1999). Corporate ownership around the world. *The Journal of Finance*, *54*(2), 471-517.

LaPorta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and finance. *Journal of Political Economy*, *106*(6), 1113-1155.

Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*, *27*(2), 131-150.

Li, X. C., Han, J., & Li, W. W. (2015). 传承还是另创领地?——家族企业二代继承的权威合法性建构 [Is it succession of the family business or creating other field? The construction of the authority legitimacy of the second generation succession of the family business].

Journal of Management World, (6), 110-124.

Li, X. C., He, X., & Chen, W. T. (2008). 战略创业与家族企业创业精神的传承——基于百年老字号李锦记的案例研究 [Starting an undertaking in terms of strategy, and the succession of entrepreneurialism of clannish firms: A case study based on Lee Kum Kee—a century-old shop]. *Journal of Management World*, (10), 127-140.

Li, X. C., Ye, W. P., & Zhu, H. (2016). 牢笼的束缚与抗争:地区关系文化与创业企业的关系战略 [Trapped in or free from the cage: The relationship between regional guanxi culture and guanxi strategy of entrepreneurial firms]. *Journal of Management World*, (10), 88-102.

Liang, Q., Li, X. C., Yang, X. R., Lin, D. M., & Zheng, D. H. (2013). How does family involvement affect innovation in China? *Asia Pacific Journal of Management*, *3*, 677-695.

Liang, X. Y., Wang, L. H., & Cui, Z. Y. (2014). Chinese private firms and internationalization: Effects of family involvement in management and family ownership. *Family Business Review*, *27*(2), 126-141.

Litz, R. A. (1995). The family business: Toward definitional clarity. *Family Business Review*, *8*(2), 71-81.

Lumpkin, G., Brigham, K., & Moss, T. (2010). Long-term orientation: Implications for the entrepreneurial orientation and performance of family businesses. *Entrepreneurship and Regional Development*, *22*, 241-264.

Luo, R., & Chung, C.-N. (2012). Filling or abusing the institutional void? Ownership and management control of public family businesses in an emerging market. *Organization Science*, *24*, 591-613.

Matzler, K., Veider, V., Hautz, J., & Stadler, C. (2014). The impact of family ownership, management, and governance on innovation. *Journal of Product Innovation Management*, *32*(3), 319-333.

Miller, D., & Breton-Miller, I. (2006). Family governance and firm performance: Agency, stewardship, and capabilities. *Family Business Review*, *19*, 73-87.

Miller, D., Le Breton-Miller, I., Amore, M. D., Minichilli, A., & Corbetta, G. (2017). Institutional logics, family firm governance and performance. *Journal of Business Venturing*, *32*(6), 674-693.

Miller, D., Le Breton-Miller, I., Minichilli, A., Corbetta, G., & Pittino, D. (2013). When do non-family CEOs outperform in family firms? Agency and behavioral agency perspectives. *Journal of Management Studies*, *51*, 547-572.

Ming, Y. J., Cheng, Z. J., & Li, R. (2016). 家族涉入与企业技术创新 [Family involvement and firm technological innovation]. *Foreign Economics & Management*, *3*(38), 86-98.

Mirrlees, J. A. (1976). The optimal structure of incentives and authority within an organization. *The Bell Journal of Economics*, *7*(1), 105-131.

Morck, R., & Yeung, B. (2003). Agency problems in large family groups. *Entrepreneurship Theory and Practice*, *27*, 367-382.

Morck, R., & Yeung, B. (2003). Family control and the rent-seeking society. *Entrepreneurship Theory and Practice*, *28*(4), 391-409.

Neubaum, D., Kammerlander, N., & Brigham, K. (2019). Capturing family firm heterogeneity: How taxonomies and typologies can help the field move forward. *Family Business Review*, *32*, 106-130.

Nordqvist, M., Sharma, P., & Chirico, F. (2014). Family firm heterogeneity and governance: A configuration approach. *Journal of Small Business Management*, *52*(2), 192-209.

North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.

Pan, B. S. (1998). 乡镇企业中的家族经营问题——兼论家族企业在中国的历史命运 [Family business issues in township enterprises: A discussion on the historical destiny of

family enterprises in China]. *China Rural Survey*, (01), 14-20.
Ross, S. A. (1973). The economic theory of agency: the principal's problem. *The American Economic Review*, *63*(2), 134-139.
Rothschild, M., & Stiglitz, J. E. (1984). Equilibrium unemployment as a worker displine device. *American Economic Review*, *74*(3), 433-444.
Royer, S., Simons, R., Boyd, B., & Rafferty, A. (2008). Promoting family: A contingency model of family business succession. *Family Business Review*, *21*(1), 15-30.
Schmid, T., Achleitner, A. K., Ampenberger, M., & Kaserer, C. (2014). Family firms and R&D behavior – New evidence from a large-scale survey. *Research Policy*, *43*(1), 233-244.
Schulze, W., & Gedajlovic, E. (2010). Whither family business? *Journal of Management Studies*, *47*, 191-204.
Schulze, W., Lubatkin, M., & Dino, R. (2001). Agency relationships in family firms: Theory and evidence. *Organization Science*, *12*, 99-116.
Schulze, W., Lubatkin, M., & Dino, R. (2002). Altruism, agency and the competitiveness of family firms. *Managerial and Decision Economics*, *23*, 247-259.
Schulze, W., Lubatkin, M. H., & Dino, R. N. (2003). Toward a theory of agency and altruism in family firms. *Journal of Business Venturing*, *18*(4), 473-490.
Schumpeter, P. (1982). *The theory of economic development*. Transaction Publishers.
Shao, C. L. (2015). 法治环境、所有制差异与债务融资成本——来自中国工业企业的微观证据 [Environment of rule of law, different enterprises ownership and the cost of debt financing: Microscopic evidence from Chinese industrial enterprises]. *Zhejiang Social Sciences*, (9), 19-31.
Songini, L., & Gnan, L. (2014). Family involvement and agency cost control mechanisms in family small and medium-sized enterprises. *Journal of Small Business Management*, *53*(3), 748-775.
Spence, M. (1973). Job market signaling. *Quarterly Journal of Economics*, *87*(3), 355-374.
Stewart, A., & Hitt, M. (2011). Why can't a family business be more like a nonfamily business? *Family Business Review*, *25*(1), 58-86.
Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, *71*(3), 393-410.
Su, W., & Lee, C. Y. (2012). Effects of corporate governance on risk taking in Taiwanese family firms during institutional reform. *Asia Pacific Journal of Management*, *30*, 336-384.
Su, Z. F., Xie, E., & Sun, Y. F. (2006). 环境的包容性和复杂性对战略柔性实施效果的影响研究 [Study on the influence of environmental munificence and complexity on the effect of strategic flexibility]. *Science of Science and Management of S.& T.*, (9), 119-123.
Sun, Z. B. (1995). 家族主义与现代台湾企业 [Familialism and modern Taiwanese enterprises]. *Sociological Studies*, (5), 56-65.
Tsao, S. M., Lin, C. H., & Chen, V. Y. S. (2015). Family ownership as a moderator between R&D investments and CEO compensation. *Journal of Business Research*, *68*(3), 599-606.
Villalonga, B., & Amit, R. (2006). How do family ownership, control and management affect firm value? *Journal of Financial Economics*, *80*(2), 385-417.
Wang, M. L., Xu, M. N., & Wang, H. S. (2014). 利他行为能够降低代理成本吗?——基于家族企业中亲缘利他行为的实证研究 [Does altruistic behavior reduce the agency cost? An empirical study based on kin altruistic behavior in family business]. *Economic Research Journal*, *3*(49), 144-157.
Wang, M. L., & Zhou, S. C. (2006). 控制性家族类型、双重三层委托代理问题与企业价值 [Controlling family types, dual three-layer principal-agent problems, and corporate value]. *Journal of Management World*, (8), 83-93.
Wang, X. L. (2019, December, 7). *Marketization reform and economic growth*. 17th China

Reform Forum, Beijing, China.

Williams, R. I., Pieper, T. M., Kellermanns, F. W., & Astrachan, J. H. (2019). Family business goal formation: A literature review and discussion of alternative algorithms. *Management Review Quarterly*, *69*(3), 329-349.

Wolfe, A. B. (1943). Review of capitalism, socialism, and democracy. *Political Science Quarterly*, *58*(2), 265-267.

Wu, B. D., Wang, Z. W., Cheng, S. H., & Zhu, J. A. (2017). 目标兼容性、投资视野与家族控制:以研发资金配置为例 [Compatibility goal, investment horizon, and family control: Evidence from R&D fund allocation]. *Journal of Management World*, (2), 109-119.

Yan, R. S., & Ye, Y. L. (2014). 家族所有权、家族管理涉入与企业 R&D 投入水平——基于社会情感财富的分析视角 [Family ownership, family involvement in management and the level of enterprise R&D investment: From the perspective of socioemotional wealth]. *Business and Management Journal*, *12*(36), 51-61.

Yang, X. R., & Li, X. C. (2009). 家族涉入指数的构建与测量研究 [Research on the construction and measurement of family involvement index]. *China Industrial Economics*, (5), 97-107.

Zattoni, A., Gnan, L., & Huse, M. (2015). Does family involvement influence firm performance? Exploring the mediating effects of board processes and tasks. *Journal of Management*, *41*(4), 1214-1243.

Zellweger, T., Nason, R., Nordqvist, M., & Brush, C. (2011). Why do family firms strive for nonfinancial goals? An organizational identity perspective. *Entrepreneurship Theory and Practice*, *37*, 229-248.

Zhang, J. J., & Ma, H. (2009). Adoption of professional management in Chinese family business: A multilevel analysis of impetuses and impediments. *Asia Pacific Journal of Management*, *26*, 119-139.

Zhang, J. J., & Zhang, R. L. (2016). 董事长—总经理的异质性、权力差距和融洽关系与组织绩效——来自上市公司的证据 [Chairman-CEO heterogeneity, power differential, rapport and organizational performance]. *Journal of Management World*, (1), 110-120.

Zhang, N., & Li, X. (2017). 家族涉入与上市公司创新行为关系研究——来自我国家族上市公司的经验数据 [A study on the relationship between family involvement and innovation behavior of listed companies: Evidence from family listed companies in China]. *Shandong Social Sciences*, (5), 178-183.

Zhang, S. B., & Zhang, Z. X. (2012). 区域制度差异,CEO 管理自主权与企业风险承担——中国 30 省高技术产业的证据 [Regional institutions disparity, CEO managerial discretion and firm risk taking: Evidence from China high-tech firms across 30 provinces]. *Journal of Management World*, (4), 101-114.

Zhang, Y. F., He, X. L., & Lian, Y. L. (2013). “富则思安”吗?——基于中国民营上市公司的实证分析 [Does wealth accumulation lead to strategy persistence? A case study based on China’s private listed companies]. *Journal of Management World*, (7), 130-144.

Zhou, L. X. (2018). 家族企业创业导向与企业成长:社会情感财富与制度环境的调节作用 [Entrepreneurial orientation and growth of family firms: the moderating role of social emotional wealth and institutional environment]. *Science & Technology Progress and Policy*, *2*(35), 90-95.

Zhu, F. F. (2018). 高管薪酬激励、可用冗余和研发投入——兼谈高管团队稳定的情境影响 [Executive compensation incentives, available slack and R&D investment: Also a discussion of situational impact of TMT stability]. *Science of Science and Management of S.& T.*, *9*(39), 120-136.

Zhu, K., Eric, K., & Zhu, Y. H. (2016). 社会情感财富抑制了中国家族企业的创新投入吗?

[Does social emotional wealth suppress the innovation investment of Chinese family businesses?]. *Journal of Management World*, (3), 99-114.

Zou, G. Q., & Ni, C. H. (2010). 经济转型中的政治关联与企业绩效:基于我国上市公司的实证研究 [Political connections and corporate performance in economic transformation: An empirical study based on listed companies in China]. *Modernization of Management*, (3), 42-43.